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Intertek Material Safety Data Sheet (REVIEW)
Sep-15-2010
NB293TCP

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
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STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Company: ZHEJIANG KELI PRINTING NEW TECHNOLOGY
DEVELOP CO., LTD
Address:
No.20, Lingjiang Road, Lingjiang
Industrial Zone, Longyou,
Zhejiang, China

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

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Section 2 - HAZARDS IDENTIFICATION

RISK

May cause SENSITIZATION by skin contact.

May cause fire.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

• Although ingestion is not thought to produce harmful effects, the material may still be damaging to the health of the individual following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE

• Although the material is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterized by tearing or conjunctival redness (as with windburn).

SKIN

• The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

• The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS

• Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	2082-79-3	5
water	7732-18-5	5
sorbitan monooleate, ethoxylated	9005-65-6	75
carbon black	1333-86-4	15

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Center or a doctor.

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.

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Section 4 - FIRST AID MEASURES

- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):

Upper Explosive Limit (%):

Specific Gravity (water=1):

Lower Explosive Limit (%):

EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible solid which burns but propagates flame with difficulty.
 - Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion.
Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
 - Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
 - Build-up of electrostatic charge may be prevented by bonding and grounding.
 - Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.
- May emit poisonous fumes.
- May emit corrosive fumes.

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Section 5 - FIRE FIGHTING MEASURES

A fire in bulk finely divided carbon may not be obviously visible unless the material is disturbed and sparks appear. A straw broom may be useful to produce the disturbance. Explosion and Ignition Behaviour of Carbon Black with Air

Lower Limit for Explosion:	50 g/m3 (carbon black in air)
Maximum Explosion Pressure:	10 bar
Maximum Rate of Pressure Rise:	30- 100 bar/sec
Minimum Ignition Temperature:	315 deg. C.
Ignition Energy:	>1 kJ
Glow Temperature:	500 deg. C. (approx.)

Notes on Test Methods:

Tests 1, 2 and 3 were conducted by Bergwerkeschaftliche Versuchsstrecke, Dortmunde-Derne, using a 1 m3 vessel with two chemical igniters having an intensity of 5000 W.S.

Tests 1 and 2 results are confirmed by information in the Handbook of Powder Technology, Vol. 4 (P. Field)

In Test 4, a modified Godbert-Greenwald furnace was used. See U.S. Bureau of Mines, Report 5624, 1960, p.5, "Lab Equipment and Test Procedures".

Test 5 used a 1 m3 vessel with chemical igniters of variable intensity.

Test 6 was conducted in a laboratory oven. Active glowing appeared after 3 minutes exposure.

(European Committee for Biological Effects of Carbon Black) (2/84).

FIRE INCOMPATIBILITY

• Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Respirator:

Type ANO- P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

MAJOR SPILLS

- Moderate hazard.
- CAUTION: Advise personnel in area.
- Alert Emergency Responders and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.
- Recover product wherever possible.
- IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
- ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

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Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

• NOTE:

- Wet, activated carbon removes oxygen from the air thus producing a severe hazard to workers inside carbon vessels and in enclosed or confined spaces where activated carbons might accumulate.
- Before entry to such areas, sampling and test procedures for low oxygen levels should be undertaken; control conditions should be established to ensure the availability of adequate oxygen supply.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	Peak mg/m ³	Notes
Canada - British Columbia Occupational Exposure Limits	3, 5- bis(butyl)- 4-hydroxyhydrocinnamic stearate (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))				DataAvailab leButBlank	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	3, 5- bis(butyl)- 4-hydroxyhydrocinnamic stearate (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5			
Canada - British Columbia Occupational Exposure Limits	carbon black (Carbon black)				DataAvailab leButBlank	2B
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	carbon black (Carbon black)	-		-		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	carbon black (Carbon black)		3.5			
The following materials had no OELs on our records						
• water:			CAS:7732- 18- 5			
• sorbitan monooleate, ethoxylated:			CAS:9005- 65- 6			

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m ³)	Revised IDLH Value (ppm)
carbon black	1, 750	

MATERIAL DATA

INK - BLACK:
 Not available

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

• It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

WATER:

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- No exposure limits set by NOHSC or ACGIH.

SORBITAN MONOOLEATE, ETHOXYLATED:

SORBITAN MONOOLEATE, ETHOXYLATED:

• Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

CARBON BLACK:

• The TLV-TWA for carbon black is recommended to minimise complaints of excessive dirtiness and applies only to commercially produced carbon blacks or to soots derived from combustion sources containing absorbed polycyclic aromatic hydrocarbons (PAHs). When PAHs are present in carbon black (measured as the cyclohexane-extractable fraction) NIOSH has established a REL-TWA of 0.1 mg/m³ and considers the material to be an occupational carcinogen.

The NIOSH REL-TWA was "selected on the basis of professional judgement rather than on data delineating safe from unsafe concentrations of PAHs".

This limit was justified on the basis of feasibility of measurement and not on a demonstration of its safety.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

HANDS/FEET

- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
 - frequency and duration of contact,
 - chemical resistance of glove material,
 - glove thickness and

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.

- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.

- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly.

Application of a non-perfumed moisturiser is recommended.

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.

- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).

- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.

- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.

- Use approved positive flow mask if significant quantities of dust becomes airborne.

- Try to avoid creating dust conditions.

RESPIRATOR

• Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	ANO- 1 P	-
1000	50	-	ANO- 1 P
5000	50	Airline*	-
5000	100	-	ANO- 2 P
10000	100	-	ANO- 3 P
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

- Exhaust ventilation should be designed to prevent accumulation and recirculation in the workplace and safely remove carbon black from the air.

Note: Wet, activated carbon removes oxygen from the air and thus presents a severe hazard to workers inside carbon vessels and enclosed or confined spaces. Before entering such areas sampling and test procedures for low oxygen levels should be undertaken and control conditions set up to ensure ample oxygen availability.[Linde].

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:
 - (a): particle dust respirators, if necessary, combined with an absorption cartridge;
 - (b): filter respirators with absorption cartridge or canister of the right type;
 - (c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

State	Molecular Weight	
Melting Range (°F)	Viscosity	Not available
Boiling Range (°F)	Solubility in water (g/L)	
Flash Point (°F)	pH (1% solution)	
Decomposition Temp (°F)	pH (as supplied)	
Autoignition Temp (°F)	Vapour Pressure (mmHG)	
Upper Explosive Limit (%)	Specific Gravity (water=1)	
Lower Explosive Limit (%)	Relative Vapor Density (air=1)	
Volatile Component (%vol)	Evaporation Rate	

Material	Value
3, 5- BIS(BUTYL)- 4- HYDROXYHYDROCINNAMIC STEARATE:	
log Kow >6 (20- 25 C)	

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

No data for this material.

STORAGE INCOMPATIBILITY

- Avoid oxidizing agents, reducing agents.

Reaction with finely divided metals, bromates, chlorates, chloramine monoxide, dichlorine oxide, iodates, metal nitrates, oxygen difluoride, peroxyformic acid, peroxyfuroic acid and trioxxygen difluoride may result in an exotherm with ignition or explosion. Less active forms of carbon will ignite or explode on suitably intimate contact with oxygen, oxides, peroxides, oxosalts, halogens, interhalogens and other oxidizing species.

Explosive reaction with ammonium nitrate, ammonium perchlorate, calcium hypochlorite and iodine pentoxide may occur following heating. Carbon may react violently with nitric acid and may be explosively reactive with nitrogen trifluoride at reduced temperatures. In the presence of nitrogen oxide, incandescence and ignition may occur. Finely divided or highly porous forms of carbon, exhibiting a high surface area to mass (up to 2000 m2/g) may function as unusually active fuels possessing both adsorptive and catalytic properties which accelerate the release of energy in the presence of oxidizing substances. Dry metal-impregnated charcoal catalysts may generate sufficient static, during handling, to cause ignition.

Graphite in contact with liquid potassium, rubidium or caesium at 300 deg. C. produces intercalation compounds (C8M) which ignite in air and may react explosively with water. The fusion of powdered diamond and potassium hydroxide may produce explosive decomposition.

Activated carbon, when exposed to air, represents a potential fire hazard due to a high surface area and adsorptive capacity. Freshly prepared material may ignite spontaneously in the presence of air especially at high humidity. Spontaneous combustion in air may occur at 90-100 deg. C. The presence of moisture in air facilitates the ignition. Drying oils and oxidizing oils promote spontaneous heating and ignition; contamination with these must be avoided. Unsaturated drying oils (linseed oil etc.) may ignite following adsorption owing to an enormous increase in the surface area of oil exposed to air; the rate of oxidation may also be catalyzed by metallic impurities in the carbon. A similar, but slower effect occurs on fibrous materials such as cotton waste. Spontaneous heating of activated carbon is related to the composition and method of preparation of the activated carbon. Free radicals, present in charcoal, are responsible for autoignition. Self-heating and autoignition may also result from adsorption of various vapors and gases (especially oxygen). For example, activated carbon auto-ignites in flowing air at 452-518 deg. C.; when the

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Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

base, triethylene-diamine, is adsorbed on the carbon (5%) the autoignition temperature is reduced to 230-260 deg. C.. An exotherm is produced at 230-260 deg. C., at high flow rates of air, although ignition did not occur until 500 deg. C.. Mixtures of sodium borohydride with activated carbons, in air, promote the oxidation of sodium borohydride, producing a self-heating reaction that may result in the ignition of charcoal and in the production of hydrogen through thermal decomposition of the borohydride.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

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TOXICITY AND IRRITATION

SORBITAN MONOOLEATE, ETHOXYLATED:

CARBON BLACK:

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

• unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

• Not available. Refer to individual constituents.

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

TOXICITY

Oral (rat) LD50: >10000 mg/kg *

Inhalation (rat) LCLo: >1.3 mg/l/4h * *Ciba-Geigy

Dermal (rat) LD50: >2000 mg/kg *

Intraperitoneal (rat) LD50: >1000 mg/kg *

Inhalation (Rat) LC50: >1800 mg/m³

• Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

For hindered phenols:

Acute oral and dermal toxicity data are available for all but two of the substances in the group. The data show that acute

toxicity of these substances is low.

Mutagenicity. Data from bacterial reverse mutation assays and in vitro and in vivo chromosome aberration studies were reviewed. All assays, with and without metabolic activation, were negative. The weight of evidence for mutagenic potential for this category indicates these substances are not mutagenic.

In Vitro Chromosome Aberration Studies. In vitro chromosome aberration studies are available for several members. All except 2,6-di-tert-butyl-p-cresol were negative.

In Vivo Chromosome Aberration Studies. In vivo studies evaluating chromosome damage are available for six of the hindered phenols. All in vivo evaluations were negative.

Repeated Dose Toxicity. Repeated dose toxicity data of approximately three months (90-day, 12- and 13-week) are available for most of the substances in this group. The liver was the target organ in rats for almost all of the substances with subchronic toxicity data in that species. Other target organs included thyroid and kidney and mesenteric lymph nodes. NOAELs in rats ranged from 100 ppm (approximately 5 mg/kg/day) to 10,000 ppm (500 mg/kg/day).

Carcinogenicity: Data is available for 2,6-di-tert-butyl-p-cresol (128-37-0); and 4,4'-thiobis-6-(t-butyl-m-cresol) (96-69-5). Liver adenomas were reported for 2,6-di-tert-butyl-p-cresol (128-37-0) and a NOAEL was established for the study at 25 mg/kg/day. 4,4'-Thiobis-6-(t-butyl-m-cresol) (96-69-5) was not carcinogenic in rats or mice, but the kidney was identified as a target organ in female rats.

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Section 11 - TOXICOLOGICAL INFORMATION

For 3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate

Teratogenicity/Reproductive Toxicity:

2-Generation study (Rats): The test substance was fed in the diet at concentrations of 0, 500, 1,500 and 5,000 ppm. Treatment of the F0 males and females began when they were six weeks of age, and continued until all F1 litters had been weaned. Direct treatment of the F1 males and females began when they were 4 weeks of age, and continued until all F2 litters had been weaned. Findings at 5,000 ppm among adults of both generations (F0 and F1) that appeared to be treatment-related were as follows: a. Slight reductions in food consumption, weekly weight gain and weight gain of females during pregnancy. b. Statistically significant increases in liver weight and reduction in spleen weight. Histological examination of livers from F1 adult animals showed minimal centrilobular hepatocyte enlargement. c. In the F0 generation, initial litter size was reduced. Post-partum pup loss was increased and pup weight gain reduced. d. In the F1 generation initial litter size was again reduced. There was no pup loss. Pup-weight gain was slightly lower than among control animals despite the smaller litter size and hence reduced intra-litter competition. Organ weight analyses of selected F1 and F2 weanlings showed significantly increased liver weights and reduced spleen weights. Histological examination of these tissues from F2 weanlings showed no treatment-related changes. Mating performance, pregnancy rate and the duration of gestation at all three dietary concentrations were unaffected by treatment. The overall NOEL is below 500 ppm due to the increased liver weight and reductions in spleen weight reported among selected F1 and F2 weanlings of the intermediate and low dose group.

Segment II study (Rats): Test substance was administered by gavage to pregnant rats from day 6 to 15 of gestation, inclusive. The concentrations were 0, 150, 500 and 1,000 mg/kg. Bodyweight gain was slightly depressed in the 500 and 1,000 mg/kg dose levels and reduced feed intake was registered in a dose related fashion during the period of administration of the test substance. Retardation of physiological growth of the fetuses was recorded. No teratogenic effects were observed under the conditions of the experiment. The 150 mg/kg dose was considered to be the no observable effect level (NOEL).

Segment II study (Mice): Test substance was administered by gavage to pregnant mice from day 6 to 15 of gestation, inclusive. The concentrations were 150, 500 and 1,000 mg/kg. The average bodyweight gain as well as feed intake were comparable for all groups. There was no evidence of an adverse effect on the embryonic or fetal development in the mouse, except that, in the high-dose group, the average weight of the fetuses was found to be slightly but significantly increased when compared with the control. No teratogenic effects were observed under the conditions of the experiment. The NOEL was considered to be 500 mg/kg.

Subchronic Toxicity: (Dogs): In a 3-month toxicity study, Beagle dogs were fed a diet containing 0, 1,000, 3,000 and 10,000 ppm of the test substance. No clinical symptoms or signs of systemic toxicity were observed and no deaths occurred during the experiment. Ophthalmic inspection, hearing test, food consumption, bodyweight gain, mean food conversion, haematology, blood chemistry, gross pathology and histopathology revealed no treatment related effects. The occasionally elevated concentrations of serum bilirubin levels were not accompanied by any histopathological changes in the liver. Organ weights and ratios for the treated dogs were comparable to those of the control animals with the exception of a slightly increased incidence of higher liver weights and ratios in the dogs of the 3,000 and 10,000 ppm groups. The NOEL was concluded to be 1,000 ppm in the diet, corresponding to 31.5 - 34.5 mg/kg/day.

(Rats): The test substance was administered to rats as an aerosol (dust) for 6 hours/day, 5 days/week for 3 weeks. The animals were exposed to mean gravimetric concentrations of 23 and 543 mg/m³. There were no reactions to treatment for any of the parameters investigated. The NOEL is greater than 543 mg/m³ air for male and female rats.

Chronic Toxicity/Carcinogenicity:

(Mice): Mice were administered 0, 5, 50, 500 ppm of the test substance in the feed, corresponding to a mean daily intake of about 56 mg/kg/day for the highest dose group for 24 months. The only difference seen was reduced survival time for the high dose animals. There was no evidence of an increased tumor incidence. The NOEL was 50 ppm.

(Rats): In a 104 week/feeding study, rats were treated with the test substance in the diet at levels of 0, 500, 1,500, 5,000 ppm. Reaction to treatment at the various dietary levels was as follows: At 5,000 ppm: a. A higher survival rate among females (Mindfully note: which means a lower survival rate for males). b. An inferior bodyweight gain and reduced food intake associated with a minor impairment in the efficiency of food utilization among females. c. Increased liver and thyroid weights in males and females and decreased adrenal weights in females. At 1,500 ppm: a. A reduction in food intake among male rats between weeks 53 and 80 and among females during the first 80 weeks of treatment. b. Decreased adrenal weight in females. At 500 ppm: A reduction in food intake among male and female rats between weeks 53 and 80. There was no evidence of an increased tumor incidence. The NOEL was concluded to be 500 ppm.

Absorption/Distribution/Excretion Metabolism

10 mg/kg of radiolabeled test substance was administered by gavage to 4 albino rats after a 12-hour fast

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Section 11 - TOXICOLOGICAL INFORMATION

(water permitted). The animals were then placed in metabolism cages for 168 hours and urine and feces samples were collected. Within 0-48 hours after administration about 73% of the radioactivity was eliminated from the body. Afterwards, elimination proceeded slowly and was not fully completed at 168 hours. At that time 96% of the radioactivity was recovered (35% in the urine, 61% in the feces).

Other Toxicity Data:

4-week oral toxicity study (Young rats): Fifty young (4 week old) rats were treated by gavage with single daily doses of 0, 5, 30, 100 and 300 mg/kg of the test substance for 28 days. The liver was the target organ as indicated by a dose-dependent organ weight increase and by histopathology: at 300 mg/kg a minimal centrilobular hepatocytic hypertrophy was observed. A small number of high dose animals showed clinical chemistry changes, including elevated transaminase activities and cholesterol levels compared to control animals. The NOEL was considered to be 30 mg/kg/day.

WATER:

- No significant acute toxicological data identified in literature search.

SORBITAN MONOOLEATE, ETHOXYLATED:

TOXICITY

Oral (mouse) LD50: 25000 mg/kg

IRRITATION

Eye (rabbit): 150 mg - Mild

Skin (rabbit): - slight

- For Group D aliphatic esters:(sorbitan fatty esters)

According to a classification scheme described by the American Chemistry Council' Aliphatic Esters Panel, Group D substances are esters of monoacids, mainly common fatty acids, and sorbitan (which is derived from sorbitol - a natural carbohydrate sweetener). The fatty acids include lauric, stearic, oleic acids and cocoa fatty acids (mainly lauric and myristic acids). The hydroxy group in the sorbitan represents the alcohol portion of the ester linkage. The Group D esters are carbohydrate-derived esters since the ester linkage is connected to the hydroxy group(s) of sorbitan. They may have single ester linkages (i.e., sorbitan monoester) or may have multiple ester linkages, as in the case of sorbitan sesquioleate and sorbitan trioleate. Multiple ester linkages with long-chain fatty acids increase lipophilicity and also tend to diminish water solubility. The sorbitan esters are non-ionic surfactant-active agents that typically find use as emulsifiers, stabilizers, and thickeners in foods, cosmetics and medical products.

Acute toxicity: Sorbitan esters do not represent a toxicological concern since they are derived from naturally occurring materials and the parent esters are ultimately metabolised back to these same natural constituents: namely, sorbitan and common fatty acids, both of which have low orders of toxicity. The oral LD50 in rats ranged from >2.9 g/kg to > 39.8 g/kg. Numerous sorbitan esters have been studied by acute oral and dermal administration. Results from these studies support the general conclusion that sorbitan fatty acid esters have low orders of acute toxicity.

Repeated Dose Toxicity. A large number of subchronic oral and dermal studies and chronic oral feeding studies have been carried out for sorbitan monolaurate, sorbitan monostearate and sorbitan monooleate. For sorbitan monostearate, no adverse effects were reported in rats fed 5% concentrations of the test substance in the diet for 6 weeks. The NOAEL was estimated to be 5% or approximately 2500 mg/kg/day. In 2-year feeding studies at 5, 10 and 20% in the diet rats tolerated sorbitan monostearate with no adverse effects. However, at 20%, there was a small but significant decrease on growth rate in male rats. Hence, the NOAEL was 10% in the diet or approximately 5000 mg/kg/day in rats, based on these findings. In a 80-week dietary study in mice, no adverse effects were observed for sorbitan monostearate at 2% concentration in the diet and the NOAEL was 2% or approximately 2600 mg/kg/day. Subchronic studies have also been carried out with sorbitan, fatty acids C6-10, tetraester (CAS 228573-47-5).. Oral gavage studies for 28 days at dose levels up to 1000 mg/kg /day resulted in no systemic toxicity. Therefore, the NOAEL was 1000 mg/kg/day for this tetraester.

Since the sesquioleate and trioleate of sorbitan are merely multiple ester homologs of sorbitan monooleate, they would be expected to show similar effects, given their structural similarities and potential to be metabolised to the monooleate.

Reproductive and developmental toxicity: Limited reproductive toxicity data have been reported for the sorbitan esters. In a 2-year feeding studies in rats with sorbitan monostearate, there were no effects on gestation and fertility at any dose level (0, 5, 10 and 20% in the diet) but survival of the newborn animals and maternal lactation were slightly diminished at the 20% level. Sorbitol was also studied indirectly as part of a mixture of hydrogenated starch hydrolysates (HSH) which contained about 7% sorbitol as part of the polyhydric alcohol mixture. The HSH mixture was investigated as part of a two-year ingestion study, a multigeneration reproduction study and a teratology study. At concentrations of 18% in drinking water (3000-7000 mg/kg/day), HSH did not produce reproductive or developmental effects. These results indicate that

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sorbitol does not cause reproductive/ developmental toxicity in animals. Given these findings and the low order of toxicity of natural fatty acids, it seems unlikely that sorbitan esters would present reproductive and developmental toxicity concerns.

Genotoxicity: Sorbitan monostearate (CAS 1338-41-6) was found to be negative in the Ames assay. In addition, the non-HPV substance, sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5), did not cause any mutagenic effects in the Salmonella in vitro test. These substances bridge the low and high carbon range of most of the sorbitan esters and the chemistry of the sorbitan esters (i.e., sorbitan/ sorbitol, natural fatty acids) does not suggest the likelihood that the sorbitan esters are electrophilic or reactive in nature. Thus, it is not likely that the substances in Group D cause mutagenic effects.

Sorbitan monostearate did not transform primary Syrian golden hamster embryo cells. As discussed above for point mutation, the chemistry of the sorbitan esters does not suggest the likelihood that these substances, or their constituent substructures (i.e., sorbitol, fatty acids) are reactive or electrophilic in nature.

CARBON BLACK:

TOXICITY

Inhalation (rat) TCl₀: 50 mg/m³/6h/90D- I

Inhalation (rat) TCl₀: 7 mg/m³

Dermal (rabbit) LD₅₀: >3000 mg/kg

IRRITATION

Nil Reported

• WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

CARCINOGEN

Carbon black	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
Carbon black	ND	Carcinogen Category	A4
CARBON BLACK	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
CARBON BLACK	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
Carbon black	ND	Carcinogen	Ca

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

• Very toxic to aquatic organisms.

• Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

• For hindered phenols:

The hindered phenols in this category consist of a group of chemicals in which a molecule of phenol (hydroxybenzene) has multiple substitutions on the aromatic ring with relatively large aliphatic and/or aromatic groups. At least one of the groups is adjacent to the hydroxyl group (the 2-, or ortho- position). Due to the bulky substituent groups, the substances, which may be either room temperature solids or liquids, have limited water solubility, high partition coefficients and are not readily biodegradable. The vapor pressure of these chemicals is low.

Environmental fate:

Fate and Transport Characteristics. Experimental data show that hindered phenols are not readily biodegradable. With one exception, the low water solubility of these chemicals precludes experimentally obtaining hydrolysis data. Model derived photodegradation indicates that these substances photodegrade

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Section 12 - ECOLOGICAL INFORMATION

rapidly. Fugacity modeling shows that, generally, partitioning would be to soil and sediments rather than air or water.

Ecotoxicity:

Aquatic Toxicology. Hindered phenols have low water solubility and, therefore, low aquatic toxicity.

Experimental data are available on acute fish toxicity, acute invertebrate toxicity, and alga toxicity for the majority of chemicals in this category.

One chronic ecotoxicity test is available for butylated hydroxytoluene (BHT) (Daphnia magna NOEC 0.07 mg/l) hence BHT may fulfil the T criterion (for PBT substances) as a borderline case.

For 3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate

log Kow >6 (20-25 C)

COD 2.52/g

Partially but not readily biodegradable.

Inherently degradable in a combined Zahn-wellens carbon dioxide evolution test.

Fish LC50 (96 h): rainbow trout >100 mg/l

Daphnia EC50: >100 mg/l

Bacteria IC50 (3 h): >100 mg/l (sewage sludge)

Algae EC50 (72 h): Scenedesmus spp >30 mg/l

Sewage bacteria IC20, IC50, IC80 >100 ppm

No effects at the highest concentration tested. The tested concentration is well above its water solubility.

SORBITAN MONOOLEATE, ETHOXYLATED:

Refer to data for ingredients, which follows:

SORBITAN MONOOLEATE, ETHOXYLATED:

• For Group D aliphatic esters:(sorbitan fatty esters)

Environmental fate:

The chain-length of the fatty acid in the sorbitan monoesters influences water solubility, boiling point and lipophilicity. The degree of esterification (monooleate versus trioleate) will also influence these properties. Hence, the water solubility of sorbitan monolaurate (C12 acid) (CAS 1338-39-2) is predicted to be much greater than that of sorbitan monostearate or sorbitan monooleate (C18 acids). The monooleate was predicted to have greater solubility in water than the corresponding sesquioleate or trioleate ester of sorbitan.

Biodegradation:

The biodegradation of sorbitan monolaurate, sorbitan monooleate and sorbitan, fatty acid C6-10 tetraester (CAS 228573-47-5), has been reported. These three sorbitan esters were biodegraded to the extent of 60-70% in 28-days, which indicate these materials undergo metabolism and degradation extensively in the aerobic environment. The sorbitan esters tested covered the range of carbon numbers (C18-C38) and included relatively water soluble (i.e., sorbitan monolaurate) as well as water-insoluble [i.e., sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5)] members of the group. The high degree of biodegradation (70% in 28 days) for sorbitan tetraester (CAS 228573-47-5), in spite of its poor water solubility, indicates that enzymatic cleavage of the multiple ester linkage must be taking place in order to achieve the observed level of biodegradation. This would be consistent with the fact that fatty acids (e.g., oleic, stearic acid) arising from enzymatic ester bond cleavage of the sorbitan esters would be expected to be rapidly biodegraded. In addition, enzymatic ester cleavage of sorbitan trioleate and sesquioleate would lead to sorbitan monooleate, for which biodegradation data exist. Thus, there is sufficient information to head-across?for the other sorbitan esters, based on the available data and the similarities in chemistry and metabolism.

Ecotoxicity:

Aquatic toxicity data have been reported for the sorbitan esters. Sorbitan monolaurate and sorbitan monooleate have been tested. In addition sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5), has also been evaluated in fish, daphnia and algae. These findings indicate that the sorbitan esters are not acutely toxic to aquatic organisms. The available data covered the range of water-soluble (e.g., monolaurate) and water-insoluble sorbitan esters (e.g., C6-C10 acid tetraester). Most of the sorbitan esters have limited water solubility and for this reason are not likely to cause acute aquatic toxicity. In addition, metabolism of sorbitan sesquioleate and sorbitan trioleate will generate sorbitan monooleate, for which aquatic toxicity data exist. Thus, there is sufficient information to head-across?for the other sorbitan esters, based on the available data and chemical similarities of sorbitan esters in general.

• Octanol/ water partition coefficients cannot easily be determined for surfactants because one part of the molecule is hydrophilic and the other part is hydrophobic. Consequently they tend to accumulate at the interface and are not extracted into one or other of the liquid phases. As a result surfactants are expected

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to transfer slowly, for example, from water into the flesh of fish. During this process, readily biodegradable surfactants are expected to be metabolized rapidly during the process of bioaccumulation. This was emphasized by the OECD Expert Group stating that chemicals are not to be considered to show bioaccumulation potential if they are readily biodegradable. Several anionic and nonionic surfactants have been investigated to evaluate their potential to bioconcentrate in fish. BCF values (BCF - bioconcentration factor) ranging from 1 to 350 were found. These are absolute maximum values resulting from the radio labeling technique used. In all these studies, substantial oxidative metabolism was found resulting in the highest radioactivity in the gall bladder. This indicates liver transformation of the parent compound and biliary excretion of the metabolized compounds, so that "real" bioconcentration is overstated. After correction it can be expected that "real" parent BCF values are one order of magnitude less than those indicated above, i.e. "real" BCF is <100. Therefore the usual data used for classification by EU Directives to determine whether a substance is "Dangerous to the Environment" has little bearing on whether the use of the surfactant is environmentally acceptable.

- DO NOT discharge into sewer or waterways.

CARBON BLACK:

- DO NOT discharge into sewer or waterways.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	HIGH		LOW	LOW
water	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

? Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

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Section 15 - REGULATORY INFORMATION



REGULATIONS

Regulations for Ingredients

3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate (CAS: 2082-79-3) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US EPA High Production Volume Program Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Inventory of Effective Food Contact Substance Notifications", "US Toxic Substances Control Act (TSCA) - Inventory"

water (CAS: 7732-18-5) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Pennsylvania - Hazardous Substance List", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (a) Inventory Update Rule (IUR) - Partial Exemptions"

sorbitan monooleate, ethoxylated (CAS: 9005-65-6) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Food Additive Database", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory"

carbon black (CAS: 1333-86-4) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Carcinogens", "US - California Proposition 65 - Priority List for the Development of NSRLs for Carcinogens", "US - California Toxic Air Contaminant List Category IV", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Maine Chemicals of High Concern List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ACGIH Threshold Limit Values (TLV) - Notice of Intended Changes", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Program Chemical List", "US FDA CFSAN Color Additive Status List 4", "US FDA CFSAN Color Additive Status List 6", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Inventory"

No data for INK - BLACK (CW: 1009154)

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Ingestion may produce health damage*.
- Cumulative effects may result following exposure*.
- May produce discomfort of the eyes*.
- Limited evidence of a carcinogenic effect*.
- Repeated exposure potentially causes skin dryness and cracking*.

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Section 16 - OTHER INFORMATION

* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	2082- 79- 3	Xn Mut3; R68

EXPOSURE STANDARD FOR MIXTURES

- "Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration:

- Composite Exposure Standard for Mixture (TWA) :100 mg/m³.
- Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

- For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:

OSHA Standards - 29 CFR:

1910.132 - Personal Protective Equipment - General requirements

1910.133 - Eye and face protection

1910.134 - Respiratory Protection

1910.136 - Occupational foot protection

1910.138 - Hand Protection

Eye and face protection - ANSI Z87.1

Foot protection - ANSI Z41

Respirators must be NIOSH approved.

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

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STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA**SUPPLIER**

Company: ZHEJIANG KELI PRINTING NEW TECHNOLOGY
DEVELOP CO., LTD

Address:

No.20, Lingjiang Road, Lingjiang
Industrial Zone, Longyou,
Zhejiang, China

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS**EMERGENCY OVERVIEW**

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Section 2 - HAZARDS IDENTIFICATION

RISK

May cause SENSITIZATION by skin contact.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

• Although ingestion is not thought to produce harmful effects, the material may still be damaging to the health of the individual following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE

• Although the material is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterized by tearing or conjunctival redness (as with windburn).

SKIN

• The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

• The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS

• Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	2082-79-3	5
water	7732-18-5	5
sorbitan monooleate, ethoxylated	9005-65-6	75
C.I. Pigment Blue 15	147-14-8	15

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

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Section 4 - FIRST AID MEASURES

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):

Upper Explosive Limit (%):

Specific Gravity (water=1):

Lower Explosive Limit (%):

EXTINGUISHING MEDIA

- Alcohol stable foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.
- Mists containing combustible materials may be explosive.

Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

May emit corrosive fumes.

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Section 5 - FIRE FIGHTING MEASURES

FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

PVC chemical resistant type.

Respirator:

Type ANO- P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Slippery when spilt.
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

- Chemical Class: alcohols and glycols

For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross- linked polymer - particulate	1	shovel	shovel	R, W, SS
cross- linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
sorbent clay - particulate	2	shovel	shovel	R, I, P
wood fiber - pillow	3	throw	pitchfork	R, P, DGC, RT
treated wood fiber - pillow	3	throw	pitchfork	DGC, RT
foamed glass - pillow	4	throw	pichfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross- linked polymer - particulate	1	blower	skiploader	R, W, SS
polypropylene - particulate	2	blower	skiploader	W, SS, DGC
sorbent clay - particulate	2	blower	skiploader	R, I, W, P, DGC
polypropylene - mat	3	throw	skiploader	DGC, RT

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Section 6 - ACCIDENTAL RELEASE MEASURES

expanded mineral - particulate	3	blower	skiploader	R, I, W, P, DGC
polyurethane - mat	4	throw	skiploader	DGC, RT

Legend

DGC: Not effective where ground cover is dense

R; Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT: Not effective where terrain is rugged

SS: Not for use within environmentally sensitive sites

W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.

Slippery when spilt.

Moderate hazard.

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- No smoking, naked lights or ignition sources. Increase ventilation.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Overheating of ethoxylates in air should be avoided. When some ethoxylates are heated vigorously in the presence of air or oxygen, at temperatures exceeding 160 C, they may undergo exothermic oxidative degeneration resulting in self-heating and autoignition.
- Nitrogen blanketing will minimize the potential for ethoxylate oxidation.
- Trace quantities of ethylene oxide may be present in the material. Although these may accumulate in the headspace of storage and transport vessels, concentrations are not expected to exceed levels which might produce a flammability or worker exposure hazard.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working

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Section 7 - HANDLING AND STORAGE

conditions.

RECOMMENDED STORAGE METHODS

- Glass container.
- Metal can or drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+

X

+

X

X

+

- +: May be stored together
O: May be stored together with specific precautions
X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	Peak mg/m ³
Canada - British Columbia Occupational Exposure Limits	3, 5- bis(butyl)- 4-hydroxyhydrocinnamic stearate (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))				Data Available But Blank
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	3, 5- bis(butyl)- 4-hydroxyhydrocinnamic stearate (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	C.I. Pigment Blue 15 (Copper - Fume)	-		-	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	C.I. Pigment Blue 15 (Copper - Dusts and mists (as Cu))	-		-	

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

The following materials had no OELs on our records

- water:
- sorbitan monooleate, ethoxylated:

CAS:7732- 18- 5
CAS:9005- 65- 6

MATERIAL DATA

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Not available

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

• It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

WATER:

- No exposure limits set by NOHSC or ACGIH.

SORBITAN MONOOLEATE, ETHOXYLATED:

SORBITAN MONOOLEATE, ETHOXYLATED:

• Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

HANDS/FEET

- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
 - frequency and duration of contact,
 - chemical resistance of glove material,
 - glove thickness and
 - dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly.

Application of a non-perfumed moisturiser is recommended.

Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

- Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	ANO- 1 P	-
1000	50	-	ANO- 1 P
5000	50	Airline*	-
5000	100	-	ANO- 2 P
10000	100	-	ANO- 3 P
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

- General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

"capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25- 0.5 m/s (50- 100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

State	Molecular Weight	
Melting Range (°F)	Viscosity	Not available
Boiling Range (°F)	Solubility in water (g/L)	
Flash Point (°F)	pH (1% solution)	
Decomposition Temp (°F)	pH (as supplied)	
Autoignition Temp (°F)	Vapour Pressure (mmHG)	
Upper Explosive Limit (%)	Specific Gravity (water=1)	
Lower Explosive Limit (%)	Relative Vapor Density (air=1)	
Volatile Component (%vol)	Evaporation Rate	

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Material	Value
3, 5- BIS(BUTYL)- 4- HYDROXYHYDROCINNAMIC STEARATE:	
log Kow >6 (20- 25 C)	

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

No data for this material.

STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

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TOXICITY AND IRRITATION

SORBITAN MONOOLEATE, ETHOXYLATED:

C.I. PIGMENT BLUE 15:

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

- Not available. Refer to individual constituents.

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

TOXICITY

Oral (rat) LD50: >10000 mg/kg *

Inhalation (rat) LCLo: >1.3 mg/l/4h * *Ciba-Geigy

Dermal (rat) LD50: >2000 mg/kg *

Intraperitoneal (rat) LD50: >1000 mg/kg *

Inhalation (Rat) LC50: >1800 mg/m³

• Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

For hindered phenols:

Acute oral and dermal toxicity data are available for all but two of the substances in the group. The data show that acute

toxicity of these substances is low.

Mutagenicity. Data from bacterial reverse mutation assays and in vitro and in vivo chromosome aberration studies were reviewed. All assays, with and without metabolic activation, were negative. The weight of evidence for mutagenic potential for this category indicates these substances are not mutagenic.

In Vitro Chromosome Aberration Studies. In vitro chromosome aberration studies are available for several members. All except 2,6-di-tert-butyl-p-cresol were negative.

In Vivo Chromosome Aberration Studies. In vivo studies evaluating chromosome damage are available for six of the hindered phenols. All in vivo evaluations were negative.

Repeated Dose Toxicity. Repeated dose toxicity data of approximately three months (90-day, 12- and 13-week)

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Section 11 - TOXICOLOGICAL INFORMATION

are available for most of the substances in this group. The liver was the target organ in rats for almost all of the substances with subchronic toxicity data in that species. Other target organs included thyroid and kidney and mesenteric lymph nodes. NOAELs in rats ranged from 100 ppm (approximately 5 mg/kg/day) to 10,000 ppm (500 mg/kg/day)

Carcinogenicity: Data is available for 2,6-di-tert-butyl-p-cresol (128-37-0); and 4,4'-thiobis-6-(t-butyl-m-cresol) (96-69-5). Liver adenomas were reported for 2,6-di-tert-butyl-p-cresol (128-37-0) and a NOAEL was established for the study at 25 mg/kg/day. 4,4'-Thiobis-6-(t-butyl-m-cresol) (96-69-5) was not carcinogenic in rats or mice, but the kidney was identified as a target organ in female rats.

For 3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate

Teratogenicity/Reproductive Toxicity:

2-Generation study (Rats): The test substance was fed in the diet at concentrations of 0, 500, 1,500 and 5,000 ppm. Treatment of the F0 males and females began when they were six weeks of age, and continued until all F1 litters had been weaned. Direct treatment of the F1 males and females began when they were 4 weeks of age, and continued until all F2 litters had been weaned. Findings at 5,000 ppm among adults of both generations (F0 and F1) that appeared to be treatment-related were as follows: a. Slight reductions in food consumption, weekly weight gain and weight gain of females during pregnancy. b. Statistically significant increases in liver weight and reduction in spleen weight. Histological examination of livers from F1 adult animals showed minimal centrilobular hepatocyte enlargement. c. In the F0 generation, initial litter size was reduced. Post-partum pup loss was increased and pup weight gain reduced. d. In the F1 generation initial litter size was again reduced. There was no pup loss. Pup-weight gain was slightly lower than among control animals despite the smaller litter size and hence reduced intra-litter competition. Organ weight analyses of selected F1 and F2 weanlings showed significantly increased liver weights and reduced spleen weights. Histological examination of these tissues from F2 weanlings showed no treatment-related changes. Mating performance, pregnancy rate and the duration of gestation at all three dietary concentrations were unaffected by treatment. The overall NOEL is below 500 ppm due to the increased liver weight and reductions in spleen weight reported among selected F1 and F2 weanlings of the intermediate and low dose group.

Segment II study (Rats): Test substance was administered by gavage to pregnant rats from day 6 to 15 of gestation, inclusive. The concentrations were 0, 150, 500 and 1,000 mg/kg. Bodyweight gain was slightly depressed in the 500 and 1,000 mg/kg dose levels and reduced feed intake was registered in a dose related fashion during the period of administration of the test substance. Retardation of physiological growth of the fetuses was recorded. No teratogenic effects were observed under the conditions of the experiment. The 150 mg/kg dose was considered to be the no observable effect level (NOEL).

Segment II study (Mice): Test substance was administered by gavage to pregnant mice from day 6 to 15 of gestation, inclusive. The concentrations were 150, 500 and 1,000 mg/kg. The average bodyweight gain as well as feed intake were comparable for all groups. There was no evidence of an adverse effect on the embryonic or fetal development in the mouse, except that, in the high-dose group, the average weight of the fetuses was found to be slightly but significantly increased when compared with the control. No teratogenic effects were observed under the conditions of the experiment. The NOEL was considered to be 500 mg/kg.

Subchronic Toxicity: (Dogs): In a 3-month toxicity study, Beagle dogs were fed a diet containing 0, 1,000, 3,000 and 10,000 ppm of the test substance. No clinical symptoms or signs of systemic toxicity were observed and no deaths occurred during the experiment. Ophthalmic inspection, hearing test, food consumption, bodyweight gain, mean food conversion, haematology, blood chemistry, gross pathology and histopathology revealed no treatment related effects. The occasionally elevated concentrations of serum bilirubin levels were not accompanied by any histopathological changes in the liver. Organ weights and ratios for the treated dogs were comparable to those of the control animals with the exception of a slightly increased incidence of higher liver weights and ratios in the dogs of the 3,000 and 10,000 ppm groups. The NOEL was concluded to be 1,000 ppm in the diet, corresponding to 31.5 - 34.5 mg/kg/day.

(Rats): The test substance was administered to rats as an aerosol (dust) for 6 hours/day, 5 days/week for 3 weeks. The animals were exposed to mean gravimetric concentrations of 23 and 543 mg/m³. There were no reactions to treatment for any of the parameters investigated. The NOEL is greater than 543 mg/m³ air for male and female rats.

Chronic Toxicity/Carcinogenicity:

(Mice): Mice were administered 0, 5, 50, 500 ppm of the test substance in the feed, corresponding to a mean daily intake of about 56 mg/kg/day for the highest dose group for 24 months. The only difference seen was reduced survival time for the high dose animals. There was no evidence of an increased tumor incidence. The NOEL was 50 ppm.

(Rats): In a 104 week/feeding study, rats were treated with the test substance in the diet at levels of 0, 500, 1,500, 5,000 ppm. Reaction to treatment at the various dietary levels was as follows: At 5,000 ppm: a. A higher survival rate among females (Mindfully note: which means a lower survival rate for males). b. An

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Section 11 - TOXICOLOGICAL INFORMATION

inferior bodyweight gain and reduced food intake associated with a minor impairment in the efficiency of food utilization among females. c. Increased liver and thyroid weights in males and females and decreased adrenal weights in females. At 1,500 ppm: a. A reduction in food intake among male rats between weeks 53 and 80 and among females during the first 80 weeks of treatment. b. Decreased adrenal weight in females. At 500 ppm: A reduction in food intake among male and female rats between weeks 53 and 80. There was no evidence of an increased tumor incidence. The NOEL was concluded to be 500 ppm.

Absorption/Distribution/Excretion Metabolism

10 mg/kg of radiolabeled test substance was administered by gavage to 4 albino rats after a 12-hour fast (water permitted). The animals were then placed in metabolism cages for 168 hours and urine and feces samples were collected. Within 0-48 hours after administration about 73% of the radioactivity was eliminated from the body. Afterwards, elimination proceeded slowly and was not fully completed at 168 hours. At that time 96% of the radioactivity was recovered (35% in the urine, 61% in the feces).

Other Toxicity Data:

4-week oral toxicity study (Young rats): Fifty young (4 week old) rats were treated by gavage with single daily doses of 0, 5, 30, 100 and 300 mg/kg of the test substance for 28 days. The liver was the target organ as indicated by a dose-dependent organ weight increase and by histopathology: at 300 mg/kg a minimal centrilobular hepatocytic hypertrophy was observed. A small number of high dose animals showed clinical chemistry changes, including elevated transaminase activities and cholesterol levels compared to control animals. The NOEL was considered to be 30 mg/kg/day.

WATER:

- No significant acute toxicological data identified in literature search.

SORBITAN MONOOLEATE, ETHOXYLATED:

TOXICITY

Oral (mouse) LD50: 25000 mg/kg

IRRITATION

Eye (rabbit): 150 mg - Mild

Skin (rabbit): - slight

- For Group D aliphatic esters:(sorbitan fatty esters)

According to a classification scheme described by the American Chemistry Council' Aliphatic Esters Panel, Group D substances are esters of monoacids, mainly common fatty acids, and sorbitan (which is derived from sorbitol - a natural carbohydrate sweetener). The fatty acids include lauric, stearic, oleic acids and coca fatty acids (mainly lauric and myristic acids). The hydroxy group in the sorbitan represents the alcohol portion of the ester linkage. The Group D esters are carbohydrate-derived esters since the ester linkage is connected to the hydroxy group(s) of sorbitan. They may have single ester linkages (i.e., sorbitan monoester) or may have multiple ester linkages, as in the case of sorbitan sesquioleate and sorbitan trioleate. Multiple ester linkages with long-chain fatty acids increase lipophilicity and also tend to diminish water solubility. The sorbitan esters are non-ionic surfactant-active agents that typically find use as emulsifiers, stabilizers, and thickeners in foods, cosmetics and medical products.

Acute toxicity: Sorbitan esters do not represent a toxicological concern since they are derived from naturally occurring materials and the parent esters are ultimately metabolised back to these same natural constituents: namely, sorbitan and common fatty acids, both of which have low orders of toxicity. The oral LD50 in rats ranged from >2.9 g/kg to > 39.8 g/kg. Numerous sorbitan esters have been studied by acute oral and dermal administration. Results from these studies support the general conclusion that sorbitan fatty acid esters have low orders of acute toxicity.

Repeated Dose Toxicity. A large number of subchronic oral and dermal studies and chronic oral feeding studies have been carried out for sorbitan monolaurate, sorbitan monostearate and sorbitan monooleate. For sorbitan monostearate, no adverse effects were reported in rats fed 5% concentrations of the test substance in the diet for 6 weeks. The NOAEL was estimated to be 5% or approximately 2500 mg/kg/day. In 2-year feeding studies at 5, 10 and 20% in the diet rats tolerated sorbitan monostearate with no adverse effects. However, at 20%, there was a small but significant decrease on growth rate in male rates. Hence, the NOAEL was 10% in the diet or approximately 5000 mg/kg/day in rats, based on these findings. In a 80-week dietary study in mice, no adverse effects were observed for sorbitan monostearate at 2% concentration in the diet and the NOAEL was 2% or approximately 2600 mg/kg/day. Subchronic studies have also been carried out with sorbitan, fatty acids C6-10, tetraester (CAS 228573-47-5).. Oral gavage studies for 28 days at dose levels up to 1000 mg/kg /day resulted in no systemic toxicity. Therefore, the NOAEL was 1000 mg/kg/day for this tetraester. Since the sesquioleate and trioleate of sorbitan are merely multiple ester homologs of sorbitan monooleate, they would be expected to show similar effects, given their structural similarities and potential to be metabolised to the monooleate.

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Section 11 - TOXICOLOGICAL INFORMATION

Reproductive and developmental toxicity: Limited reproductive toxicity data have been reported for the sorbitan esters. In a 2-year feeding studies in rats with sorbitan monostearate, there were no effects on gestation and fertility at any dose level (0, 5, 10 and 20% in the diet) but survival of the newborn animals and maternal lactation were slightly diminished at the 20% level. Sorbitol was also studied indirectly as part of a mixture of hydrogenated starch hydrolysates (HSH) which contained about 7% sorbitol as part of the polyhydric alcohol mixture. The HSH mixture was investigated as part of a two-year ingestion study, a multigeneration reproduction study and a teratology study. At concentrations of 18% in drinking water (3000-7000 mg/kg/day), HSH did not produce reproductive or developmental effects. These results indicate that sorbitol does not cause reproductive/ developmental toxicity in animals. Given these findings and the low order of toxicity of natural fatty acids, it seems unlikely that sorbitan esters would present reproductive and developmental toxicity concerns.

Genotoxicity: Sorbitan monostearate (CAS 1338-41-6) was found to be negative in the Ames assay. In addition, the non-HPV substance, sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5), did not cause any mutagenic effects in the Salmonella in vitro test. These substances bridge the low and high carbon range of most of the sorbitan esters and the chemistry of the sorbitan esters (i.e., sorbitan/ sorbitol, natural fatty acids) does not suggest the likelihood that the sorbitan esters are electrophilic or reactive in nature. Thus, it is not likely that the substances in Group D cause mutagenic effects.

Sorbitan monostearate did not transform primary Syrian golden hamster embryo cells. As discussed above for point mutation, the chemistry of the sorbitan esters does not suggest the likelihood that these substances, or their constituent substructures (i.e., sorbitol, fatty acids) are reactive or electrophilic in nature.

C.I. PIGMENT BLUE 15:

TOXICITY

Oral (rat) LD50: >10000 mg/kg

IRRITATION

Skin (human): non- Irritant

Eye (human): non- Irritant

[Manuf. C.G.]

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

- Very toxic to aquatic organisms.
- Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

• For hindered phenols:

The hindered phenols in this category consist of a group of chemicals in which a molecule of phenol (hydroxybenzene) has multiple substitutions on the aromatic ring with relatively large aliphatic and/or aromatic groups. At least one of the groups is adjacent to the hydroxyl group (the 2-, or ortho- position). Due to the bulky substituent groups, the substances, which may be either room temperature solids or liquids, have limited water solubility, high partition coefficients and are not readily biodegradable. The vapor pressure of these chemicals is low.

Environmental fate:

Fate and Transport Characteristics. Experimental data show that hindered phenols are not readily biodegradable. With one exception, the low water solubility of these chemicals precludes experimentally obtaining hydrolysis data. Model derived photodegradation indicates that these substances photodegrade rapidly. Fugacity modeling shows that, generally, partitioning would be to soil and sediments rather than air or water.

Ecotoxicity:

Aquatic Toxicology. Hindered phenols have low water solubility and, therefore, low aquatic toxicity. Experimental data are available on acute fish toxicity, acute invertebrate toxicity, and alga toxicity for the majority of chemicals in this category.

One chronic ecotoxicity test is available for butylated hydroxytoluene (BHT) (Daphnia magna NOEC 0.07 mg/l) hence BHT may fulfil the T criterion (for PBT substances) as a borderline case.

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Section 12 - ECOLOGICAL INFORMATION

For 3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate

log Kow >6 (20-25 C)

COD 2.52/g

Partially but not readily biodegradable.

Inherently degradable in a combined Zahn-wellens carbon dioxide evolution test.

Fish LC50 (96 h): rainbow trout >100 mg/l

Daphnia EC50: >100 mg/l

Bacteria IC50 (3 h): >100 mg/l (sewage sludge)

Algae EC50 (72 h): *Scenedesmus* spp >30 mg/l

Sewage bacteria IC20, IC50, IC80 >100 ppm

No effects at the highest concentration tested. The tested concentration is well above its water solubility.

SORBITAN MONOOLEATE, ETHOXYLATED:

Refer to data for ingredients, which follows:

SORBITAN MONOOLEATE, ETHOXYLATED:

• For Group D aliphatic esters:(sorbitan fatty esters)

Environmental fate:

The chain-length of the fatty acid in the sorbitan monoesters influences water solubility, boiling point and lipophilicity. The degree of esterification (monooleate versus trioleate) will also influence these properties. Hence, the water solubility of sorbitan monolaurate (C12 acid) (CAS 1338-39-2) is predicted to be much greater than that of sorbitan monostearate or sorbitan monooleate (C18 acids). The monooleate was predicted to have greater solubility in water than the corresponding sesquioleate or trioleate ester of sorbitan.

Biodegradation:

The biodegradation of sorbitan monolaurate, sorbitan monooleate and sorbitan, fatty acid C6-10 tetraester (CAS 228573-47-5), has been reported. These three sorbitan esters were biodegraded to the extent of 60-70% in 28-days, which indicate these materials undergo metabolism and degradation extensively in the aerobic environment. The sorbitan esters tested covered the range of carbon numbers (C18-C38) and included relatively water soluble (i.e., sorbitan monolaurate) as well as water-insoluble [i.e., sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5)] members of the group. The high degree of biodegradation (70% in 28 days) for sorbitan tetraester (CAS 228573-47-5), in spite of its poor water solubility, indicates that enzymatic cleavage of the multiple ester linkage must be taking place in order to achieve the observed level of biodegradation. This would be consistent with the fact that fatty acids (e.g., oleic, stearic acid) arising from enzymatic ester bond cleavage of the sorbitan esters would be expected to be rapidly biodegraded. In addition, enzymatic ester cleavage of sorbitan trioleate and sesquioleate would lead to sorbitan monooleate, for which biodegradation data exist. Thus, there is sufficient information to head-across?for the other sorbitan esters, based on the available data and the similarities in chemistry and metabolism.

Ecotoxicity:

Aquatic toxicity data have been reported for the sorbitan esters. Sorbitan monolaurate and sorbitan monooleate have been tested. In addition sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5), has also been evaluated in fish, daphnia and algae. These findings indicate that the sorbitan esters are not acutely toxic to aquatic organisms. The available data covered the range of water-soluble (e.g., monolaurate) and water-insoluble sorbitan esters (e.g., C6-C10 acid tetraester). Most of the sorbitan esters have limited water solubility and for this reason are not likely to cause acute aquatic toxicity. In addition, metabolism of sorbitan sesquioleate and sorbitan trioleate will generate sorbitan monooleate, for which aquatic toxicity data exist. Thus, there is sufficient information to head-across?for the other sorbitan esters, based on the available data and chemical similarities of sorbitan esters in general.

• Octanol/ water partition coefficients cannot easily be determined for surfactants because one part of the molecule is hydrophilic and the other part is hydrophobic. Consequently they tend to accumulate at the interface and are not extracted into one or other of the liquid phases. As a result surfactants are expected to transfer slowly, for example, from water into the flesh of fish. During this process, readily biodegradable surfactants are expected to be metabolized rapidly during the process of bioaccumulation. This was emphasized by the OECD Expert Group stating that chemicals are not to be considered to show bioaccumulation potential if they are readily biodegradable. Several anionic and nonionic surfactants have been investigated to evaluate their potential to bioconcentrate in fish. BCF values (BCF - bioconcentration factor) ranging from 1 to 350 were found. These are absolute maximum values resulting from the radio labeling technique used. In all these studies, substantial oxidative metabolism was found resulting in the highest radioactivity in the gall bladder. This indicates liver transformation of the parent compound and biliary

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Section 12 - ECOLOGICAL INFORMATION

excretion of the metabolized compounds, so that "real" bioconcentration is overstated. After correction it can be expected that "real" parent BCF values are one order of magnitude less than those indicated above, i.e. "real" BCF is <100. Therefore the usual data used for classification by EU Directives to determine whether a substance is "Dangerous to the Environment" has little bearing on whether the use of the surfactant is environmentally acceptable.

- DO NOT discharge into sewer or waterways.

C.I. PIGMENT BLUE 15:

- Copper is unlikely to accumulate in the atmosphere due to a short residence time for airborne copper aerosols. Airborne coppers, however, may be transported over large distances. Copper accumulates significantly in the food chain.

The toxic effect of copper in the aquatic biota depends on the bio-availability of copper in water which, in turn, depends on its physico-chemical form (i.e. speciation). Bioavailability is decreased by complexation and adsorption of copper by natural organic matter, iron and manganese hydrated oxides, and chelating agents excreted by algae and other aquatic organisms. Toxicity is also effected by pH and hardness. Total copper is rarely useful as a predictor of toxicity. In natural sea water, more than 98% of copper is organically bound and in river waters a high percentage is often organically bound, but the actual percentage depends on the river water and its pH.

Copper exhibits significant toxicity in some aquatic organisms. Some algal species are very sensitive to copper with EC50 (96 hour) values as low as 47 ug/liter dissolved copper whilst for other algal species EC50 values of up to 481 ug/liter have been reported. However many of the reportedly high EC50 values may arise in experiments conducted with a culture media containing copper-complexing agents such as silicate, iron, manganese and EDTA which reduce bioavailability.

- Toxic effects arising following exposure by aquatic species to copper are typically:

Algae EC50 (96 h)	Daphnia magna LC50 (48- 96 h)	Amphipods LC50 (48- 96 h)	Gastropods LC50 (48- 96 h)	Crab larvae LC50 (48- 96 h)
47- 481 *	7- 54 *	37- 183 *	58- 112 *	50- 100 *

* ug/liter

Exposure to concentrations ranging from one to a few hundred micrograms per liter has led to sublethal effects and effects on long-term survival. For high bioavailability waters, effect concentrations for several sensitive species may be below 10 ug Cu/liter.

In fish, the acute lethal concentration of copper ranges from a few ug/liter to several mg/liter, depending both on test species and exposure conditions. Where the value is less than 50 ug Cu/liter, test waters generally have a low dissolved organic carbon (DOC) level, low hardness and neutral to slightly acidic pH. Sublethal effects and effects on long-term survival range from exposure to concentrations from one to a few hundred ug/liter. Lower effect concentrations are generally associated with test waters of high bioavailability.

In summary:

Responses expected for high concentration ranges of copper *

Total dissolved Cu concentration range (ug/liter)
1- 10

Effects of high availability in water

Significant effects are expected for diatoms and sensitive invertebrates, notably cladocerans. Effects on fish could be significant in freshwaters with low pH and hardness.

10- 100

Significant effects are expected on various species of microalgae, some species of macroalgae, and a range of invertebrates, including crustaceans, gastropods and sea urchins. Survival of sensitive fish will be affected and a variety of fish show sublethal effects.

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100- 1000	Most taxonomic groups of macroalgae and invertebrates will be severely affected. Lethal levels for most fish species will be reached.
>1000	Lethal concentrations for most tolerant organisms are reached.

- * Sites chosen have moderate to high bioavailability similar to water used in most toxicity tests.
- In soil, copper levels are raised by application of fertilizer, fungicides, from deposition of highway dusts and from urban, mining and industrial sources. Generally, vegetation rooted in soils reflects the soil copper levels in its foliage. This is dependent upon the bioavailability of copper and the physiological requirements of species concerned.

Typical foliar levels of copper are:

Uncontaminated soils (0.3- 250 mg/kg)	Contaminated soils (150- 450 mg/kg)	Mining/ smelting soils
6.1- 25 mg/kg	80 mg/kg	300 mg/kg

Plants rarely show symptoms of toxicity or of adverse growth effects at normal soil concentrations of copper. Crops are often more sensitive to copper than the native flora, so protection levels for agricultural crops range from 25 mg Cu/kg to several hundred mg/kg, depending on country. Chronic and or acute effects on sensitive species occur at copper levels occurring in some soils as a result of human activities such as copper fertilizer addition, and addition of sludge.

When soil levels exceed 150 mg Cu/kg, native and agricultural species show chronic effects. Soils in the range 500-1000 mg Cu/kg act in a strongly selective fashion allowing the survival of only copper-tolerant species and strains. At 2000 Cu mg/kg most species cannot survive. By 3500 mg Cu/kg areas are largely devoid of vegetation cover. The organic content of the soil appears to be a key factor affecting the bioavailability of copper.

On normal forest soils, non-rooted plants such as mosses and lichens show higher copper concentrations. The fruiting bodies and mycorrhizal sheaths of soil fungi associated with higher plants in forests often accumulate copper to much higher levels than plants at the same site. International Programme on Chemical Safety (IPCS): Environmental Health Criteria 200.

- NOTE: Because of similarities in structure to thalidomide, concerns have been raised about the potential teratogenicity of all phthalimides (the basic building block of phthalocyanine. Animal studies, in part, appear to support this proposition

Phthalocyanine dyes are probably not biodegradable. Reversible reduction and decolourisation occurs under anaerobic conditions.

Many dyes are visible in water at concentrations as low as 1 mg/l Textile-processing waste waters, typically with a dye content in the range 10- 200 mg /l are therefore usually highly coloured and discharge in open waters presents an aesthetic problem. As dyes are designed to be chemically and photolytically stable, they are highly persistent in natural environments. The release of dyes may therefore present an ecotoxic hazard and introduces the potential danger of bioaccumulation that may eventually affect man by transport through the food chain.

Algae are generally susceptible to dyes, but the inhibitory effect is thought to be related to light inhibition at high dye concentrations, rather than a direct inhibitory effect of the dyes. This effect may account for up to 50% of the inhibition observed.

Virtually all dyes from all chemically distinct groups are prone to fungal oxidation but there are large differences between fungal species with respect to their catalysing power and dye selectivity. A clear relationship between dye structure and fungal dye biodegradability has not been established. Fungal degradation of aromatic structures is a secondary metabolic event that starts when nutrients (C, N and S) become limiting. Therefore, while the enzymes are optimally expressed under starving conditions, supplementation of energy substrates and nutrients are necessary for propagation of the cultures. The effects of the substitutional pattern of the dyes are inconclusive, but it has been suggested that introduction of the functional groups; methyl, nitro, sulfo or acid, weakens the inhibition of bacteria, whereas introduction of chlorine and bromine strengthens the inhibition.

- DO NOT discharge into sewer or waterways.

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Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	HIGH		LOW	LOW
water	LOW		LOW	HIGH
C.I. Pigment Blue 15	HIGH		LOW	LOW

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

? Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION



REGULATIONS

ND

Ingredient	CAS	% de minimus concentration (*)
C.I. Pigment Blue 15	147- 14- 8	

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Section 15 - REGULATORY INFORMATION

ND

Ingredient

C.I. Pigment Blue 15

Regulations for ingredients

CAS

147- 14- 8

RQ

**

3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate (CAS: 2082-79-3) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US EPA High Production Volume Program Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Inventory of Effective Food Contact Substance Notifications", "US Toxic Substances Control Act (TSCA) - Inventory"

water (CAS: 7732-18-5) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Pennsylvania - Hazardous Substance List", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (a) Inventory Update Rule (IUR) - Partial Exemptions"

sorbitan monooleate, ethoxylated (CAS: 9005-65-6) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Food Additive Database", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory"

C.I. Pigment Blue 15 (CAS: 147-14-8) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "OECD Representative List of High Production Volume (HPV) Chemicals", "US EPA High Production Volume Program Chemical List", "US EPA Master Testing List - Index I Chemicals Listed", "US EPA Master Testing List - Index II Chemicals Removed", "US FDA CFSAN Color Additive Status List 7", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory"

No data for INK - BLUE (CW: 1009153)

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Ingestion may produce health damage*.
 - Cumulative effects may result following exposure*.
 - May produce discomfort of the eyes*.
 - Repeated exposure potentially causes skin dryness and cracking*.
- *(limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	2082- 79- 3	Xn Mut3; R68

• Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

• The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

• For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:
OSHA Standards - 29 CFR:
1910.132 - Personal Protective Equipment - General requirements
1910.133 - Eye and face protection
1910.134 - Respiratory Protection

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Section 16 - OTHER INFORMATION

1910.136 - Occupational foot protection

1910.138 - Hand Protection

Eye and face protection - ANSI Z87.1

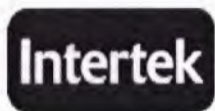
Foot protection - ANSI Z41

Respirators must be NIOSH approved.

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
INK - RED

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER
Company: ZHEJIANG KELI PRINTING NEW TECHNOLOGY
DEVELOP CO., LTD
Address:
No.20, Lingjiang Road, Lingjiang
Industrial Zone, Longyou,
Zhejiang, China

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

continued...

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Section 2 - HAZARDS IDENTIFICATION

RISK

May cause SENSITIZATION by skin contact.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

• Although ingestion is not thought to produce harmful effects, the material may still be damaging to the health of the individual following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE

• Although the material is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterized by tearing or conjunctival redness (as with windburn).

SKIN

• The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

• The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS

• Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	2082-79-3	5
water	7732-18-5	5
sorbitan monooleate, ethoxylated	9005-65-6	75
C.I. Pigment Red 112	6535-46-2	15

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

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Section 4 - FIRST AID MEASURES

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):

Upper Explosive Limit (%):

Specific Gravity (water=1):

Lower Explosive Limit (%):

EXTINGUISHING MEDIA

- Alcohol stable foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.
- Mists containing combustible materials may be explosive.

Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

May emit corrosive fumes.

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Section 5 - FIRE FIGHTING MEASURES

FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

PVC chemical resistant type.

Respirator:

Type ANO- P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Slippery when spilt.
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

- Chemical Class: alcohols and glycols

For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross- linked polymer - particulate	1	shovel	shovel	R, W, SS
cross- linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
sorbent clay - particulate	2	shovel	shovel	R, I, P
wood fiber - pillow	3	throw	pitchfork	R, P, DGC, RT
treated wood fiber - pillow	3	throw	pitchfork	DGC, RT
foamed glass - pillow	4	throw	pichfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross- linked polymer - particulate	1	blower	skiploader	R, W, SS
polypropylene - particulate	2	blower	skiploader	W, SS, DGC
sorbent clay - particulate	2	blower	skiploader	R, I, W, P, DGC
polypropylene - mat	3	throw	skiploader	DGC, RT

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Section 6 - ACCIDENTAL RELEASE MEASURES

expanded mineral - particulate	3	blower	skiploader	R, I, W, P, DGC
polyurethane - mat	4	throw	skiploader	DGC, RT

Legend

DGC: Not effective where ground cover is dense

R: Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT: Not effective where terrain is rugged

SS: Not for use within environmentally sensitive sites

W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.

Slippery when spilt.

Moderate hazard.

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- No smoking, naked lights or ignition sources. Increase ventilation.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Overheating of ethoxylates in air should be avoided. When some ethoxylates are heated vigorously in the presence of air or oxygen, at temperatures exceeding 160 C, they may undergo exothermic oxidative degeneration resulting in self-heating and autoignition.
- Nitrogen blanketing will minimize the potential for ethoxylate oxidation.
- Trace quantities of ethylene oxide may be present in the material. Although these may accumulate in the headspace of storage and transport vessels, concentrations are not expected to exceed levels which might produce a flammability or worker exposure hazard.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working

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Section 7 - HANDLING AND STORAGE

conditions.

RECOMMENDED STORAGE METHODS

- Glass container.
- Metal can or drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+



X



+



X



X



X



+

+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA mg/m ³	Peak mg/m ³
Canada - British Columbia Occupational Exposure Limits	3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		DataAvailableBut Blank
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)	5	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	C.I. Pigment Red 112 (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)	5	

The following materials had no OELs on our records

- water: CAS:7732- 18- 5
- sorbitan monooleate, ethoxylated: CAS:9005- 65- 6

MATERIAL DATA

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Not available

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

• It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

WATER:

- No exposure limits set by NOHSC or ACGIH.

SORBITAN MONOOLEATE, ETHOXYLATED:

• Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

HANDS/FEET

- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
 - frequency and duration of contact,
 - chemical resistance of glove material,
 - glove thickness and

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.

- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.

- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly.

Application of a non-perfumed moisturiser is recommended.

Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

- Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	ANO- 1 P	-
1000	50	-	ANO- 1 P
5000	50	Airline*	-
5000	100	-	ANO- 2 P
10000	100	-	ANO- 3 P
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

- General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:
solvent, vapors, degreasing etc., evaporating
from tank (in still air).

Air Speed:
0.25- 0.5 m/s (50- 100 f/min)

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aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

State	Molecular Weight	
Melting Range (°F)	Viscosity	Not available
Boiling Range (°F)	Solubility in water (g/L)	
Flash Point (°F)	pH (1% solution)	
Decomposition Temp (°F)	pH (as supplied)	
Autoignition Temp (°F)	Vapour Pressure (mmHG)	
Upper Explosive Limit (%)	Specific Gravity (water=1)	
Lower Explosive Limit (%)	Relative Vapor Density (air=1)	
	Evaporation Rate	
Volatile Component (%vol)		

Material	Value
3, 5- BIS(BUTYL)- 4- HYDROXYHYDROCINNAMIC STEARATE:	
log Kow >6 (20- 25 C)	

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Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

No data for this material.

STORAGE INCOMPATIBILITY

• Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

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TOXICITY AND IRRITATION

SORBITAN MONOOLEATE, ETHOXYLATED:

C.I. PIGMENT RED 112:

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

• unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

• Not available. Refer to individual constituents.

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

TOXICITY

Oral (rat) LD50: >10000 mg/kg *

Inhalation (rat) LCLo: >1.3 mg/l/4h * *Ciba-

Geigy

Dermal (rat) LD50: >2000 mg/kg *

Intraperitoneal (rat) LD50: >1000 mg/kg *

Inhalation (Rat) LC50: >1800 mg/m³

• Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

For hindered phenols:

Acute oral and dermal toxicity data are available for all but two of the substances in the group. The data show that acute

toxicity of these substances is low.

Mutagenicity. Data from bacterial reverse mutation assays and in vitro and in vivo chromosome aberration studies were reviewed. All assays, with and without metabolic activation, were negative. The weight of evidence for mutagenic potential for this category indicates these substances are not mutagenic.

In Vitro Chromosome Aberration Studies. In vitro chromosome aberration studies are available for several members. All except 2,6-di-tert-butyl-p-cresol were negative.

In Vivo Chromosome Aberration Studies. In vivo studies evaluating chromosome damage are available for six of the hindered phenols. All in vivo evaluations were negative.

Repeated Dose Toxicity. Repeated dose toxicity data of approximately three months (90-day, 12- and 13-week) are available for most of the substances in this group. The liver was the target organ in rats for almost all of the substances with subchronic toxicity data in that species. Other target organs included thyroid and kidney and mesenteric lymph nodes. NOAELs in rats ranged from 100 ppm (approximately 5 mg/kg/day) to 10,000 ppm (500 mg/kg/day).

Carcinogenicity: Data is available for 2,6-di-tert-butyl-p-cresol (128-37-0); and 4,4'-thiobis-6-(t-butyl-m-

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Section 11 - TOXICOLOGICAL INFORMATION

cresol) (96-69-5). Liver adenomas were reported for 2,6-di-tert-butyl-p-cresol (128-37-0) and a NOAEL was established for the study at 25 mg/kg/day. 4,4'-Thiobis-6-(t-butyl-m-cresol) (96-69-5) was not carcinogenic in rats or mice, but the kidney was identified as a target organ in female rats.

For 3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate

Teratogenicity/Reproductive Toxicity:

2-Generation study (Rats): The test substance was fed in the diet at concentrations of 0, 500, 1,500 and 5,000 ppm. Treatment of the F0 males and females began when they were six weeks of age, and continued until all F1 litters had been weaned. Direct treatment of the F1 males and females began when they were 4 weeks of age, and continued until all F2 litters had been weaned. Findings at 5,000 ppm among adults of both generations (F0 and F1) that appeared to be treatment-related were as follows: a. Slight reductions in food consumption, weekly weight gain and weight gain of females during pregnancy. b. Statistically significant increases in liver weight and reduction in spleen weight. Histological examination of livers from F1 adult animals showed minimal centrilobular hepatocyte enlargement. c. In the F0 generation, initial litter size was reduced. Post-partum pup loss was increased and pup weight gain reduced. d. In the F1 generation initial litter size was again reduced. There was no pup loss. Pup-weight gain was slightly lower than among control animals despite the smaller litter size and hence reduced intra-litter competition. Organ weight analyses of selected F1 and F2 weanlings showed significantly increased liver weights and reduced spleen weights. Histological examination of these tissues from F2 weanlings showed no treatment-related changes. Mating performance, pregnancy rate and the duration of gestation at all three dietary concentrations were unaffected by treatment. The overall NOEL is below 500 ppm due to the increased liver weight and reductions in spleen weight reported among selected F1 and F2 weanlings of the intermediate and low dose group.

Segment II study (Rats): Test substance was administered by gavage to pregnant rats from day 6 to 15 of gestation, inclusive. The concentrations were 0, 150, 500 and 1,000 mg/kg. Bodyweight gain was slightly depressed in the 500 and 1,000 mg/kg dose levels and reduced feed intake was registered in a dose related fashion during the period of administration of the test substance. Retardation of physiological growth of the fetuses was recorded. No teratogenic effects were observed under the conditions of the experiment. The 150 mg/kg dose was considered to be the no observable effect level (NOEL).

Segment II study (Mice): Test substance was administered by gavage to pregnant mice from day 6 to 15 of gestation, inclusive. The concentrations were 150, 500 and 1,000 mg/kg. The average bodyweight gain as well as feed intake were comparable for all groups. There was no evidence of an adverse effect on the embryonic or fetal development in the mouse, except that, in the high-dose group, the average weight of the fetuses was found to be slightly but significantly increased when compared with the control. No teratogenic effects were observed under the conditions of the experiment. The NOEL was considered to be 500 mg/kg.

Subchronic Toxicity: (Dogs): In a 3-month toxicity study, Beagle dogs were fed a diet containing 0, 1,000, 3,000 and 10,000 ppm of the test substance. No clinical symptoms or signs of systemic toxicity were observed and no deaths occurred during the experiment. Ophthalmic inspection, hearing test, food consumption, bodyweight gain, mean food conversion, haematology, blood chemistry, gross pathology and histopathology revealed no treatment related effects. The occasionally elevated concentrations of serum bilirubin levels were not accompanied by any histopathological changes in the liver. Organ weights and ratios for the treated dogs were comparable to those of the control animals with the exception of a slightly increased incidence of higher liver weights and ratios in the dogs of the 3,000 and 10,000 ppm groups. The NOEL was concluded to be 1,000 ppm in the diet, corresponding to 31.5 - 34.5 mg/kg/day.

(Rats): The test substance was administered to rats as an aerosol (dust) for 6 hours/day, 5 days/week for 3 weeks. The animals were exposed to mean gravimetric concentrations of 23 and 543 mg/m³. There were no reactions to treatment for any of the parameters investigated. The NOEL is greater than 543 mg/m³ air for male and female rats.

Chronic Toxicity/Carcinogenicity:

(Mice): Mice were administered 0, 5, 50, 500 ppm of the test substance in the feed, corresponding to a mean daily intake of about 56 mg/kg/day for the highest dose group for 24 months. The only difference seen was reduced survival time for the high dose animals. There was no evidence of an increased tumor incidence. The NOEL was 50 ppm.

(Rats): In a 104 week/feeding study, rats were treated with the test substance in the diet at levels of 0, 500, 1,500, 5,000 ppm. Reaction to treatment at the various dietary levels was as follows: At 5,000 ppm: a. A higher survival rate among females (Mindfully note: which means a lower survival rate for males). b. An inferior bodyweight gain and reduced food intake associated with a minor impairment in the efficiency of food utilization among females. c. Increased liver and thyroid weights in males and females and decreased adrenal weights in females. At 1,500 ppm: a. A reduction in food intake among male rats between weeks 53 and 80 and among females during the first 80 weeks of treatment. b. Decreased adrenal weight in females. At 500 ppm: A reduction in food intake among male and female rats between weeks 53 and 80. There was no evidence of an

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Section 11 - TOXICOLOGICAL INFORMATION

increased tumor incidence. The NOEL was concluded to be 500 ppm.

Absorption/Distribution/Excretion Metabolism

10 mg/kg of radiolabeled test substance was administered by gavage to 4 albino rats after a 12-hour fast (water permitted). The animals were then placed in metabolism cages for 168 hours and urine and feces samples were collected. Within 0-48 hours after administration about 73% of the radioactivity was eliminated from the body. Afterwards, elimination proceeded slowly and was not fully completed at 168 hours. At that time 96% of the radioactivity was recovered (35% in the urine, 61% in the feces).

Other Toxicity Data:

4-week oral toxicity study (Young rats): Fifty young (4 week old) rats were treated by gavage with single daily doses of 0, 5, 30, 100 and 300 mg/kg of the test substance for 28 days. The liver was the target organ as indicated by a dose-dependent organ weight increase and by histopathology: at 300 mg/kg a minimal centrilobular hepatocytic hypertrophy was observed. A small number of high dose animals showed clinical chemistry changes, including elevated transaminase activities and cholesterol levels compared to control animals. The NOEL was considered to be 30 mg/kg/day.

WATER:

- No significant acute toxicological data identified in literature search.

SORBITAN MONOOLEATE, ETHOXYLATED:

TOXICITY

Oral (mouse) LD50: 25000 mg/kg

IRRITATION

Eye (rabbit): 150 mg - Mild

Skin (rabbit): - slight

- For Group D aliphatic esters:(sorbitan fatty esters)

According to a classification scheme described by the American Chemistry Council' Aliphatic Esters Panel, Group D substances are esters of monoacids, mainly common fatty acids, and sorbitan (which is derived from sorbitol - a natural carbohydrate sweetener). The fatty acids include lauric, stearic, oleic acids and coca fatty acids (mainly lauric and myristic acids). The hydroxy group in the sorbitan represents the alcohol portion of the ester linkage. The Group D esters are carbohydrate-derived esters since the ester linkage is connected to the hydroxy group(s) of sorbitan. They may have single ester linkages (i.e., sorbitan monoester) or may have multiple ester linkages, as in the case of sorbitan sesquioleate and sorbitan trioleate. Multiple ester linkages with long-chain fatty acids increase lipophilicity and also tend to diminish water solubility. The sorbitan esters are non-ionic surfactant-active agents that typically find use as emulsifiers, stabilizers, and thickeners in foods, cosmetics and medical products.

Acute toxicity: Sorbitan esters do not represent a toxicological concern since they are derived from naturally occurring materials and the parent esters are ultimately metabolised back to these same natural constituents: namely, sorbitan and common fatty acids, both of which have low orders of toxicity. The oral LD50 in rats ranged from >2.9 g/kg to > 39.8 g/kg. Numerous sorbitan esters have been studied by acute oral and dermal administration. Results from these studies support the general conclusion that sorbitan fatty acid esters have low orders of acute toxicity.

Repeated Dose Toxicity. A large number of subchronic oral and dermal studies and chronic oral feeding studies have been carried out for sorbitan monolaurate, sorbitan monostearate and sorbitan monooleate. For sorbitan monostearate, no adverse effects were reported in rats fed 5% concentrations of the test substance in the diet for 6 weeks. The NOAEL was estimated to be 5% or approximately 2500 mg/kg/day. In 2-year feeding studies at 5, 10 and 20% in the diet rats tolerated sorbitan monostearate with no adverse effects. However, at 20%, there was a small but significant decrease on growth rate in male rats. Hence, the NOAEL was 10% in the diet or approximately 5000 mg/kg/day in rats, based on these findings. In a 80-week dietary study in mice, no adverse effects were observed for sorbitan monostearate at 2% concentration in the diet and the NOAEL was 2% or approximately 2600 mg/kg/day. Subchronic studies have also been carried out with sorbitan, fatty acids C6-10, tetraester (CAS 228573-47-5).. Oral gavage studies for 28 days at dose levels up to 1000 mg/kg /day resulted in no systemic toxicity. Therefore, the NOAEL was 1000 mg/kg/day for this tetraester.

Since the sesquioleate and trioleate of sorbitan are merely multiple ester homologs of sorbitan monooleate, they would be expected to show similar effects, given their structural similarities and potential to be metabolised to the monooleate.

Reproductive and developmental toxicity: Limited reproductive toxicity data have been reported for the sorbitan esters. In a 2-year feeding studies in rats with sorbitan monostearate, there were no effects on gestation and fertility at any dose level (0, 5, 10 and 20% in the diet) but survival of the newborn animals and maternal lactation were slightly diminished at the 20% level. Sorbitol was also studied indirectly as part of a mixture of hydrogenated starch hydrolysates (HSH) which contained about 7% sorbitol as part of the

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polyhydric alcohol mixture. The HSH mixture was investigated as part of a two-year ingestion study, a multigeneration reproduction study and a teratology study. At concentrations of 18% in drinking water (3000-7000 mg/kg/day), HSH did not produce reproductive or developmental effects. These results indicate that sorbitol does not cause reproductive/ developmental toxicity in animals. Given these findings and the low order of toxicity of natural fatty acids, it seems unlikely that sorbitan esters would present reproductive and developmental toxicity concerns.

Genotoxicity: Sorbitan monostearate (CAS 1338-41-6) was found to be negative in the Ames assay. In addition, the non-HPV substance, sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5), did not cause any mutagenic effects in the Salmonella in vitro test. These substances bridge the low and high carbon range of most of the sorbitan esters and the chemistry of the sorbitan esters (i.e., sorbitan/ sorbitol, natural fatty acids) does not suggest the likelihood that the sorbitan esters are electrophilic or reactive in nature. Thus, it is not likely that the substances in Group D cause mutagenic effects.

Sorbitan monostearate did not transform primary Syrian golden hamster embryo cells. As discussed above for point mutation, the chemistry of the sorbitan esters does not suggest the likelihood that these substances, or their constituent substructures (i.e., sorbitol, fatty acids) are reactive or electrophilic in nature.

C.I. PIGMENT RED 112:

TOXICITY

Oral (rat) LD50: >5000 mg/kg

IRRITATION

Nil Reported [BASF]

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

3,5-BIS(BUTYL)-4-HYDROXYHYDROCINNAMIC STEARATE:

- Very toxic to aquatic organisms.
- Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
- For hindered phenols:

The hindered phenols in this category consist of a group of chemicals in which a molecule of phenol (hydroxybenzene) has multiple substitutions on the aromatic ring with relatively large aliphatic and/or aromatic groups. At least one of the groups is adjacent to the hydroxyl group (the 2-, or ortho- position). Due to the bulky substituent groups, the substances, which may be either room temperature solids or liquids, have limited water solubility, high partition coefficients and are not readily biodegradable. The vapor pressure of these chemicals is low.

Environmental fate:

Fate and Transport Characteristics. Experimental data show that hindered phenols are not readily biodegradable. With one exception, the low water solubility of these chemicals precludes experimentally obtaining hydrolysis data. Model derived photodegradation indicates that these substances photodegrade rapidly. Fugacity modeling shows that, generally, partitioning would be to soil and sediments rather than air or water.

Ecotoxicity:

Aquatic Toxicology. Hindered phenols have low water solubility and, therefore, low aquatic toxicity. Experimental data are available on acute fish toxicity, acute invertebrate toxicity, and alga toxicity for the majority of chemicals in this category.

One chronic ecotoxicity test is available for butylated hydroxytoluene (BHT) (Daphnia magna NOEC 0.07 mg/l) hence BHT may fulfil the T criterion (for PBT substances) as a borderline case.

For 3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate

log Kow >6 (20-25 C)

COD 2.52/g

Partially but not readily biodegradable.

Inherently degradable in a combined Zahn-wellens carbon dioxide evolution test.

Fish LC50 (96 h): rainbow trout >100 mg/l

Daphnia EC50: >100 mg/l

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Section 12 - ECOLOGICAL INFORMATION

Bacteria IC50 (3 h): >100 mg/l (sewage sludge)

Algae EC50 (72 h): *Scenedesmus* spp >30 mg/l

Sewage bacteria IC20, IC50, IC80 >100 ppm

No effects at the highest concentration tested. The tested concentration is well above its water solubility.

SORBITAN MONOOLEATE, ETHOXYLATED:

- For Group D aliphatic esters:(sorbitan fatty esters)

Environmental fate:

The chain-length of the fatty acid in the sorbitan monoesters influences water solubility, boiling point and lipophilicity. The degree of esterification (monooleate versus trioleate) will also influence these properties. Hence, the water solubility of sorbitan monolaurate (C12 acid) (CAS 1338-39-2) is predicted to be much greater than that of sorbitan monostearate or sorbitan monooleate (C18 acids). The monooleate was predicted to have greater solubility in water than the corresponding sesquioleate or trioleate ester of sorbitan.

Biodegradation:

The biodegradation of sorbitan monolaurate, sorbitan monooleate and sorbitan, fatty acid C6-10 tetraester (CAS 228573-47-5), has been reported. These three sorbitan esters were biodegraded to the extent of 60-70% in 28-days, which indicate these materials undergo metabolism and degradation extensively in the aerobic environment. The sorbitan esters tested covered the range of carbon numbers (C18-C38) and included relatively water soluble (i.e., sorbitan monolaurate) as well as water-insoluble [i.e., sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5)] members of the group. The high degree of biodegradation (70% in 28 days) for sorbitan tetraester (CAS 228573-47-5), in spite of its poor water solubility, indicates that enzymatic cleavage of the multiple ester linkage must be taking place in order to achieve the observed level of biodegradation. This would be consistent with the fact that fatty acids (e.g., oleic, stearic acid) arising from enzymatic ester bond cleavage of the sorbitan esters would be expected to be rapidly biodegraded. In addition, enzymatic ester cleavage of sorbitan trioleate and sesquioleate would lead to sorbitan monooleate, for which biodegradation data exist. Thus, there is sufficient information to head-across?for the other sorbitan esters, based on the available data and the similarities in chemistry and metabolism.

Ecotoxicity:

Aquatic toxicity data have been reported for the sorbitan esters. Sorbitan monolaurate and sorbitan monooleate have been tested. In addition sorbitan fatty acid C6-10 tetraester (CAS 228573-47-5), has also been evaluated in fish, daphnia and algae. These findings indicate that the sorbitan esters are not acutely toxic to aquatic organisms. The available data covered the range of water-soluble (e.g., monolaurate) and water-insoluble sorbitan esters (e.g., C6-C10 acid tetraester). Most of the sorbitan esters have limited water solubility and for this reason are not likely to cause acute aquatic toxicity. In addition, metabolism of sorbitan sesquioleate and sorbitan trioleate will generate sorbitan monooleate, for which aquatic toxicity data exist. Thus, there is sufficient information to head-across?for the other sorbitan esters, based on the available data and chemical similarities of sorbitan esters in general.

- Octanol/ water partition coefficients cannot easily be determined for surfactants because one part of the molecule is hydrophilic and the other part is hydrophobic. Consequently they tend to accumulate at the interface and are not extracted into one or other of the liquid phases. As a result surfactants are expected to transfer slowly, for example, from water into the flesh of fish. During this process, readily biodegradable surfactants are expected to be metabolized rapidly during the process of bioaccumulation. This was emphasized by the OECD Expert Group stating that chemicals are not to be considered to show bioaccumulation potential if they are readily biodegradable. Several anionic and nonionic surfactants have been investigated to evaluate their potential to bioconcentrate in fish. BCF values (BCF - bioconcentration factor) ranging from 1 to 350 were found. These are absolute maximum values resulting from the radio labeling technique used. In all these studies, substantial oxidative metabolism was found resulting in the highest radioactivity in the gall bladder. This indicates liver transformation of the parent compound and biliary excretion of the metabolized compounds, so that "real" bioconcentration is overstated. After correction it can be expected that "real" parent BCF values are one order of magnitude less than those indicated above, i.e. "real" BCF is <100. Therefore the usual data used for classification by EU Directives to determine whether a substance is "Dangerous to the Environment" has little bearing on whether the use of the surfactant is environmentally acceptable.

- DO NOT discharge into sewer or waterways.

Ecotoxicity

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Section 12 - ECOLOGICAL INFORMATION

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	HIGH		LOW	LOW
water	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

? Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION



REGULATIONS

Regulations for ingredients

3,5-bis(butyl)-4-hydroxyhydrocinnamic stearate (CAS: 2082-79-3) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US EPA High Production Volume Program Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Inventory of Effective Food Contact Substance Notifications", "US Toxic Substances Control Act (TSCA) - Inventory"

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Section 15 - REGULATORY INFORMATION

water (CAS: 7732-18-5) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Pennsylvania - Hazardous Substance List", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (a) Inventory Update Rule (IUR) - Partial Exemptions"

sorbitan monooleate, ethoxylated (CAS: 9005-65-6) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Food Additive Database", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory"

C.I. Pigment Red 112 (CAS: 6535-46-2) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "US Toxic Substances Control Act (TSCA) - Inventory"

No data for INK - RED (CW: 1009152)

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Ingestion may produce health damage*.
 - May produce discomfort of the eyes*.
 - Repeated exposure potentially causes skin dryness and cracking*.
- * (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
3, 5- bis(butyl)- 4- hydroxyhydrocinnamic stearate	2082- 79- 3	Xn Mut3; R68
C.I. Pigment Red 112	6535- 46- 2	Xn Carc3; R40

• Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

• The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

• For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:

OSHA Standards - 29 CFR:

1910.132 - Personal Protective Equipment - General requirements

1910.133 - Eye and face protection

1910.134 - Respiratory Protection

1910.136 - Occupational foot protection

1910.138 - Hand Protection

Eye and face protection - ANSI Z87.1

Foot protection - ANSI Z41

Respirators must be NIOSH approved.

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