Super Kelp SP

Agreva Sustainable Agriculture

Chemwatch Hazard Alert Code: **1**

Chemwatch: **5680-56**
Version No: **2.1**
Safety Data Sheet according to Work Health and Safety Regulations (Hazardous Chemicals) 2023 and ADG requirements

Issue Date: **27/06/2024**
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S.GHS.AUS.EN.E

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

Product Identifier

Product name	Super Kelp SP
Chemical Name	Not Applicable
Synonyms	Kelp soluble powder
Chemical formula	Not Applicable
Other means of identification	Not Available

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

Relevant identified uses	Use according to manufacturer's directions. Seaweed or macroalgae Seaweed, or macroalgae, refers to several species of macroscopic, multicellular, marine algae. Seaweed extracts are used ▸ as plant growth biostimulants ▸ as feed additives ▸ in biomedical applications: Algal extracts were firstly manufactured to obtain highly concentrated product with long shelf life While liquefying seaweeds, in some cases even 100% of particular biologically active substances can be extracted . Among different valuable compounds in algal extracts there are sulfated polysaccharides, carotenoid pigments, phycosterols, bioactive peptides polyunsaturated fatty acids (PUFA), betaines, taurine, polyphenols (especially phlorotannins), minerals, vitamins and others Some of biologically active substances, like phlorotannins, occur only in seaweeds. As plant growth biostimulants: Seaweed extracts can act as plant biostimulants improving condition and vitality of plants due to the presence of many bioactive substances important for higher plants and can enhance nutrient uptake from soil.. Seaweed extracts produce beneficial effect on seed germination and root development Plant biostimulants are also able to improve crop yields . Marine algae are a rich source of many bioactive substances that can positively affect cellular metabolism and beneficially condition the plants These substances are also present in sea-weed extracts. Among them there are many compounds such as polysaccharides (e.g. laminaran and fucoidan), polyphenols phytohormones, carotenoids and minor nutrients Polymers synthesized by seaweeds play an important role in defending plants against microorganisms. Fucoidan is well known for its antiviral and antibacterial action, while laminaran stimulates genes for producing special proteins that participate in antimicrobial response. Another polysaccharide – alginate, is responsible for activating growth of some symbiotic fungi in rhizosphere. Galactans, carrageenans and agars present in cell wall of red seaweeds are known for anticoagulant and antiviral activity and act as natural chelators, support root elongation and improve the moisture content of the soil (as hydrocolloids with antioxidant and gelling activity). Polyphenols, identified in algal extracts, are known for antibacterial activity, which protect plants against diseases . Carotenoids have also been detected in seaweed extracts. They enable plants to protect them from chlorophyll degradation Sesquiterpenes, acting as plant pheromones, are found in seaweed extracts. They exhibit antibacterial and antifungal activity. Seaweed extracts are also a rich source of macro- and micronutrients (Fe, Mn, Co, Cu) which play many important roles in plants. They are essential for plants life cycle, occurring in active sites of metalloproteins. Furthermore, they improve crops quality and increase crop yields because of their influence on soil conditions Seaweed extract was found to significantly reduce the incidence of white blister disease on broccoli leaves. Clubroot caused by Plasmodiophora brassicae is considered the most important soil-borne disease of brassicae crop. a liquid seaweed extract could reduce primary and secondary infection of broccoli by P. brassicae. The direct role of seaweed extracts in reducing the inoculum of fungal, soil-borne pathogens such as S. minor has elicited interest. S. minor is a devastating necrotrophic pathogen of a number of horticultural crops, including lettuce, green bean, cabbage, broccoli and others. As feed additives Use of algal extracts as feed additives has many benefits, like overall health improvement of feedstock, favorable change in gastrointestinal flora or increased milk production. Algal extracts used in aquaculture contain compounds, which have significant positive effects on the growth and immune system. Fucoidan and laminarin are of particular interest because of their positive effect on animals (especially pigs) gut flora. A study with newly weaned pigs showed that the inclusion of laminarin-fucoidan extract decreased the counts of E. coli in the faeces and improved performance of pigs after weaning As prophylactic antibiotics for pigs (feed additives acting as growth promoters) have been banned in most countries there is an urgent need for new, safe and natural substances with antimicrobial properties. Fucoidan acts a soluble dietary fibre, which has been reported to increase feed intake in pig-feeding studies. Zootechnical research on chickens showed that carrageenans reduce the cholesterol concentration in the blood plasma. Alginates can prevent absorption of toxic metal cations and play the role of dietary fibre which "cleans" the digestive system and prevents substances like toxic metal ions or cholesterol from absorption into the organism. Alginates also possess strong antibacterial properties and stimulate reparative process in wound healing.. Seaweeds contain substantial amounts of omega-3 fatty acids (polyunsaturated fatty acids - PUFAs) which are substances of particular interest in animal feeding, because of their antimicrobial and antioxidant properties and their ability to biofortify animal products Addition of PUFAs to the animal feed biofortifies animal products with these substances, because they are essential in human nutrition. Studies show that feeding animals with omega-3 fatty acid supplement increases the content of these substances in milk, meat and eggs. Carotenoids and phycobiliproteins are the most useful pigments in terms of animal feeding. Carotenoid compounds have been reported to have antimicrobial and antioxidant properties. Moreover, some pigments can accumulate in muscles of salmonoids (salmon and trout) and enhance their colour, which makes them more attractive for consumers. Studies have shown that polyphenolic compounds extracted from seaweeds are bioavailable for animals from the colon. Polyphenols can be absorbed either directly in the upper digestive tract in unchanged form or in the lower intestine, after modification by gut bacteria.. Polyphenols exhibit very strong antioxidative properties and are anti-inflammatory and antimutagenic. In biomedical applications: Algae are a natural source of bioactive molecules with a broad range of biological activities, such as antibiotics, anti-virals, anti-tumorals, antioxidants and anti-inflammatories. Alginates are used in wound dressings, and dental moulds. In microbiology, agar is used as a culture medium. Carrageenans, alginates and agaroses, with other macroalgael polysaccharides, have biomedicine applications. Seaweed extract is used in some diet pills. Other seaweed pills exploit the same effect as gastric banding, expanding in the stomach to

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	make the stomach feel more full A large number of algal extract products derived from seaweeds have been found to have antimicrobial activity. Many of the structures were identified as fatty acids and hydroxyl unsaturated fatty acids, glycolipids, steroids, phenolics and terpenoids. Lauric acid, palmitic acid, linolenic acid, oleic acid, stearic acids are known to be potential antibiotic or antifungal agents Some halogenated with bromine, chlorine and even iodine metabolites like diterpenes, triterpenes have been reported to possess diverse biological activities as anti-bacterials, ichtyotoxics, antioxidant, antimalarials, insecticidals and cytotoxics . Polysaccharides possess immunological properties ranging from nonspecific stimulation of host immune system, resulting in anti-tumor, antiviral and anti-infection effects to antioxidant, anti-mutagenic or haematopoietic activity. Polysaccharides have shown good immunomodulatory properties associate with antitumour effects. A role of sulfated polysaccharides from algae as anti-neoplastic agent has been suggested. Several investigations have reported that sulfated polysaccharides have anti-proliferative activity in cancer cell lines as well as inhibitory activity against tumors. The anticoagulant, antithrombotic, immuno-modulatory, anticancer and anti-proliferative activities of fucoidans are extensively reported Fucoidan has antiviral properties toward viruses such as HIV and human cytomegalovirus (HCMV) Increasing the number of sulfate groups in the fucoidan molecule has been shown to affect the anti-tumor and anti-angiogenic activity. Fucoidan with sulfate content less than 20% showed dramatic decreases in anticancer activity. It was also suggested that fucoidan polymers activate the host immune system against tumor. Structural similarities between sulfated poly-saccharides from marine algae and heparin have been reported, Heparin (an anticoagulant) be used as a medication for thrombotic disorders. Antioxidant properties are found in the protein extract, specifically some phycobiliproteins such as C-phycocyanin (CP) and allophycocyanin. It was confirmed that the protection effect against hydroxy urea-teratogenic insult was related to the antioxidant activity of the protein extract Natural pigments have received particular attention, because of their beneficial activities, such as anticancer, anti-inflammatory, anti-obesity, anti-angiogenic and neuroprotective effects. Potential antioxidant compounds were associated with some seaweed pigments (fucoxanthin, astaxantin, carotenoids) Many products based on microalgal pigment with intended uses including anti-obesity agents, immunity boosters and many others can be found on the market Microalgal phenolics can be expected to contribute to the antioxidant activity by suppressing lipid peroxidation. Polyphenolic extracts possess therapeutic potential for combating bronchial asthma associated with allergic diseases. Intraperitoneal administration of several resulted in a significant inhibition of all asthmatic reactions Tannins have also been reported to show their HIV-1 inhibitory mode of action by inhibiting polymerase and ribonuclease activities of HIV-1RT . Enteromorpha exhibited good antioxidant activitiesof its bioactive compounds (phlorotannins) which anticipate a major breakthrough for a variety of food/medical applications as they have potential for the use of such compounds as natural antioxidants in different pharmaceutical products. Many of polyphenolic compounds found in algal extracts are endowed with photoprotective and anti-photoaging activities that can prevent oxidative stress and damage from exposure to UV radiation One of the group of compounds synthesized by algae phlorotannins, are able to absorb UV radiation, acting as photoprotective cells against photo-damage It was found that these properties can also protect against UVB-induced skin carcinogenesis in animal. Phlorotannins such as dieckol and eckol reduce the intracellular reactive oxygen species generated by gamma-ray radiation . Phlorotannin, dieckol, has potential whitening effect and can have potential use in the pharmaceutical and cosmetics industry for skin treatment. Ability to inhibit digestive enzymes to achieve The potential anti-diabetic effect of phenolic-rich extracts from marine macroalgae has been demonstrated Fucosterol (phlorotannins) caused a significant decrease in serum glucose concentration and exhibited an inhibition of sorbitol accumulation in the lenses of rats. In vitro, phlorotannin extracts completely inhibited the dose-dependent relation of alpha-amylase and alpha-glucosidase, while in animals the phlorotannins extracts were able to reduce the normal increase in postprandial blood glucose observed 20 minutes after a meal by 90% and consecutively reduced peak insulin secretion by 40%. Several phlorotannins isolated from Eisenia arborea were reported to possess antiallergic properties. Polyphenol-rich extracts and isolated phlorotannin components have been shown to inhibit proliferation of cancer cells (e.g. colon cancer) and to influence anti-inflammatory responses Phloroglucinol (phlorotannins) derivatives exerted a higher anti-proliferative activity in human breast cancer cell lines,an induced a significant proliferative inhibition and apoptosis.

Details of the manufacturer or supplier of the safety data sheet

Registered company name	**Agreva Sustainable Agriculture**	**Sustainable Farming Solutions**
Address	160 Pine Ave, Mildura VIC 3500 Australia	160 Pine Ave, Mildura VIC 3500 Australia
Telephone	+613 9008 6352; +618 93883623	+613 9008 6352; +618 93883623
Fax	Not Available	Not Available
Website	http://agreva.com/	sustainablefarming.com.au
Email	Not Available	Not Available

Emergency telephone number

Association / Organisation	**CHEMWATCH EMERGENCY RESPONSE (24/7)**
Emergency telephone numbers	+61 1800 951 288
Other emergency telephone numbers	+61 3 9573 3188

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SECTION 2 Hazards identification

Classification of the substance or mixture

Poisons Schedule	Not Applicable
Classification [1]	Not Applicable

Label elements

Hazard pictogram(s)	Not Applicable
Signal word	**Not Applicable**

Hazard statement(s)

Not Applicable

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Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
84775-78-0	>60	kelp extract
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

Eye Contact	If this product comes in contact with eyes: ▸ Wash out immediately with water. ▸ If irritation continues, seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation. For thermal burns: ▸ Decontaminate area around burn. ▸ Consider the use of cold packs and topical antibiotics. For first-degree burns (affecting top layer of skin) ▸ Hold burned skin under cool (not cold) running water or immerse in cool water until pain subsides. ▸ Use compresses if running water is not available. ▸ Cover with sterile non-adhesive bandage or clean cloth. ▸ Do NOT apply butter or ointments; this may cause infection. ▸ Give over-the counter pain relievers if pain increases or swelling, redness, fever occur. For second-degree burns (affecting top two layers of skin) ▸ Cool the burn by immerse in cold running water for 10-15 minutes. ▸ Use compresses if running water is not available. ▸ Do NOT apply ice as this may lower body temperature and cause further damage. ▸ Do NOT break blisters or apply butter or ointments; this may cause infection. ▸ Protect burn by cover loosely with sterile, nonstick bandage and secure in place with gauze or tape. To prevent shock: (unless the person has a head, neck, or leg injury, or it would cause discomfort): ▸ Lay the person flat. ▸ Elevate feet about 12 inches. ▸ Elevate burn area above heart level, if possible. ▸ Cover the person with coat or blanket. ▸ Seek medical assistance. For third-degree burns Seek immediate medical or emergency assistance. In the mean time: ▸ Protect burn area cover loosely with sterile, nonstick bandage or, for large areas, a sheet or other material that will not leave lint in wound. ▸ Separate burned toes and fingers with dry, sterile dressings. ▸ Do not soak burn in water or apply ointments or butter; this may cause infection. ▸ To prevent shock see above. ▸ For an airway burn, do not place pillow under the person's head when the person is lying down. This can close the airway. ▸ Have a person with a facial burn sit up. ▸ Check pulse and breathing to monitor for shock until emergency help arrives.
Inhalation	▸ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▸ Other measures are usually unnecessary.
Ingestion	▸ Immediately give a glass of water. ▸ First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 Firefighting measures

Extinguishing media

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

Special hazards arising from the substrate or mixture

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

Advice for firefighters

Fire Fighting	▸ 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.
Fire/Explosion Hazard	▸ 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. ▸ 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). ▸ 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. ▸ A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people. ▸ Usually the initial or primary explosion takes place in a confined space such as plant or machinery, and can be of sufficient force to damage or rupture the plant. If the shock wave from the primary explosion enters the surrounding area, it will disturb any settled dust layers, forming a second dust cloud, and often initiate a much larger secondary explosion. All large scale explosions have resulted from chain reactions of this type. ▸ 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. ▸ All movable parts coming in contact with this material should have a speed of less than 1-meter/sec. ▸ A sudden release of statically charged materials from storage or process equipment, particularly at elevated temperatures and/ or pressure, may result in ignition especially in the absence of an apparent ignition source. ▸ One important effect of the particulate nature of powders is that the surface area and surface structure (and often moisture content) can vary widely from sample to sample, depending of how the powder was manufactured and handled; this means that it is virtually impossible to use flammability data published in the literature for dusts (in contrast to that published for gases and vapours). ▸ Autoignition temperatures are often quoted for dust clouds (minimum ignition temperature (MIT)) and dust layers (layer ignition temperature (LIT)); LIT generally falls as the thickness of the layer increases. Combustion products include: carbon monoxide (CO) carbon dioxide (CO2) sulfur oxides (SOx) other pyrolysis products typical of burning organic material.
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	▸ Clean up all spills immediately. ▸ Avoid contact with skin and eyes. ▸ Wear impervious gloves and safety glasses. ▸ Use dry clean up procedures and avoid generating dust. ▸ Vacuum up (consider explosion-proof machines designed to be grounded during storage and use). ▸ Do NOT use air hoses for cleaning ▸ Place spilled material in clean, dry, sealable, labelled container.
Major Spills	▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Control personal contact with the substance, by using protective equipment and dust respirator. ▸ Prevent spillage from entering drains, sewers or water courses. ▸ Avoid generating dust. ▸ Sweep, shovel up. Recover product wherever possible. ▸ Put residues in labelled plastic bags or other containers for disposal. ▸ If contamination of drains or waterways occurs, advise emergency services.

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	▸ Limit all unnecessary personal contact. ▸ Wear protective clothing when risk of exposure occurs.

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	▸ Use in a well-ventilated area. ▸ 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 storage and handling recommendations contained within this SDS. ▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. ▸ 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. ▸ Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used. ▸ Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition. ▸ Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance. ▸ Do not empty directly into flammable solvents or in the presence of flammable vapors. ▸ The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges. 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.
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	▸ Lined metal can, lined metal pail/ can. ▸ Plastic pail. ▸ Polyliner drum. ▸ Packing as recommended by manufacturer. ▸ Check all containers are clearly labelled and free from leaks.
Storage incompatibility	Avoid contamination of water, foodstuffs, feed or seed. ▸ Avoid reaction with oxidising agents

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
Super Kelp SP	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
kelp extract	Not Available	Not Available

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. ▸ 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.

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- 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 ft/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 ft/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 favourable 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 ft/min) for extraction of crusher dusts generated 2 metres 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.

Individual protection measures, such as personal protective equipment

Eye and face protection

- Safety glasses with side shields
- Chemical goggles.
- 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. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

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. Important factors in the selection of gloves include:
· 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, AS/NZS 2161.1 or national equivalent).
· 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) is recommended.
· Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.
· Contaminated gloves should be replaced.
As defined in ASTM F-739-96 in any application, gloves are rated as:
· Excellent when breakthrough time > 480 min
· Good when breakthrough time > 20 min
· Fair when breakthrough time < 20 min
· Poor when glove material degrades
For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.
It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.
Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task.
Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:
· Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.
· Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential
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.
- fluorocaoutchouc.
- polyvinyl chloride.

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

Body protection

See Other protection below

Other protection

No special equipment needed when handling small quantities.

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OTHERWISE:
- Overalls.
- Barrier cream.
- Eyewash unit.

Respiratory protection

Type -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	P1 Air-line*	- -	PAPR-P1 -
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	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)

· 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.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Black powder with marine-like odor; mixes with water. Several of the 12,000+ varieties of seaweed in the ocean have been shown to be valuable additions to the organic garden In terms of soil structure, seaweed does not add a great deal of bulk, but its jelly like alginate content helps to bind soil crumbs together, and it contains all soil nutrients (0.3% N, 0.1% P, 1.0% K, plus a full range of trace elements) and amino acids. The resource for the manufacture of algal extracts can be the biomass of seaweeds harvested from surface waters. Many papers have been published which discuss the methods of manufacture and the composition of algal extracts. The general conclusion is that the composition of extracts strongly depends on the raw material (geographical location of harvested algae and algal species) as well as on the extraction method. The biologically active compounds which are transferred from the biomass of algae to the liquid phase include polysaccharides, proteins, polyunsaturated fatty acids, pigments, polyphenols, minerals, plant growth hormones and other. They have well documented beneficial effect on humans, animals and plants, mainly by protection of an organism from biotic and abiotic stress (antibacterial activity, scavenging of free radicals, host defense activity etc.) and can be valuable components of pharmaceuticals, feed additives and fertilizers. Seaweeds contain many different polysaccharides, which chemical structure relates to the corresponding taxonomic classification of algae and their cell structure. Sulfated polysaccharides inhibit activity of many bacterial species as well as viruses Polysaccharides can act as prebiotics (substances that stimulate the growth of beneficial bacteria in the digestive track) and exert growth-promoting and health-improving effects. Many of them are soluble dietary fibers which have positive effect on digestive track of animals (i.e..alginic acid). Also, seaweed-derived polysaccharides are effective and non-toxic antioxidants. The contents of polysaccharides show seasonal variations. The total level of these compounds in seaweeds is up to 76% of dry weight. Among many different algal polysaccharides, the most important are galactans, fucoidan, laminarin and alginates. Structure and biological properties of proteins extracted from seaweeds are not as widely documented as of polysaccharides. Usually the content of proteins in seaweeds is less than 5%. The lowest content of proteins have brown seaweeds. Most species of algae contain all of the essential amino acids. Very important bioactive proteins that can be extracted from macroalgae are lectins, which bind with carbohydrates and participate in many biological processes like intercellular communication. They have also antibacterial, antiviral or anti-inflammatory activities. Phospholipids and glycolipids are the main classes of lipids found in seaweeds. When the decrease of environmental temperature occurs, seaweeds can accumulate poly-unsaturated fatty acids (PUFAs). The species that live in cold regions contain more PUFAs than species living in higher temperatures Long chain PUFAs (LC-PUFAs) are of particular interest, because they are very important for human health maintenance and they are synthesized only by plants. These lipids consist of at least 20 carbon atoms with at least two double bonds. When the first double bond is located in the third carbon atom, the lipid molecule is referred as omega-3 (n-3 LC-PUFA). Seaweed pigments can be divided into three major groups: chlorophylls, carotenoids and phycobiliproteins. Carotenoids are organic pigments present in chloroplasts and chromoplasts. They are produced by marine algae, plants, fungi and by some bacteria and are the most wide-spread pigments in the nature. Pigments are polyenes soluble in lipids. Different species of algae contain different kinds of carotenoids, which are very strong antioxidants. These properties are based on the fact that they are able to quench singlet oxygen and scavenge free radicals. The most important carotenoids are beta-carotene, fucoxanthin and tocopherol. The content of beta-carotene in algal dry mass ranges from 36 to 4500 mg/kg. Fucoxanthin comprises up to 70% of total carotenoid content . Supercritical CO2 extraction gives an opportunity to extract these compounds from different sea-weeds (e.g. Chlorella vulgaris, or Dunaliella salina) with extraction yield ranging up to 90% Phycobiliproteins are water soluble pigments produced by cyanobacteria (blue-green algae), red algae and crypto-monads.. They constitute a few percent of algal dry weight. Phycobiliproteins have not only antioxidant, but also anti-inflammatory, antiviral and neuroprotective properties. Polyphenols are produced by most plants, including sea-weeds. Polyphenols are strong antioxidants Seaweeds produce these compounds to protect them from external conditions such as stress and herbivores. Reactive oxygen species, generated in organisms as an integral part of metabolism, are highly reactive and can cause cellular dysfunction and cytotoxicity. Polyphenols can donate hydrogen to free radicals and produce non-reactive radicals. Seaweed extracts contain appreciable amounts of polyphenols, but their content is strongly dependent on the extraction method. Ascophyllum spp. have significantly more polyphenols than other sea-weeds, while Ulva spp. have the lowest content of these compounds. Phlorotannins are the group of tannin compounds, which belong to the polyphenolic substances. Although tannins are widespread among both terrestrial and marine plants, phlorotannins, eg. eckol or dieckol, have been found only in brown seaweeds. These polymers have many biological activities in organisms, eg. are involved in host defense mechanism. Phlorotannin content varies.from 1 to 10% of the algal dry mass. The molecular skeleton of phlorotannins consist of up to 8 phenol rings, while terrestrial plants produce tannins consisting of only 3 to 4 rings. Phenol rings act as electron traps for free radicals. Consequently, phlorotannins have very strong antioxidant properties because of their unique structure . For example, phlorotannins isolated from Eisenia bicyclis have shown even 10 times higher antioxidant activity in comparison with ascorbic acid and alpha-tocopherol. Phlorotannins also have strong antimicrobial activities. They can attack microbiological

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	proteins, which can result in inhibition of bacteria . Algae are a rich source of minerals. Their content in the biomass is sometimes as high as 40% This is because seaweeds accumulate metal ions from salt water and concentrate those substances as carbonate salts in their fronds. Plant growth hormones found in seaweed extracts are mainly responsible for plant growth stimulation and the increase of the intensity of photosynthesis. Cytokinins (plant growth regulators) protect plants from the consequences of temperature changes They are synthesized by biochemical modification of adenine. Among many important functions, being responsible for controlling of bud and cell division, seem to be the most important. Within this group of hormones, zeatin and indole-3-propionic acid (IPA - a strigolactone analogue) were the main compounds identified in seaweed extracts. Cytokinins were found in Protococcus, Chlorella, and Scenedesmus spp. Other plant hormones present in seaweed extracts – auxins, were shown to initiate root formation and inhibit its elongation. Plants are able to synthesize these compounds from tryptophan or indole]. The concentrations of auxins in seaweed extracts are different and strongly depend on the species. Gibberellins were also isolated from seaweed extracts. They are produced in developing seeds from glyceraldehyde-3-phosphates. Gibberellins were identified in extracts from Fucus vesiculosus and Fucus spiralis Trace quantities of these compounds were also detected in extract from Ascophyllum nodosum. The main role of gibberellins is to initiate seeds germination. Abscisic acid (ABA) synthesized from carotenoids by more than 60 species of algae (e.g. Chlorella spp., Haematococcus pluvialis) is another plant growth regulator. ABA is mostly responsible for synthesis of proteins required for response to drought Although abscisic acid was determined in many groups of seaweeds, in some extracts lunularic acid was found as a compound which plays the same role as ABA in higher plants. It is supposed that algae produce a complex responsible for growth inhibition consisting of several components which act as ABA in algae. Betaines, which are not conventional plant hormones, were also found in algal extracts. Their minor function is to protect plants from drought and frost Besides, they can act as a source of nitrogen for plants. Another role of this plant regulator is to enhance chlorophyll content in leaves by decreasing its degradation. Extracts from brown algae Ascophyllum nodosum are also proved to be rich in betaine. Katarzyna Chojnack et al: Biologically Active Compounds in Seaweed Extracts - the Prospects for the Application: The Open Conference Proceedings Journal, 2012, 3, (Suppl 1-M4) 20-28 http://benthamopen.com/contents/pdf/TOPROCJ/TOPROCJ-3-3-20.pdf Brassinosteroids and strigolactones have attributes that are related to some of the types of benefits found when seaweed extracts are applied to specific plants. The brassinosteroids have roles in flowering, plant structure and stress tolerance and also have a role in the innate plant immune system. The original role attributed to strigolactones was to stimulate seed germination of certain parasitic plants. Defined strigolactones have a role as a plant stress regulator in drought, salinity and nutrient responses From an agronomic perspective, the exogenous application of these plant stimulants increased plant productivity.

Physical state	Divided Solid	**Relative density (Water = 1)**	0.65
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	550
pH (as supplied)	Not Available	**Decomposition temperature (°C)**	Not Available
Melting point / freezing point (°C)	Not Available	**Viscosity (cSt)**	Not Available
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%)**	Not Available
Vapour density (Air = 1)	Not Available	**VOC g/L**	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.
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	The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives 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. Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.
Ingestion	The material has **NOT** been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.
Skin Contact	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives 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.
Eye	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result.

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Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course. Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis, caused by particles less than 0.5 micron penetrating and remaining in the lung.

Super Kelp SP	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
kelp extract	**TOXICITY**	**IRRITATION**
	Not Available	Not Available

Legend:	***1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances***

Super Kelp SP & KELP EXTRACT

The Cosmetic Ingredient Review (CIR) Expert Panel (Panel) assessed the safety of 82 brown algae-derived ingredients, which are frequently reported to function in cosmetics as skin-conditioning agents. The Panel concluded that the following 6 of the 82 reviewed brown algae-derived ingredients are safe in cosmetics in the present practices of use and concentration and also concluded that the available data are insufficient to make a determination that the remaining 76 ingredients are safe under the intended conditions of use in cosmetic formulations
“Kelp” (the dehydrated, ground product prepared from Macrocystis pyrifera, Laminaria digitata, Laminaria saccharina, and Laminaria cloustoni) is approved as a food additive for direct addition to food for human consumption as a source of iodine or as a dietary supplement. In animal drugs, feeds, and related products, brown algae (kelp; Laminaria spp. and Nereocystis spp.) are generally regarded as safe (GRAS) as natural substances and as solvent-free natural extractives used in conjunction with spices and other natural seasonings and flavourings.
Extraction methods and solvents vary, depending on the desired composition of the final ingredient. Powders, however, are generally the dried algae pulverized by milling. Inorganic arsenic, usually in the form of arsenosugars, is a natural constituent of brown algae and the amount in the harvested algae can be reduced by several methods. In addition to arsenic, brown algae exhibit an affinity for heavy metals and uptake is strongly dependent on environmental parameters.
Several brown algae constituents, such as phytosterols,phytosteryl ingredients,and alginic acid were previously found to be safe
Toxicity:
In oral human clinical trials, adverse effects of an Ascophyllum nodosum powder (0.5 g/d), an Ecklonia cava extract (up to 400 mg/day), and an Undaria pinnatifida powder (average intake 3.3 g per day) were mild and transient. The adverse effects included nausea, indigestion, dyspepsia, and diarrhea.
Acute oral administration of brown algae extracts was not toxic to mice, rats, and dogs. Cystoseira Compressa Extract was not toxic to mice up to 2000 mg/kg by gavage. Ecklonia Cava Extract was not toxic to rats and dogs up to 3000 mg/kg by gavage. The oral LD50s of two different Fucus Vesiculosus Extracts were 500 mg/kg and greater for mice and rats. There were no signs of toxicity at up to 4000 mg/kg Laminaria Japonica Extract orally administered to rats. Sargassum Fulvellum Extract and Sargassum Thunbergii Extract administered by gavage were not toxic to mice.
In oral short-term and subchronic studies, there were some adverse effects observed. In rats, Cladosiphon Okamuranus Extract (1200 to 4000 mg/kg by gavage) caused a dose-dependent increase in clotting time and decrease in alkaline phosphatase (ALP); there were no other adverse effects reported. An enzyme extract of Ecklonia Cava Extract (starting at 2000 mg/kg) administered by gavage for 2 weeks caused reduced ovary and brain weights in female rats. Hepatic effects in rats were observed in an alcohol Ecklonia Cava Extract at 2000 mg/kg/day for 4 weeks and at 1500 mg/kg/day when administered for 13 weeks (the hepatic effects resolved after 4 weeks of recovery). There were increased liver weights in male rats treated with two ethanol Fucus Vesiculosus Extracts (starting at 200 mg/kg/day) administered by gavage for 4 weeks. Vomiting was the only adverse effect when Ecklonia Cava Extract capsules (in increasing amounts up to 1000 mg/kg over 8 days) were orally administered to dogs.In other oral short-term and subchronic studies, there no adverse effects observed. Ascophyllum Nodosum was not toxic to pigs for 23 days or to rats for 4 weeks administered in feed at up to 10% and 15%, respectively. While consuming high-fat diets, there were no adverse effects caused by alcohol Ecklonia Cava Extract (up to 5 mg/day) administered to mice by gavage daily for 4 weeks and an ethanol Laminaria Japonica Extract (up to 400 mg/kg) administered by gavage for 6 weeks caused decreased body weight gain, fat-pad weights, and serum and hepatic lipid levels in rats. A Ecklonia cava powder (up to 0.15%; inference for Ecklonia Cava Extract and Ecklonia Cava Water) administered in feed for 28 days was not toxic to weanling pigs. An orally administered Undaria pinnatifida extract for 28 days was not toxic to rats up to 1000 mg/kg/day, but ALT and triglyceride levels in males and HDL cholesterol in females increased at 2000 mg/kg/day.In a chronic oral toxicity study, the NOAEL of a Laminaria Japonica Extract administered to rats by gavage for 6 months was 300 mg/kg/day. In females, a decrease in AST was observed starting at 300 mg/kg/day and, at 2500 mg/kg/day, there was decreased serum glucose concentration; all effects returned to baseline after a 1-month recovery. Laminaria Japonica Powder incorporated into feed did not affect the lifespan of mice at up to 5%. In rats, Undaria Pinnatifida Extract administered as drinking water at 100% for 32 weeks and incorporated into the feed (at up to 5%) for 36 weeks did not cause any toxic effects.
Genetic toxicity:
In genotoxicity assays of several of the brown algae-derived ingredients, all results were negative with the exception of an Ascophyllum Nodosum Extract in one mammalian cell gene mutation test in which the extract was genotoxic starting at 1500 ug/ml in CHO cells. Ascophyllum Nodosum Extract was not genotoxic in an Ames assay and a mammalian cell gene mutation test (up to 500 µg/ml), and in chromosome aberration assays (up to 5 mg/ml). Cystoseira Compressa Extract (up to 5 mg/plate) was not genotoxic in an Ames assay. Ecklonia Cava Extract was not genotoxic in Ames assays (up to 5000 µg/plate) and chromosome aberration assays (up to 350 µg/plate). Aqueous Fucus Vesiculosus Extract was not genotoxic in a chromosome aberration assay and a comet assay (up to 1 mg/ml). Laminaria Japonica Extract (up to 5000 ug/plate) was not mutagenic in an Ames assay and a chromosome aberration assay. Undaria Pinnatifida Extract was not genotoxic in Ames assays and chromosome aberration assays (up to 5000 µg/ml). In micronucleus assays, Ecklonia Cava Extract (up to 3000 mg/kg), Laminaria Japonica Extract (up to 2000 mg/kg), and Undaria Pinnatifida Extract (up to 2000 mg/kg) were not genotoxic. An Ames test was performed according to OECD TG 471 using a trade name mixture containing 4.7% Ascophyllum Nodosum Extract in 94.5% water. No mutagenic activity was reported. None of the orally or dermally administered brown algae-derived ingredients tested (e.g., Hizikia Fusiforme Extract, Saccharina Angustata Extract (inference from Saccharina Angustata powder), Undaria Pinnatifida Extract, and Undaria Pinnatifida Powder) were tumor (mammary and colorectal) promoters; instead, decreases in the number, incidence, and/or size of tumors in rats were reported. Rats administered methylnitronitrosguanidine (MNNG) followed by 8 weeks of Sargassum Pallidum Extract (400 to 800 mg/kg/day) in drinking water exhibited decreased inflammatory responses.
Reproductive toxicity:
A Fucus vesiculosus extract exhibited estrogen effects in several in vitro studies. This extract (50 and 75 umol/l) reduced 17-beta-estradiol levels in human granulosa cells and also competed with estradiol and progesterone for binding to their receptors. In another study, a Fucus vesiculosus (bladderwrack) extract competed for, and bound to, estrogen receptors ERalpha (IC50 = 42.2 umol/l), ERbeta (IC50 = 31.8 umol/l), and PR-B (IC50 = 31.8 umol/l), with a slightly higher affinity for ERbeta. In co-treatments with E2 (12.5 pM; EC50), a Fucus vesiculosus extract (2%) reduced the activation of the luciferase reporter by up to 50%, exhibiting potent ER antagonistic effects. ER-dependent and -independent cancer cell lines showed significantly decreased viability with increasing test material concentrations. The cell line-specific sensitivity suggests that Fucus vesiculosus extract was not toxic at up to 2%, but instead induces cell death through modulated pathways. In one study, aromatase activity following treatment of hLGCs with a Fucus vesiculosus extract (10 to 100 umol/L) did not change.In in vivo studies, a Fucus vesiculosus powder exhibited estrogenic effects. Daily oral administration (175 and 350 mg/kg/day) for 4 weeks resulted in a dose-dependent increase in the length of the estrous cycle and an overall 100% increase in the mean length of the dioestrus phase of the estrous cycle in the treated rats. Mean serum 17-beta-estradiol levels were reduced at 2 weeks and further reduced at 4 weeks. Female rats that had naturally high circulating estradiol had reduced serum 17-beta-estradiol (25% to 58% in all but 2 rats) after 1 week oral administration of a Fucus vesiculosus powder (350 mg/kg/day).
This powder (700 and 1400 mg/day) increased the menstrual cycle length and reduced the days of menstruation in a dose-dependent manner in three female human subjects with hypermenorrhea, dysmenorrhea, and other related ailments. In one subject, the plasma

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estradiol levels were decreased and the progesterone levels were increased in a dose-dependent manner.
Irritation studies
In an in vivo dermal irritation assay of an Ascophyllum nodosum extract (0.5 g in water) conducted in accordance with the OECD TG 404, a trade name mixture containing 4.7% Ascophyllum Nodosum Extract in 94.5% water was not considered to be an irritant. An Ascophyllum nodosum extract (0.5 g in water) administered to the shaved backs of rabbits under semi-occlusion for 4 h was not irritating. A skin cream containing a Laminaria japonica extract (10%; 20 mg) was not irritating to human subjects.
According to a specifications data sheet, a trade name mixture containing 4.7% Ascophyllum Nodosum Extract in 94.5% water was practically non-irritating when used in a Het-Cam test. An Ascophyllum nodosum extract (100 mg) administered to the eyes of rabbits had a maximum irritation score was 6.7 out of 8 at 1 h post-installation. The score decreased to 0 by day 7 and was rated as a mild ocular irritant.
The ophthalmic irritation potential of an eye cream containing 0.076% Sargassum Muticum Extract was tested in 31 subjects The test material did not indicate a potential for ophthalmologic irritation and was considered safe for use by both contact and non-contact lens wearers.
A gel with an aqueous Fucus vesiculosus extract (1%; 0.2 ml) was applied to one cheek of human subjects at least twice per day (morning and evening) for 5 weeks. There were no signs of erythema or edema during the experiment
Sensitisation:
HRIPTs were performed using a night cream containing 0.05% Alaria Esculenta Extract, an eye cream containing 0.076% Sargassum Muticum Extract, and a skin care formulation containing 0.076% Sargassum Muticum Extract. No potential for dermal irritation or allergic contact sensitization was noted for any of the formulations.
Phototoxicity:
A phototoxicity study was performed according to OECD TG 432 using a trade name mixture containing 4.7% Ascophyllum Nodosum Extract in 94.5% water. No phototoxic activity was reported.
In an in vitro study examining the photo-protection potential involving a Sargassum Muticum extract, the effect of this extract against cell death induced by UVB radiation was studied. Cell viability was 61% in UVB (150 mJ/cm2) irradiated cells and 70% in UVB-irradiated cells treated with SME. Decreased numbers of apoptotic bodies as well as DNA fragmentation was apparent in cells exposed to SME and UVB versus UVB exposure alone.
Notes:
The ingredients in this safety assessment are derived from various species of brown algae. “Algae” is not a taxonomic group, but a functional group of convenience. Not all algae should be considered to be plant-like (seaweed; macroalgae). While some algae are seaweed, some are protozoa, and some are unique and belong in other kingdoms.However, these aquatic and oxygenic organisms are all part of the eclectic group called “algae.”
There are several major groups of algae, and they are commonly referred to as brown algae (Phaeophyceae), green algae (Chlorophyta), diatoms (Bacillariophyceae), chrysophytes (Chrysophyta), blue-green algae (Cyanophyta), red algae(Rhodophyta), dinoflagellates (Pyrrhophyta), and euglenoids (Euglenophyta). The different algal phyla are differentiated by storage products, pigmentation, and cell wall composition.
Cosmetic Ingredient Review Safety Assessment of Brown Algae-Derived Ingredients as Used in Cosmetics: January 2019
http://www.cir-safety.org/sites/default/files/browna122018TR_0.pdf
Laxative properties of brown seaweeds (Phaeophyceae) have traditionally been attributed to the component alginic acid, a hydrophilic colloidal polysaccharide.
Kelp are frequently high in iodine content, and have been used traditionally for thyroid diseases. In humans, there are case reports of transient hyperthyroidism as a result of bladderwrack ingestion. Bladderwrack products contain up to 600 ug per gram of iodine, while normal human iodine intake is approximately 100-200 ug/day. Individuals ingesting bladderwrack or kelp products as food or supplements may ingest up to 30 times this amount. Chronic iodine toxicity may result in hypothyroidism, hyperthyroidism, goiter, or myxedema, although many individuals remain euthyroid. Systematic study of the effects of bladderwrack in humans is currently lacking, and there may be other active constituents. In terms of iodine content, a widely accepted standardization of iodine content in bladderwrack is lacking at this time, although some products may list iodine content on the label.
Theoretically, the thyroid stimulatory properties of bladderwrack may cause hypermetabolic weight loss. However, its anorectic properties have not been adequately evaluated in humans.
Doses of 700 to 1400 mg/day were found to increase the menstrual cycle lengths, decrease the days of menstruation per cycle, and decrease the serum levels of 17beta-estradiol while was later carried out and showed similar effects.
Kelp products should not be used in cases of hyperthyroidism or cardiac problems, or during pregnancy and lactation. Excessive dosage (many times the recommended dosage) may lead to hyperthyroidism, tremor, increased pulse rate and elevated blood pressure.
Based on animal evidence, sodium alginate (soluble algae polysaccharide) may lower lipid levels in the blood Because cholesterol is needed to produce sex hormones, it has been suggested that oral ingestion of kelp may affect circulating sex hormone levels and menstrual cycling patterns. Researchers tested the effects of bladderwrack to determine if its effects on women with or at high risk for estrogen-dependent diseases. Three pre-menopausal women with abnormal menstrual cycling patterns and/or menstrual-related disease histories received bladderwrack. Bladderwrack significantly increased menstrual cycle length by 5.5-14 days. In addition, hormone measurements in one woman revealed significant anti-estrogenic and progestagenic effects. Mean baseline 17beta-estradiol levels were reduced from 626 +/ 91 to 164 +/- 30 pg/ml (p=0.04) following 700 mg daily, which decreased further to 92.5.0 +/ 3.5 pg/ml (p=0.03) with the 1.4 g daily dose. Mean baseline progesterone levels increased from 0.58 +/- 0.14 to 8.4 +/- 2. 6 ng/ml with the 700 mg daily dose (p=0.1), which increased further to 16.8 +/- 0.7 ng/ml with the 1.4 g daily dose (p=0.002). The authors concluded that dietary bladderwrack may prolong the menstrual cycle and exert anti-oestrogenic effects in pre-menopausal women. The authors also suggested that seaweed may help reduce the risk of oestrogen-related cancers observed in Japanese populations. However, these preliminary findings need to be confirmed in well-controlled clinical trials.
No significant acute toxicological data identified in literature search.
For fucoidan: (a sulfated polysaccharide also known as galactofucan)
Fucoidan is reported to have a wide range of bioactive properties,such as anticancer, anti-inflammatory, anticoagulant and antiproliferative properties.The stimulatory effects of fucoidan depends on the species it is isolated from, molecular weight and position of and amount of the sulfate groups.
Because of the complex chemical structure of fucoidan, it cannot be fermented by gut microbiota. Still it has shown prebiotic-like effects and could increase the abundance of benign microbes in the gut, in a fashion similar to Lactobacillus spp.and short chain fatty acid (SCFA)-producers,whilst decreasing the number of opportunistic pathogens. These compositional changes in the gut could lead to indirect health promoting effects for the host and could potentially be used as a treatment of intestinal dysbiosis. Fucoidan degrading enzymes may be a way of identifying various immunostimulatory effects. Both fucoidanases,cutting the fucoidan backbone,and sulfatases may be valuable tools in addressing which structural elements are causing biological effects.
Fucoidan can stimulate the immune system by its ability to modify properties on the cell surface or act as an immunomodulator directly on macrophages, T-lymphocytes, B-cells, natural killer (NK) cells and induce production of interleukin 1 (IL-1) and interferon-gamma (INF-gamma),in vitro. Fucoidan also demonstrated to produce antitumor effects.
In several studies examining the role of fucoidan in the inflammatory processes associated with ischemia and collagen-induced arthritis in mice and in vitro macrophage cell lines,results indicated that low molecular weight fucoidan (LMWF)showed more potent bioactivity an high molecular weight fucoidan (HMWF). LMWF are usually isolated from algae or hydrolysed from HMWF. Both types of fucoidans showed an effect,but it was indicated that HMWF enhanced arthritis by increasing the activation of macrophages, while LMWF reduced arthritis through the suppression of specific cytokine-mediated immune reactions.
The anticoagulant properties of fucoidans from brown macroalgae have been studied. Results indicated that the structural differences not only determined anticoagulant potency, but also the mechanisms by which they carried out their activity. Fucoidan seemed to directly inhibit thrombin, and a single difference in one sulfate group per tetrasaccharide repeating unit altered the activity notably.In platelet aggregation assays,fucoidan with a high sulfate content(>20%) have shown greater anticoagulant activity in LMWF than fucoidan. with a low sulfate content(<20%).
Several studies have been performed on the effect of fucoidan on cell migration and proliferation in vitro. In a migration assay of osteoblast cells fucoidan treated cells showed slightly decreased migration compared to the control cells. In addition, the cells shrunk and showed decreased spreading and adhesion. Fucoidan isolated form Ascophyllum nodosum, stimulated cell growth in the presence of fibroblast growth factor-1 whilst inhibiting proliferation induced by fibroblast growth factor-2.Similarly, in the presence of another sulfated polysaccharide (heparin),the cell migration was also inhibited.
Sulfated polysaccharides (SP) represent a complex group of biopolymers with a wide range of important biological functions and activities Besides the sulfated glycosaminoglycans of vertebrates, SP are ubiquitous components of marine algae and marine invertebrates. While carrageenans and agarans, two types of sulfated galactans extracted from red algae species, have been industrially applied as hydrocolloids

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fucoidans, the typical SP of brown algae of the class Phaeophyceae, are increasingly attracting attention as promising candidates for numerous health-supporting and therapeutic applications Interest has mainly focused on their potentially beneficial effects in humans including antitumor, immunomodulatory, anti-inflammatory, antiviral, antithrombotic, anticoagulant, and antioxidant effects, as well as specific activities against kidney, liver and urinary system disorders
Different studies were performed testing the toxic potential of fucoidan, No evidence of mutagenicity was reported when an Ames test was performed using a trade name mixture containing 7% hydrolyzed fucoidan extracted from Laminaria digitata. A dermal irritation assay was performed using the same trade name mixture containing. The product was classified as a non-irritant.
No phototoxic potential was reported when Balb/c 3T3 cells were exposed to a mixture containing 7% hydrolyzed fucoidan extracted from Laminaria digitata. A neutral red uptake assay was performed on BALB/c 3T3 cells using a trade name mixture containing 7% hydrolyzed fucoidan extracted from Laminaria digitata. The product was reported to be not/mildly irritating.
Anticancer activity:
Intact fucoidans showed anticancer activity Moreover, when hydrolyzed in boiling water with HCl for 5 min, the anticancer activity of fucoidans significantly increased Results suggests that anticancer activity of fucoidans could be markedly improved when they are depolymerized in mild conditions.
Fucoidan isolated from the sporophyll of New Zealand U. pinnatifida exhibits similar cell growth-inhibition effects in breast adenocarcinoma cell line MCF-7, lung carcinoma cell line A-549, and colon adenocarcinoma cell line WiDr, in comparison with commercial fucoidan isolated from F. vesiculosus). Similar results are reported by another group where breast cancer cell line T-47D and melanoma cancer cell line SK-MEL-28 are susceptible to the anticancer effect of fucoidan isolated from U. pinnatifida grown in Japan Sea There was an enhanced inhibitory effect against melanin biosynthesis in B16BL6 melanoma cells with low molecular weight fucoidan It has also been shown that fucoidan from U. pinnatifida has antiproliferation effect on prostate and hepatocellular cancer cells. Research suggests that fucoidan treatment could induce intrinsic and extrinsic apoptosis pathways via the activation of extracellular signal-regulated kinase mitogen-activated protein kinase (ERK1/2 MAPK), the inactivation of p38 MAPK and phosphatidylinositol 3-kinase (PI3K)/Akt signaling pathways, and the downregulation of the Wnt/beta-catenin signaling pathway . Further research suggested that fucoidan induces apoptosis via a ROS-mediated mitochondrial pathway. By increasing reactive oxygen species (ROS) production, fucoidan induces mitochondrial oxidative damage, mitochondrial membrane potential (MMP) depolarization, and release of cytochrome c; combined with downregulation of Livin and XIAP mRNA and activation of caspase-3 and caspase-9 . Another report demonstrates that fucoidan can ameliorate hepatic infrared injury in mice via JAK2/STAT1-mediated apoptosis and autophagy.
The anticancer activity of fucoidan is influenced by its sulfate content; low molecular weight fucans isolated from Ascophyllum nodosum exhibited increased antiproliferative activity on fibroblast cell line CCL39 with increased sulfate content. Likewise, oversulfated fucoidan from F. vesiculosus exhibited higher anti-angiogenesis potency on the growth of B16 melanoma cells, Lewis lung carcinoma, and Sarcoma 180 cell lines . This suggests that the sulfate content of fucoidan may be critical in influencing its anticancer activity.
Antioxidant activity:
The antioxidant capacity of fucoidan isolated from various seaweed species has been demonstrated in the literature . It has been reported that fucoidan typically exhibits strong secondary antioxidant activity that is comparable to synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) that are known for causing side effects in humans including cancer . It has been reported that fucoidan isolated from Sargassum binderi exhibits significantly higher secondary antioxidant capacity, based on superoxide radical scavenging and hydrogen peroxide scavenging assays, than synthetic antioxidants BHA and BHT.
There have been numerous reports on the correlation between the antioxidant capacity of fucoidan and its sulfate content and molecular weight.
Besides sulfate content, a correlation between molecular weight and the antioxidant capacity of fucoidan has also been reported . The high molecular weight fucoidan fractions show low inhibitory effects on low-density lipoprotein (LDL) oxidation while the low molecular weight fractions exhibited higher inhibitory effects
Anticoagulant effects:
Studies have confirmed the anticoagulant and antithrombotic activity of fucoidan from the brown seaweeds Saccharina latissimi. The molecular weight of the fucoidan polymer is thought to be related to its anticoagulant activity. One study found that the fucoidan polymer exhibited the strongest anticoagulant activity with the molecular weight from approximately 10 kDa to 300 kDa. Fucoidans appeared to have no cytotoxic effect on the red blood cells, and the values of prothrombin time, activated partial thromboplastin time, and fibrinogen are significantly changed. The purified fucoidan significantly prolongs clotting time in a manner similar to heparin.
Antibacterial activity:
Antibacterial activity of fucoidan from U. pinnatifida has been tested and proven to be effective. Compared with Gram-negative strains, Gram-positive bacterial strains are more inhibited by fucoidan
The antibacterial mechanism is due to a large amount of sulfuric acid and glucuronic acid in the depolymerization products of fucoidan, which have the property of polyanion. The depolymerized fucoidans bind to the bacterial membrane proteins and cause a membrane-disrupting effect that induces the expression of certain apoptotic factors, which leads to bacterial apoptosis.
Other benefits:
Fucoidin has significantly induced osteoblastic cell differentiation and has potential in use as a functional food ingredient in bone health supplement. Fucoidan from C. okamuranus (Phaeophyceae) protects gastric mucosa against acid and pepsin. Therefore, fucoidan can be developed as a potential antiulcer ingredient in functional foods
Note:
It is generally challenging to produce marine SP in a reproducible quality, since they are not only usually complex, heterogeneous molecule mixtures, but they also vary substantially in their composition depending on the source material (e.g., alga species, harvest time), environmental parameters (e.g., light, nutrition, salinity, temperature), as well as the process of extraction and purification Particularly, the fucoidans found in the cell walls and intercellular spaces of brown algae represent a tremendous number of structurally distinct fucose-containing SP ranging from homofucans to complex, highly branched heteropolysaccharides so that some authors consider the term fucose-containing sulfated polysaccharides more appropriate than the term fucoidan Even crude fucoidan isolated from a single species of brown algae mostly consists of a mixture of structurally distinct polymers and the composition of this mixture may considerably vary depending on a multitude of factors.Aggravating this situation, the compounds indicated in literature as “fucoidans” considerably vary in their degree of purity, i.e., their content of co-extracted compounds like laminarin, alginic acid, proteins, polyphenols, etc. may influence the observed biological effect.

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ ***– Data either not available or does not fill the criteria for classification***
✓ ***– Data available to make classification***

SECTION 12 Ecological information

Toxicity

Super Kelp SP

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

kelp extract

Endpoint	Test Duration (hr)	Species	Value	Source

Continued...

	EC50	72h	Algae or other aquatic plants	60.35mg/l	2
	EC10(ECx)	72h	Algae or other aquatic plants	17.74mg/l	2
	LC50	96h	Fish	>100mg/l	2

Legend:	***Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data***

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	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. In most instances the supplier of the material should be consulted. ▸ **DO NOT** allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before 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
kelp extract	Not Available

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
kelp extract	Not Available

SECTION 15 Regulatory information

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

kelp extract is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)

Additional Regulatory Information

Not Applicable

National Inventory Status

Continued...

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (kelp extract)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (kelp extract)
Korea - KECI	No (kelp extract)
New Zealand - NZIoC	Yes
Philippines - PICCS	No (kelp extract)
USA - TSCA	No (kelp extract)
Taiwan - TCSI	Yes
Mexico - INSQ	No (kelp extract)
Vietnam - NCI	Yes
Russia - FBEPH	No (kelp extract)
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

Revision Date	27/06/2024
Initial Date	27/06/2024

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