# **Alpha Laundry Powder**

# **ACCO Brands Australia Pty Ltd**

Version No: 1.1
Safety Data Sheet according to Work Health and Safety Regulations and ADG requirements

S.GHS.AUS.EN

Issue Date: 15/08/2024

# SECTION 1 Identification of the substance / mixture and of the company / undertaking

#### **Product Identifier** Product name Alpha Laundry Powder Synonyms Not Available Other means of identification 20KG - 3055194 (636020823RE)

# Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Use according to manufacturer's directions.
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# Details of the manufacturer or supplier of the safety data sheet

# Details of the distributor of the safety data sheet

Registered company name	ACCO Brands Australia Pty Ltd	Registered company name	Reward Hospitality
Address	17-19 Waterloo Street, Queanbeyan NSW 2620 Australia	Address	1 Arthur Dixon Court, Yatala, QLD
Telephone	+61-2-96740900	Telephone	1800 473 927
Fax	+61-2-96740910	Fax	Not Available
Website	www.accobrands.com.au	Website	Rewardhospitality.com.au
Email	sds.anz@acco.com	Email	yatala@rewardh.com.au

# **Emergency telephone number**

Association / Organisation	Poisons Information Line	Poisons Information Line
Emergency telephone numbers	13 11 26	13 11 26
Other emergency telephone numbers	Not Available	Not Available

# **SECTION 2 Hazards identification**

# Classification of the substance or mixture

HAZARDOUS CHEMICAL. NON-DANGEROUS GOODS. According to the WHS Regulations and the ADG Code.

Poisons Schedule	Not Applicable
Classification <sup>[1]</sup>	Skin Corrosion/Irritation Category 2, Serious Eye Damage/Eye Irritation Category 1, Hazardous to the Aquatic Environment Acute Hazard Category 3
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

# Label elements

Hazard pictogram(s)



Signal word

Danger

# Hazard statement(s)

H315	Causes skin irritation.
H318	Causes serious eye damage.
H402	Harmful to aquatic life.

# Precautionary statement(s) General

P101	If medical advice is needed, have product container or label at hand.		
P102	Keep out of reach of children.		
P103	Read carefully and follow all instructions.		

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# Laundry Powder

# Precautionary statement(s) Prevention

P280	Wear protective gloves, protective clothing, eye protection and face protection.	
P273	Avoid release to the environment.	
P264	Wash all exposed external body areas thoroughly after handling.	

# Precautionary statement(s) Response

P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.		
P310	Immediately call a POISON CENTER/doctor/physician/first aider.		
P302+P352	IF ON SKIN: Wash with plenty of water.		
P332+P313	If skin irritation occurs: Get medical advice/attention.		
P362+P364	Take off contaminated clothing and wash it before reuse.		

# Precautionary statement(s) Storage

Not Applicable

# Precautionary statement(s) Disposal

P501 Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.

**SECTION 3 Composition / information on ingredients** 

# Substances

See section below for composition of Mixtures

# Mixtures

CAS No	%[weight]	Name	
497-19-8	30-60	sodium carbonate	
7758-29-4	<10	sodium tripolyphosphate	
68411-30-3	<10	(C10-13)alkylbenzenesulfonic acid, sodium salt	
1344-09-8	<10	sodium metasilicate	
Not Available	<10	Huntsman Teric G12A	
7647-14-5	30-60	sodium chloride	
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L * EU IOELVs available		

# **SECTION 4 First aid measures**

# Description of first aid measures

Description of first aid measur	es .	
Eye Contact	If this product comes in contact with the eyes:  Immediately hold eyelids apart and flush the eye continuously with 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.  Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.  Transport to hospital or doctor without delay.  Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.	
Skin Contact	If skin or hair contact occurs:  Immediately flush body and clothes with large amounts of water, using safety shower if available.  Quickly remove all contaminated clothing, including footwear.  Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.  Transport to hospital, or doctor.	
Inhalation	<ul> <li>If fumes or combustion products are inhaled remove from contaminated area.</li> <li>Lay patient down. Keep warm and rested.</li> <li>Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>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.</li> <li>Transport to hospital, or doctor, without delay.</li> </ul>	
Ingestion	<ul> <li>For advice, contact a Poisons Information Centre or a doctor at once.</li> <li>Urgent hospital treatment is likely to be needed.</li> <li>If swallowed do NOT induce vomiting.</li> <li>If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>Observe the patient carefully.</li> <li>Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>Transport to hospital or doctor without delay.</li> </ul>	

# Indication of any immediate medical attention and special treatment needed

For acute or short-term repeated exposures to highly alkaline materials:

- Respiratory stress is uncommon but present occasionally because of soft tissue edema.
- ▶ Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary
- Oxygen is given as indicated.
- The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
- Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilisation of proteins allow deep penetration into the tissue.

Alkalis continue to cause damage after exposure

INGESTION:

Milk and water are the preferred diluents

No more than 2 glasses of water should be given to an adult.

- Neutralising agents should never be given since exothermic heat reaction may compound injury.
- \* Catharsis and emesis are absolutely contra-indicated.
- \* Activated charcoal does not absorb alkali.
- \* Gastric lavage should not be used.

Supportive care involves the following:

- Withhold oral feedings initially.
- If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
- Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
- Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

SKIN AND EYE:

Injury should be irrigated for 20-30 minutes.

Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology]

# **SECTION 5 Firefighting measures**

# **Extinguishing media**

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

Advice for firefighters

#### Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

# Fire Fighting

Fire/Explosion Hazard

- Alert Fire Brigade 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 courses.
- 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.

# • Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions. Dorganic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary

- 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 (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
- In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL) are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the 'Minimum Explosible Concentration', MEC).
- ▶ When processed with flammable liquids/vapors/mists,ignitable (hybrid) mixtures may be formed with combustible dusts. Ignitable mixtures will increase the rate of explosion pressure rise and the Minimum Ignition Energy (the minimum amount of energy required to ignite dust clouds - MIE) will be lower than the pure dust in air mixture. The Lower Explosive Limit (LEL) of the vapour/dust mixture will be lower than the individual LELs for the vapors/mists or dusts.

Combustion products include:

carbon monoxide (CO) carbon dioxide (CO2)

hydrogen chloride

phosgene

other pyrolysis products typical of burning organic material

May emit poisonous fumes

May emit corrosive fumes.

**HAZCHEM** 

Not Applicable

# **SECTION 6 Accidental release measures**

# Personal precautions, protective equipment and emergency procedures

See section 8

# **Environmental precautions**

See section 12

# Methods and material for containment and cleaning up

# Minor Spills

**Major Spills** 

- ▶ Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- ▶ Control personal contact with the substance, by using protective equipment.
- ▶ Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.

# Moderate hazard. • CAUTION: Ad

- ► CAUTION: Advise personnel in area.
- Alert Emergency Services 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.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

# **SECTION 7 Handling and storage**

# Precautions for safe handling

- 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.

  Safe handling

  ► Organic powders when finely divided over a ra
  - Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions)
  - ▶ Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame.
  - ▶ Establish good housekeeping practices.
  - ▶ Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds.
  - Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a 'secondary' explosion. According to NFPA Standard 654, dust layers 1/32 in.(0.8 mm) thick can be sufficient to warrant immediate cleaning of the area.
  - ▶ Do not use air hoses for cleaning.

# Other information

- Store in original containers.
- ► Keep containers securely sealed.
- ▶ Store in a cool, dry area protected from environmental extremes.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks
- Observe manufacturer's storage and handling recommendations contained within this SDS.

# For major quantities:

- Consider storage in bunded areas ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams).
- Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

# Conditions for safe storage, including any incompatibilities

# Suitable container

- ▶ DO NOT use aluminium or galvanised containers
- ► Polyethylene or polypropylene container
- Check all containers are clearly labelled and free from leaks.

# Sodium carbonate:

- ▶ aqueous solutions are strong bases
- reacts violently with finely divided aluminium, fluorine, lithium, phosphorus pentoxide, sulfuric acid
- reacts with fluorine gas at room temperature, generating incandescence.
- is incompatible with organic anhydrides, acrylates, alcohols, aldehydes, alkylene oxides, substituted allyls, cellulose nitrate, cresols, caprolactam solution, epichlorohydrin, ethylene dichloride, isocyanates, ketones, glycols, nitrates, phenols, phosphorus pentoxide 2,4,6-trinitrotoluene

# Storage incompatibility

- forms explosive material with 2,4,5-trinitrotoluene and increases the thermal sensitivity of 2,4,6-trinitrotoluene (TNT) by decreasing the temperature of explosion from 297 deg. C to 218 deg. C
- attacks metal.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignite on contact (without external source of heat or ignition) with recognised fuels contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- ▶ The state of subdivision may affect the results.
- In presence of moisture, the material is corrosive to aluminium, zinc and tin producing highly flammable hydrogen gas.
- Avoid strong acids, acid chlorides, acid anhydrides and chloroformates.
- Avoid contact with copper, aluminium and their alloys.

# SECTION 8 Exposure controls / personal protection

#### **Control parameters**

Occupational Exposure Limits (OEL)

#### INGREDIENT DATA

Not Available

# **Emergency Limits**

Ingredient	TEEL-1	TEEL-2	TEEL-3
sodium carbonate	7.6 mg/m3	83 mg/m3	500 mg/m3
sodium tripolyphosphate	0.61 mg/m3	6.8 mg/m3	620 mg/m3
sodium metasilicate	5.9 mg/m3	65 mg/m3	390 mg/m3
sodium chloride	0.5 ppm	2 ppm	20 ppm

Ingredient	Original IDLH	Revised IDLH
sodium carbonate	Not Available	Not Available
sodium tripolyphosphate	Not Available	Not Available
(C10-13)alkylbenzenesulfonic acid, sodium salt	Not Available	Not Available
sodium metasilicate	Not Available	Not Available
Huntsman Teric G12A	Not Available	Not Available
sodium chloride	Not Available	Not Available

# Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit					
sodium carbonate	E	≤ 0.01 mg/m³					
sodium tripolyphosphate	E	≤ 0.01 mg/m³					
(C10-13)alkylbenzenesulfonic acid, sodium salt	E	≤ 0.01 mg/m³					
sodium metasilicate	E	≤ 0.01 mg/m³					
Huntsman Teric G12A	E	≤ 0.1 ppm					
sodium chloride	E	≤ 0.01 mg/m³					
Notes:	Occupational exposure handing is a process of assigning chemicals into	Occupational exposure handing is a process of assigning chemicals into specific categories or hands based on a chemical's potency and the					

# adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

# **Exposure controls**

# Appropriate engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard 'physically' away from the worker and ventilation that strategically 'adds' and 'removes' air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.

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.

# Individual protection measures, such as personal protective equipment













# Eye and face protection

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation lens should be removed in a clean environment only after workers have washed hands thoroughly.

# Skin protection

See Hand protection below

# Hands/feet protection

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care. 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.

Suitability and durability of glove type is dependent on usage.

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

	<ul> <li>polychloroprene.</li> <li>nitrile rubber.</li> <li>butyl rubber.</li> <li>fluorocaoutchouc.</li> <li>polyvinyl chloride.</li> <li>Gloves should be examined for wear and/ or degradation constantly.</li> </ul>
Body protection	See Other protection below
Other protection	<ul> <li>Overalls.</li> <li>P.V.C apron.</li> <li>Barrier cream.</li> <li>Skin cleansing cream.</li> <li>Eye wash unit.</li> </ul>

#### Recommended material(s)

#### GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

Forsberg Clothing Performance Index'.

The effect(s) of the following substance(s) are taken into account in the computergenerated selection:

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Material	СРІ
BUTYL	С
NATURAL RUBBER	С
NATURAL+NEOPRENE	С
NEOPRENE	С
NITRILE	С
PVA	С
PVC	С
SARANEX-23	С
VITON	С

<sup>\*</sup> CPI - Chemwatch Performance Index

- A: Best Selection
- B: Satisfactory; may degrade after 4 hours continuous immersion
- C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

\* Where the glove is to be used on a short term, casual or infrequent basis, factors such as 'feel' or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

#### Respiratory protection

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	A P1 Air-line*	-	A PAPR-P1
up to 50 x ES	Air-line**	A P2	A PAPR-P2
up to 100 x ES	-	A P3	-
		Air-line*	-
100+ x ES	-	Air-line**	A PAPR-P3

- \* Negative pressure demand \*\* Continuous flow
- A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)
- $\cdot$  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 protection. 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.
- · Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)
- · Use approved positive flow mask if significant quantities of dust becomes airborne.
- · Try to avoid creating dust conditions.

Class P2 particulate filters are used for protection against mechanically and thermally generated particulates or both.
P2 is a respiratory filter rating under various international standards, Filters at least

94% of airborne particles

Suitable for:

- $\cdot \ \text{Relatively small particles generated by mechanical processes eg. grinding, cutting,} \\$ sanding, drilling, sawing
- · Sub-micron thermally generated particles e.g. welding fumes, fertilizer and bushfire smoke.
- · Biologically active airborne particles under specified infection control applications e.g. viruses, bacteria, COVID-19, SARS

# **SECTION 9 Physical and chemical properties**

#### Information on basic physical and chemical properties Appearance Blue Powder Solid Relative density (Water = 1) Not Available Physical state Partition coefficient n-octanol Odour Not Available Not Available / water **Auto-ignition temperature** Not Available Odour threshold Not Available (°C) Decomposition pH (as supplied) Not Available Not Available temperature (°C) Melting point / freezing point Viscosity (cSt) Not Available Not Available

(°C)			
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Miscible	pH as a solution (1%)	10-12
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

# **SECTION 10 Stability and reactivity**

Reactivity	See section 7
Chemical stability	<ul> <li>Unstable in the presence of incompatible materials.</li> <li>Product is considered stable.</li> <li>Hazardous polymerisation will not occur.</li> </ul>
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

# **SECTION 11 Toxicological information**

Information	on	toxicological	effects

Inhaled	Inhalation of dusts, generated by the material, during the course of normal handling, may be harmful.  The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.  Inhalation of sodium carbonate may cause coughing, sore throat, difficulty breathing. Fluid accumulation in the lungs can occur with exposure to high doses or over a long period of time.
Ingestion	The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.  The material is not thought to produce adverse health effects following ingestion (as classified by EC Directives using animal models).  Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum.
Skin Contact	The material can produce chemical burns following direct contact with the skin.  Open cuts, abraded or irritated skin should not be exposed to this material  Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.  Contact with concentrated solutions of sodium carbonate may cause tissue damage - 'soda ulcers .  The material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering.
Еуе	The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating. If applied to the eyes, this material causes severe eye damage. 510sodacarb  Alkaline salts may cause severe irritation to the eyes and precautions should be taken to avoid direct eye contact.
Chronic	Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue.  Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.  Long term inhalation of sodium carbonate may result in nose damage and lung disease.

Lauradeu Baurdan	TOXICITY		IRRITATION	
Laundry Powder	Not Available		Not Available	
sodium carbonate				
Socium Carbonate	TOXICITY	IRRITATIO	ON .	

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_								
	dermal (rat) LD50: >2000 mg/kg <sup>[2]</sup>		Eye (rabbit): 100 mg/24h moderate					
	Oral (Rat) LD50: 2800 mg/kg <sup>[2]</sup>		Eye (rabbit	e (rabbit): 100 mg/30s mild				
			Eye (rabbit	t): 50 mg SEVERE				
			Eye: adver	rse effect observed (irritating) <sup>[1]</sup>				
			Skin (rabbi	t): 500 mg/24h mild				
		Skin: no adverse effect observed (not irritating) <sup>[1]</sup>						
	TOXICITY	TOXICITY IRRITATION						
	Dermal (rabbit) LD50: >3160 mg/kg <sup>[2]</sup>			Eye: no adverse effect observed (not irritating) <sup>[1]</sup>				
sodium tripolyphosphate	Inhalation (Rat) LC50: >0.39 mg/l4h <sup>[1]</sup>			Skin: no adverse effect observed (not irritating) <sup>[1]</sup>				
	Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>		SKIII. IIC	o adverse ellect observed (not lintaulig).				
	oral (rat) 2500.1 2000 Highlig							
	TOXICITY	ı	RRITATION					
(C10-13)alkylbenzenesulfonic	dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup>		Eye: adverse	effect observed (irreversible damage) <sup>[1]</sup>				
acid, sodium salt	Oral (Rat) LD50: 404 mg/kg <sup>[2]</sup>		Eye: adverse	effect observed (irritating) <sup>[1]</sup>				
		5	Skin: adverse	effect observed (irritating) <sup>[1]</sup>				
	TOXICITY			IRRITATION				
sodium metasilicate	dermal (rat) LD50: >5000 mg/kg <sup>[1]</sup>			Skin (human): 250 mg/24h SEVERE				
	Inhalation (Rat) LC50: >2.06 mg/l4h <sup>[1]</sup>			Skin (rabbit): 250 mg/24h SEVERE				
	Oral (Rat) LD50: 1153 mg/kg <sup>[2]</sup>							
	TOXICITY IRRITATION							
Huntsman Teric G12A	Not Available	Skin (rabbit): n	noderate - SE	EVERE				
	TOXICITY		IRRITA	ATION				
	Dermal (rabbit) LD50: >10000 mg/kg <sup>[1]</sup>		Eye (rabbit): 10 mg - moderate					
	Inhalation (Rat) LC50: >10.5 mg/l4h <sup>[1]</sup>		Eye (rabbit):100 mg/24h - moderate					
sodium chloride	Oral (Rat) LD50: 3000 mg/kg <sup>[2]</sup>		Eye: adverse effect observed (irritating) <sup>[1]</sup>					
			Skin (rabbit): 500 mg/24h - mild					
			Skin: n	Skin: no adverse effect observed (not irritating) <sup>[1]</sup>				
Legend:	Value obtained from Europe ECHA Re specified data extracted from RTECS - R			toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise nical Substances				
(C10- 13)ALKYLBENZENESULFONIC ACID, SODIUM SALT	consistent with the detergents in an oil-b Subchronic toxicity: Existing data sugge animals caused injury to the skin and th Reproductive and Developmental Toxici toxicity. There was low concern for muta	elatively low acute based vehicle har ests minimal toxic e lungs, respective ity: Existing data attion-causing potential	ving an irritati ity after chror vely. did not show ential.	nic exposure by mouth. Repeated skin contact and inhalation in this group of substances to cause reproductive or developmental				
	The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may							

# SODIUM METASILICATE

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

# \* Teric 12A8 [I.C.I]

Humans have regular contact with alcohol ethoxylates through a variety of industrial and consumer products such as soaps, detergents and other cleaning products. Exposure to these chemicals can occur through swallowing, inhalation, or contact with the skin or eyes. Studies of acute toxicity show that relatively high volumes would have to occur to produce any toxic response. No death due to poisoning with alcohol ethoxylates have low toxicity through swallowing and skin contact. Animal studies show these chemicals may produce gastrointestinal irritation, stomach ulcers, hair standing up, diarrhea and lethargy. Slight to severe irritation occurred when undiluted alcohol ethyoxylates were applied to the skin and eyes of animals. These chemicals show no indication of genetic toxicity or potential to cause mutations and cancers. Toxicity is thought to be substantially lower than that of

# **HUNTSMAN TERIC G12A**

nonylphenol ethoxylates.

Some of the oxidation products of this group of substances may have sensitizing properties.

As they cause less irritation, nonionic surfactants are often preferred to ionic surfactants in topical products.

Both laboratory and animal testing has shown that there is no evidence for alcohol ethoxylates (AEs) causing genetic damage, mutations or cancer. No adverse reproductive or developmental effects were observed.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.

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# Laundry Powder

#### The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce **SODIUM CHLORIDE** conjunctivitis Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic Laundry Powder & SODIUM condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating **CARBONATE & SODIUM** compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden TRIPOLYPHOSPHATE & (C10onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of 13)ALKYLBENZENESULFONIC RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an ACID, SODIUM SALT & infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, **SODIUM METASILICATE &** industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and SODIUM CHLORIDE is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production. For sodium carbonate: Sodium carbonate has little potential for skin irritation, but is irritating to the eyes. Due to its alkaline properties, irritation of the airways is also possible Laundry Powder & SODIUM There is no data available for animal studies regarding the repeated dose toxicity of sodium carbonate by any route. There is no evidence CARBONATE that sodium carbonate causes whole-body effects under normal handling and use. Sodium carbonate does not reach the foetus or the reproductive organs, which shows that there is no risk for developmental or reproductive toxicity. Sodium carbonate has not been shown to cause genetic toxicity or mutations. Laundry Powder & (C10-Linear alkyl benzene sulfonates are derived from strong corrosive acids. Animal testing has shown they can cause skin reactions, eye 13)ALKYLBENZENESULFONIC irritation, sluggishness, passage of frequent watery stools, weakness and may lead to death. They may also react with surfaces of the mouth and intestines, depending on the concentration exposed to. There is no evidence of harm to the unborn baby or tendency to cause **ACID, SODIUM SALT SODIUM CARBONATE &** The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the SODIUM METASILICATE & production of vesicles, scaling and thickening of the skin. SODIUM CHLORIDE **Acute Toxicity** Carcinogenicity Skin Irritation/Corrosion Reproductivity Serious Eye × STOT - Single Exposure Damage/Irritation Respiratory or Skin × × STOT - Repeated Exposure sensitisation Mutagenicity **Aspiration Hazard**

Legend:

X - Data either not available or does not fill the criteria for classification

- Data available to make classification

# **SECTION 12 Ecological information**

LC50

96h

Endpoint   Not Available   N	city									
Not Available   Not Availabl		Endpoint		Test Duration (hr)		Species	Value		Source	e
Companies	Laundry Powder	Not Available		Not Available		Not Available	Not Ava	ailable	Not Available	
EC50		Endpoint	Te	st Duration (hr)	Spe	Species		Value		Source
Column carbonate   Column carb	sodium carbonate	EC50	72	72h Al		Algae or other aquatic plants		>800m	>800mg/l	
LC50   96h   Fish   300mg/l   2		EC50	48	h	Crus	tacea		156.6-2	298.9mg/l	4
NOEC(ECx)   48h   Fish   0.011mg/L   4		LC50	96	h	Fish			300mg	<u>/</u> [	2
Endpoint   Test Duration (hr)   Species   Value   Source		EC50	96	h	Alga	e or other aquatic plants		242mg	/L	4
Companies		NOEC(ECx)	48	h	Fish			0.011m	g/L	4
EC50										
EC50   96h   Algae or other aquatic plants   69.2mg/l   2	sodium tripolyphosphate	Endpoint	Tes	Test Duration (hr) Sp		Species		Value		Source
EC50   96h   Algae or other aquatic plants   69.2mg/l   2		EC50	48h		Crust	Crustacea		>70.7<101.3mg/l		2
Endpoint   Test Duration (hr)   Species   Value   Source		EC50	96h		Algae	Algae or other aquatic plants		69.2mg/l		2
ErC50   72h   Algae or other aquatic plants   20mg/l   1		EC50(ECx)	Not	Not Reportedh Alg		Algae or other aquatic plants 25-6		25-60mg	g/L	4
ErC50   72h   Algae or other aquatic plants   20mg/l   1		-								·
EC50   72h   Algae or other aquatic plants   20mg/l   1		Endpoint	Test Duration (hr)			Species			Value	Source
10-13)alkylbenzenesulfonic acid, sodium salt   EC50		ErC50	7	72h		Algae or other aquatic pla	ints	20mg/l		1
Crustacea   6.5mg/l   1		EC50	7	72h		Algae or other aquatic plants			20mg/l	1
LC50   96h   Fish   0.26mg/l   2     NOEC(ECx)   72h   Algae or other aquatic plants   0.1mg/l   1     EC50   96h   Algae or other aquatic plants   0.91mg/l   2     sodium metasilicate   Endpoint   Test Duration (hr)   Species   Value   Source     EC50   72h   Algae or other aquatic plants   207mg/l   2		EC50	4	18h		Crustacea		6.5mg/l		1
sodium metasilicate    Endpoint   Test Duration (hr)   Species   Value   Source     EC50   72h   Algae or other aquatic plants   207mg/l   2	aciu, soulum sait	LC50	g	96h		Fish		0.26mg/l		2
sodium metasilicate  Endpoint Test Duration (hr) Species Value Source  EC50 72h Algae or other aquatic plants 207mg/l 2		NOEC(ECx)	7	72h		Algae or other aquatic plants		0.1mg/l		1
Endpoint     Test Duration (hr)     Species     Value     Source       EC50     72h     Algae or other aquatic plants     207mg/l     2		EC50	9	96h		Algae or other aquatic plants			0.91mg/l	2
Endpoint     Test Duration (hr)     Species     Value     Source       EC50     72h     Algae or other aquatic plants     207mg/l     2	sodium metasilicate									
	Journal metasineate	Endpoint	Tes	st Duration (hr)	Spe	Species		Value		Source
EC50 48h Crustacea 0.28-0.57mg/l 4		EC50	72h	า	Alga	Algae or other aquatic plants		207n	ng/l	2
		EC50	48h	า	Cru	stacea		0.28-0.57mg/l		4

Fish

260-310mg/l

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# **Laundry Powder**

	EC50(ECx)	48h		Crusta	cea		0.28-0.57mg/l	l	4
Huntsman Teric G12A	Endpoint		Test Duration (hr)		Species	Value		Source	
Huntsman Teric G12A	Not Available No		Not Available		Not Available	Not Availa	ble	Not Available	
	Endpoint	Test	Duration (hr)	Specie	s	,	Value		Source
sodium chloride	EC50	72h		Algae or other aquatic plants			20.76-36.17mg/L		4
	EC50	48h		Crustacea			0.004-0.006mg/L		4
	LC50	96h		Fish			1000mg/L		4
	EC50	96h		Algae or other aquatic plants			1110.36mg/L		4
	NOEC(ECx)	6h		Fish			0.001mg/L		4
Legend:	Ecotox database	- Aquatic		TOC Aquatic	istered Substances - L Hazard Assessment D				

Harmful to aquatic organisms.

For Linear Alkylbenzene Sulfonic Acids and their Salts (LABS): Log Kow: ~2.

Environmental Fate: The environmental fate of LABS and alkylbenzene sulfonate, (LAS), are expected to be similar. LABS are liquids and LAS is a solid at room temperature. Most of these chemicals will partition to the soil and water very little move to the air or sediment. Atmospheric Fate: Breakdown of LABS/LAS by light is expected to be an important fate process. The substances are expected to be broken down by hydroxyl radicals, with a half-life of 7-8.6 hours, (LABS), and 95% breakdown of LAS, in 20 minutes, at 25 C.

Terrestrial Fate: Substantial breakdown of LABS, LAS, and the C10-16 derivatives of LABS by oxygen using microbes is expected to occur. LAS will not breakdown under low oxygen conditions

For sodium carbonate

Environmental Fate:

As sodium carbonate has the capacity to drastically increase the pH of an ecosystm, the extent of its effect on organisms depends on the buffer capacity of the aquatic or terrestrial ecosystem, and the pH tolerance levels of the organisms living there. While the use of sodium carbonate could potentially result in its release into aquatic systems and cause an increase in pH, these levels are usually monitored in effluents, and can easily be corrected. If corrective measures are taken to control the pH of waste water no significant increase in the receiving water or adverse environmental effects is not expected with the use of sodium carbonate. The sodium ion will remain in solution and not adsorb to particulate matter. In water the carbonate ions will re-equilibrate until equilibrium is established, and will finally be incorporated into the inorganic and organic carbon cvcle.

Ecotoxicity:

Aquatic invertebrate EC50 (48 h): Cladoceran ceriodaphnia cf Dubia: 200-227 mg/l (immobilisation).

The variation in acute toxicity for aquatic organisms may be explained by the variation in buffer capacity of the test medium. In general, mortality of the test organisms was found at concentrations higher than 100 mg/l, but for Amphipoda, salmon and trout, lethal effects were observed at 67-80 mg/l.

For Surfactants: Kow cannot be easily determined due to hydrophilic/hydrophobic properties of the molecules in surfactants. BCF value: 1-350.

Aquatic Fate: Surfactants tend to accumulate at the interface of the air with water and are not extracted into one or the other liquid phases

Terrestrial Fate: Anionic surfactants are not appreciably sorbed by inorganic solids. Cationic surfactants are strongly sorbed by solids, particularly clays. Significant sorption of anionic and non-ionic surfactants has been observed in activated sludge and organic river sediments. Surfactants have been shown to improve water infiltration into soils with moderate to severe hydrophobic or water-repellent properties

Ecotoxicity. Some surfactants are known to be toxic to animals, ecosystems and humans, and can increase the diffusion of other environmental contaminants.

DO NOT discharge into sewer or waterways

# Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air		
sodium carbonate	LOW	LOW		
sodium chloride	LOW	LOW		

# Bioaccumulative potential

Ingredient	Bioaccumulation
sodium carbonate	LOW (LogKOW = -0.4605)
(C10-13)alkylbenzenesulfonic acid, sodium salt	LOW (BCF = 245)
sodium chloride	LOW (LogKOW = 0.5392)

# Mobility in soil

Ingredient	Mobility
sodium carbonate	HIGH (Log KOC = 1)
sodium chloride	LOW (Log KOC = 14.3)

# **SECTION 13 Disposal considerations**

# Waste treatment methods

	•	DC	тои с	allow	wash	water	from	cleaning	or	process	equipm	ent to	enter	drains
--	---	----	-------	-------	------	-------	------	----------	----	---------	--------	--------	-------	--------

It may be necessary to collect all wash water for treatment before disposal. Product / Packaging disposal

- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.

#### **SECTION 14 Transport information**

#### **Labels Required**

Marine Pollutant	NO
HAZCHEM	Not Applicable

Land transport (ADG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

# 14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
sodium carbonate	Not Available
sodium tripolyphosphate	Not Available
(C10-13)alkylbenzenesulfonic acid, sodium salt	Not Available
sodium metasilicate	Not Available
Huntsman Teric G12A	Not Available
sodium chloride	Not Available

# 14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
sodium carbonate	Not Available
sodium tripolyphosphate	Not Available
(C10-13)alkylbenzenesulfonic acid, sodium salt	Not Available
sodium metasilicate	Not Available
Huntsman Teric G12A	Not Available
sodium chloride	Not Available

# **SECTION 15 Regulatory information**

# Safety, health and environmental regulations / legislation specific for the substance or mixture

# sodium carbonate is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

 $\label{thm:constraints} \textbf{Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule \ 4}$ 

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5  $\,$ 

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6

Australian Inventory of Industrial Chemicals (AIIC)

# sodium tripolyphosphate is found on the following regulatory lists

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 3 Australian Inventory of Industrial Chemicals (AIIC)

# (C10-13)alkylbenzenesulfonic acid, sodium salt is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals Australian Inventory of Industrial Chemicals (AIIC)

# sodium metasilicate is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6

Australian Inventory of Industrial Chemicals (AIIC)

# Huntsman Teric G12A is found on the following regulatory lists

Not Applicable

# sodium chloride is found on the following regulatory lists

Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4 Australian Inventory of Industrial Chemicals (AIIC)

# **Additional Regulatory Information**

Not Applicable

# **National Inventory Status**

National Inventory	Status
Australia - AIIC / Australia Non- Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (sodium carbonate; sodium tripolyphosphate; sodium metasilicate; sodium chloride)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	No ((C10-13)alkylbenzenesulfonic acid, sodium salt)
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.

#### **SECTION 16 Other information**

#### Other information

Classification of the preparation 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.

The 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.

# **Definitions and abbreviations**

- ▶ PC TWA: Permissible Concentration-Time Weighted Average
- ▶ PC STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ▶ ACGIH: American Conference of Governmental Industrial Hygienists
- ▶ STEL: Short Term Exposure Limit
- ► TEEL: Temporary Emergency Exposure Limit。
- ▶ IDLH: Immediately Dangerous to Life or Health Concentrations
- ▶ ES: Exposure Standard
- ▶ OSF: Odour Safety Factor
- NOAEL: No Observed Adverse Effect Level
- ▶ LOAEL: Lowest Observed Adverse Effect Level
- ▶ TLV: Threshold Limit Value
- ▶ LOD: Limit Of Detection
- OTV: Odour Threshold Value
- ▶ BCF: BioConcentration Factors ▶ BEI: Biological Exposure Index
- ▶ DNEL: Derived No-Effect Level
- ▶ PNEC: Predicted no-effect concentration
- ▶ AIIC: Australian Inventory of Industrial Chemicals
- ▶ DSL: Domestic Substances List
- ▶ NDSL: Non-Domestic Substances List
- ▶ IECSC: Inventory of Existing Chemical Substance in China
- ▶ EINECS: European INventory of Existing Commercial chemical Substances
- ► ELINCS: European List of Notified Chemical Substances
- NLP: No-Longer Polymers
- ▶ ENCS: Existing and New Chemical Substances Inventory
- ▶ KECI: Korea Existing Chemicals Inventory
- ▶ NZIoC: New Zealand Inventory of Chemicals
- ▶ PICCS: Philippine Inventory of Chemicals and Chemical Substances
- ▶ TSCA: Toxic Substances Control Act
- ► TCSI: Taiwan Chemical Substance Inventory
- ▶ INSQ: Inventario Nacional de Sustancias Químicas
- NCI: National Chemical Inventory
   FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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