Awakening Pollination

GroPro Corporation

Chemwatch Hazard Alert Code: **2**

Version No: **0.3**
Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Issue Date: **03/14/2024**
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S.GHS.USA.EN

SECTION 1 Identification

Product Identifier

Product name	Awakening Pollination
Synonyms	Not Available
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Bio-Fertilizer

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	**GroPro Corporation**
Address	900 128th Street W Burnsville MN United States
Telephone	8334777761
Fax	Not Available
Website	WWW.GroProAg.Com
Email	Info@GroGroAg.Com

Emergency phone number

Association / Organisation	**Chemtrec**
Emergency telephone numbers	1-800-262-8200
Other emergency telephone numbers	Not Available

SECTION 2 Hazard(s) identification

Classification of the substance or mixture

NFPA 704 diamond

Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

Classification	Not Applicable

Label elements

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

Hazard statement(s)

Not Applicable

Hazard(s) not otherwise classified

Not Applicable

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

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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
57-13-6	0.5	urea
Not Available	2	Fish protein hydrolysate
Not Available	2	Soy protein hydrolysate
Not Available	3	Monopotassium phosphate
Not Available	5	Potassium chloride
10043-35-3	0.1	boric acid
Not Available	0.05	Zinc IDHA
84775-78-0	5	kelp extract
85665-41-4	2	Propolis, extract

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

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.
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.

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 Fire-fighting 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

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

Special protective equipment and precautions for fire-fighters

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

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Fire/Explosion Hazard	▸ Combustible. ▸ Slight fire hazard when exposed to heat or flame. ▸ Heating may cause expansion or decomposition leading to violent rupture of containers. ▸ On combustion, may emit toxic fumes of carbon monoxide (CO). ▸ May emit acrid smoke. ▸ Mists containing combustible materials may be explosive. Combustion products include: carbon dioxide (CO_2) other pyrolysis products typical of burning organic material. May emit poisonous fumes.

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	▸ Remove all ignition sources. ▸ Clean up all spills immediately. ▸ Avoid breathing vapours and contact with skin and eyes. ▸ Control personal contact with the substance, by using protective equipment. ▸ Contain and absorb spill with sand, earth, inert material or vermiculite. ▸ Wipe up. ▸ Place in a suitable, labelled container for waste disposal.
Major Spills	Moderate hazard. ▸ Clear area of personnel and move upwind. ▸ 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 course. ▸ No smoking, naked lights or ignition sources. ▸ Increase ventilation. ▸ Stop leak if safe to do so. ▸ Contain spill with sand, earth or vermiculite. ▸ Collect recoverable product into labelled containers for recycling. ▸ Absorb remaining product with sand, earth or vermiculite. ▸ Collect solid residues and seal in labelled drums for disposal. ▸ Wash area and prevent runoff into drains. ▸ 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	▸ Avoid all personal contact, including inhalation. ▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ Prevent concentration in hollows and sumps. ▸ **DO NOT** enter confined spaces until atmosphere has been checked. ▸ **DO NOT** allow material to contact humans, exposed food or food utensils. ▸ Avoid contact with incompatible materials. ▸ When handling, **DO NOT** eat, drink or smoke. ▸ Keep containers securely sealed when not in use. ▸ Avoid physical damage to containers. ▸ Always wash hands with soap and water after handling. ▸ Work clothes should be laundered separately. Launder contaminated clothing before re-use. ▸ Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Other information	▸ Store in original containers. ▸ Keep containers securely sealed. ▸ No smoking, naked lights or ignition sources. ▸ Store in a cool, dry, well-ventilated area. ▸ Store away from incompatible materials and foodstuff containers. ▸ Protect containers against physical damage and check regularly for leaks. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Metal can or drum ▸ Packaging as recommended by manufacturer. ▸ Check all containers are clearly labelled and free from leaks.

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Storage incompatibility	The substance may be or contains a 'metalloid' The following elements are considered to be metalloids; boron,silicon, germanium, arsenic, antimony, tellurium and (possibly) polonium The electronegativities and ionisation energies of the metalloids are between those of the metals and nonmetals, so the metalloids exhibit characteristics of both classes. The reactivity of the metalloids depends on the element with which they are reacting. For example, boron acts as a nonmetal when reacting with sodium yet as a metal when reacting with fluorine. Unlike most metals, most metalloids are amphoteric- that is they can act as both an acid and a base. For instance, arsenic forms not only salts such as arsenic halides, by the reaction with certain strong acid, but it also forms arsenites by reactions with strong bases. Most metalloids have a multiplicity of oxidation states or valences. For instance, tellurium has the oxidation states +2, -2, +4, and +6. Metalloids react like non-metals when they react with metals and act like metals when they react with non-metals. ‣ Avoid reaction with oxidising agents

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US OSHA Permissible Exposure Limits (PELs) Table Z-1	Propolis, extract	Particulates Not Otherwise Regulated (PNOR)-Total dust	15 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-1	Propolis, extract	Particulates Not Otherwise Regulated (PNOR)-Respirable fraction	5 mg/m3	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-3	Propolis, extract	Inert or Nuisance Dust: Respirable fraction	5 mg/m3 / 15 mppcf	Not Available	Not Available	Not Available
US OSHA Permissible Exposure Limits (PELs) Table Z-3	Propolis, extract	Inert or Nuisance Dust: Total Dust	15 mg/m3 / 50 mppcf	Not Available	Not Available	Not Available
US NIOSH Recommended Exposure Limits (RELs)	Propolis, extract	Particulates not otherwise regulated	Not Available	Not Available	Not Available	See Appendix D

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
urea	30 mg/m3	280 mg/m3	1,700 mg/m3
boric acid	6 mg/m3	23 mg/m3	830 mg/m3

Ingredient	Original IDLH	Revised IDLH
urea	Not Available	Not Available
boric acid	Not Available	Not Available
kelp extract	Not Available	Not Available
Propolis, extract	Not Available	Not Available

Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
urea	E	≤ 0.01 mg/m³
boric acid	D	> 0.01 to ≤ 0.1 mg/m³
Notes:	*Occupational exposure banding is a process of assigning chemicals into specific categories or bands 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.

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

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

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	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 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.
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. ‣ Wear chemical protective gloves, e.g. PVC. ‣ Wear safety footwear or safety gumboots, e.g. Rubber
Body protection	See Other protection below
Other protection	‣ Overalls. ‣ P.V.C apron. ‣ Barrier cream. ‣ Skin cleansing cream. ‣ Eye wash unit.

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

Respiratory protection

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

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'Forsberg Clothing Performance Index'.
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
Awakening Pollination

Material	CPI
BUTYL	A
NEOPRENE	A
NITRILE	A
VITON	A

* 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.

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the 'Exposure Standard' (or ES), respiratory protection is required. Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	A-AUS	-	A-PAPR-AUS / Class 1
up to 50 x ES	-	A-AUS / Class 1	-
up to 100 x ES	-	A-2	A-PAPR-2 ^

^ - Full-face
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)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Not Available

Physical state	Liquid	**Relative density (Water = 1)**	Not Available
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Available
pH (as supplied)	3.6	**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 Available
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	- Unstable in the presence of incompatible materials. - Product is considered stable. - Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7

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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.
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. Ingestion or skin absorption of boric acid causes nausea, abdominal pain, diarrhoea and profuse vomiting which may be blood stained, headache, weakness, reddened lesions on the skin. In severe cases, it may cause shock, with fall in blood pressure, increase in heart rate, blue skin colour, brain and nervous irritation, reduced urine volume or even absence of urine. Borate poisoning causes nausea, vomiting, diarrhoea and pain in the upper abdomen. Often persistent vomiting occurs, and there may be blood in the faeces.
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. Boric acid is not absorbed via intact skin but absorbed on broken or inflamed 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.
Eye	Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	Ample evidence from experiments exists that there is a suspicion this material directly reduces fertility. Chronic boric acid poisoning is characterized by mild gastrointestinal irritation, loss of appetite, disturbed digestion, nausea, possibly vomiting and a hard irregular and discoloured rash. Dryness of skin, reddening of tongue, loss of hair, inflammation of conjunctiva, and kidney injury have also been reported. Borate can accumulate in the testes and deplete germ cells and cause withering of the testicles, according to animal testing. Hair loss, skin inflammation, stomach ulcer and anaemia can all occur.

Awakening Pollination	**TOXICITY**	**IRRITATION**
	Not Available	Not Available

urea	**TOXICITY**	**IRRITATION**
	dermal (rat) LD50: 8200 mg/kg[2]	Eye: no adverse effect observed (not irritating)[1]
	Oral (Rat) LD50: 8471 mg/kg[2]	Skin (human): 22 mg/3 d (I)- mild
		Skin: no adverse effect observed (not irritating)[1]

boric acid	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >2000 mg/kg[1]	Eye: no adverse effect observed (not irritating)[1]
	Inhalation (Rat) LC50: >2.12 mg/l4h[1]	Skin (human): 15 mg/3d -I- mild
	Oral (Rat) LD50: >2600 mg/kg[1]	Skin: no adverse effect observed (not irritating)[1]

kelp extract	**TOXICITY**	**IRRITATION**
	Not Available	Not Available

Propolis, 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*

UREA	Altered sleep time, change in motor activity, antipsychosis, dyspnea, methaemoglobinaemia, convulsions, lymphomas recorded. Carcinogenic by RTECS criteria. Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of 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 infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The

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	disorder is characterized by difficulty breathing, cough and mucus production. Based on laboratory and animal testing, exposure to the material may result in irreversible effects and mutations in humans. For urea: Urea is used in ointments and creams to treat dry skin. Long-term follow-up studies have indicated that the substance does not cause allergy, and is virtually free from side effects. It is usually tolerated well, although diarrhea is sometimes reported after ingestion of very large amounts (60-90 grams/day). There is the possibility that infection of H. pylori in the human stomach may aggravate local effects by urea because of the generation of ammonia. Acute toxicity: Animal testing shows that the acute toxicity of urea is low. Repeated dose toxicity: No well-conducted repeated dose toxicity studies were located. Tests involving the skin on animals suggested low toxicity. Reproductive and developmental toxicity: No adequate data exists regarding the reproductive/developmental toxicity of urea. Genetic toxicity: Urea has been negative in several appropriately conducted tests on bacteria to assess mutation-causing potential. In mammals, it causes chromosomal aberrations only at concentrations much higher than the physiological range.
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 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

Continued...

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.
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 fucoidans, the typical SP of brown algae of the class Phaeophyceae, are increasingly attracting attention as promising candidates for numerous

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	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.
UREA & BORIC ACID	The material may cause 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.
KELP EXTRACT & PROPOLIS, EXTRACT	No significant acute toxicological data identified in literature search.

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

Continued...

Awakening Pollination	

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

urea

Endpoint	Test Duration (hr)	Species	Value	Source
ErC50	72h	Algae or other aquatic plants	24541.9mg/l	2
EC50	48h	Crustacea	3910mg/l	4
EC50	72h	Algae or other aquatic plants	24541.9mg/l	2
NOEC(ECx)	5040h	Fish	>=1.71mg/l	2
LC50	96h	Fish	4.65-8.48mg/l	4

boric acid

Endpoint	Test Duration (hr)	Species	Value	Source
EC50	96h	Algae or other aquatic plants	15.4mg/l	2
BCF	672h	Fish	<3.2	7
EC50	48h	Crustacea	230mg/L	5
EC50	72h	Algae or other aquatic plants	40.2mg/l	2
NOEC(ECx)	576h	Fish	0.001mg/L	5
LC50	96h	Fish	70-80mg/l	4

kelp extract

Endpoint	Test Duration (hr)	Species	Value	Source
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

Propolis, extract

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

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*

for Boron and Borates:
Environmental Fate - Boron is generally found in nature bound to oxygen and is never found as the free element. As an element, boron itself cannot be degraded in the environment, however; it may undergo various reactions that change the form of boron (e.g., precipitation, polymerization, and acid-base reactions) depending on conditions such as its concentration in water and pH. As boron is a natural component of the environment, individuals will have some exposure from foods and drinking water.
Atmospheric Fate: Atmospheric boron may be in the form of particulate matter or aerosols as borides, boron oxides, borates, borates, organoboron compounds, trihalide boron compounds, or borazines. Boron and borates will probably be removed from the atmosphere by precipitation and dry deposition. The half-life of airborne particles is usually on the order of days, depending on the size of the particle and atmospheric conditions.
Aquatic Fate: Borates are relatively soluble in water. Boron readily hydrolyses in water and, in concentrated solutions, may polymerize. The mineral content of water is not likely to control the fate of boron in water. Boron was found to not be significantly removed during the conventional treatment of waste water. Boron may, however; be co-precipitated with aluminium, silicon, or iron to form hydroxyborate compounds on the surfaces of minerals. Waterborne boron may be adsorbed by soils and sediments. Adsorption-desorption reactions are expected to be the only significant mechanism that will influence the fate of boron in water.
Terrestrial Fate: Soil - Boron is added to farmland as a soil improving agent, but there is not sufficient data to evaluate its effect on soil organisms. The extent of boron adsorption depends on the pH of the water and the chemical composition of the soil. The greatest adsorption is generally observed at pH 7.5-9.0. The single most important property of soil that will influence the mobility of boron is the abundance of amorphous aluminium oxide. The extent of boron adsorption has also been attributed to the levels of iron oxide, and to a lesser extent, the organic matter present in the soil, although other studies found that the amount of organic matter present was not important. The adsorption of boron may not be reversible in some soils. Most boron compounds are transformed to borates in soil due to the presence of moisture. Borates themselves are not further degraded in soil, however; borates can exist in a variety of forms in soil. Borates are removed from soils by water leaching and by assimilation by plants. Surface soil, unpolluted waterways and seawater all typically contain significant amounts of boron as borate. Plants - Boron is an essential micronutrient for healthy growth of plants, however, it can be harmful to boron sensitive plants in higher quantities. In some areas such as the American Southwest, boron occurs naturally in surface waters in concentrations that have been shown to be toxic to commercially important plants.
Ecotoxicity: It is unlikely that boron is bioconcentrated significantly by organisms from water. Boron is not expected to bioaccumulate and bioconcentration factors for fish, plants and invertebrates are low. Boron is not regarded to be dangerous to aquatic organisms. In aquatic environments low concentrations of borates generally promote the growth of algae, whereas higher concentrations inhibited algal growth. Boron has little effect on freshwater algae and water fleas. The toxicity of boron in fish is often higher in soft water than in hard water. Zebra fish and rainbow trout are the most sensitive species to the effects of boron.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
urea	LOW	LOW
boric acid	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
urea	LOW (BCF = 10)
boric acid	LOW (BCF = 0)

Mobility in soil

Continued...

Ingredient	Mobility
urea	LOW (Log KOC = 4.191)
boric acid	LOW (Log KOC = 35.04)

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. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. ▸ **DO NOT** allow wash water from cleaning 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. ▸ Recycle wherever possible or consult manufacturer for recycling options. ▸ Consult State Land Waste Authority for disposal. ▸ Bury or incinerate residue at an approved site. ▸ Recycle containers if possible, or dispose of in an authorised landfill.

SECTION 14 Transport information

Labels Required

Marine Pollutant	NO

Land transport (DOT): 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
urea	Not Available
boric acid	Not Available
kelp extract	Not Available
Propolis, extract	Not Available

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
urea	Not Available
boric acid	Not Available
kelp extract	Not Available
Propolis, extract	Not Available

SECTION 15 Regulatory information

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

urea is found on the following regulatory lists

US AIHA Workplace Environmental Exposure Levels (WEELs)
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Integrated Risk Information System (IRIS)
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)

boric acid is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List
US DOE Temporary Emergency Exposure Limits (TEELs)
US EPA Integrated Risk Information System (IRIS)
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

Continued...

kelp extract is found on the following regulatory lists

Not Applicable

Propolis, extract is found on the following regulatory lists

International WHO List of Proposed Occupational Exposure Limit (OEL) Values for Manufactured Nanomaterials (MNMS)
US - Alaska Air Quality Control - Concentrations Triggering an Air Quality Episode for Air Pollutants Other Than PM-2.5
US NIOSH Recommended Exposure Limits (RELs)
US OSHA Permissible Exposure Limits (PELs) Table Z-1
US OSHA Permissible Exposure Limits (PELs) Table Z-3

Additional Regulatory Information

Not Applicable

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 311/312 hazard categories

Flammable (Gases, Aerosols, Liquids, or Solids)	No
Gas under pressure	No
Explosive	No
Self-heating	No
Pyrophoric (Liquid or Solid)	No
Pyrophoric Gas	No
Corrosive to metal	No
Oxidizer (Liquid, Solid or Gas)	No
Organic Peroxide	No
Self-reactive	No
In contact with water emits flammable gas	No
Combustible Dust	No
Carcinogenicity	No
Acute toxicity (any route of exposure)	No
Reproductive toxicity	No
Skin Corrosion or Irritation	No
Respiratory or Skin Sensitization	No
Serious eye damage or eye irritation	No
Specific target organ toxicity (single or repeated exposure)	No
Aspiration Hazard	No
Germ cell mutagenicity	No
Simple Asphyxiant	No
Hazards Not Otherwise Classified	No

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

None Reported

US. EPCRA Section 313 Toxic Release Inventory (TRI) (40 CFR 372)

None Reported

Additional Federal Regulatory Information

Not Applicable

State Regulations

US. California Proposition 65

None Reported

Additional State Regulatory Information

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (urea; boric acid; kelp extract; Propolis, extract)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (kelp extract; Propolis, extract)

Continued...

National Inventory	Status
Korea - KECI	No (kelp extract; Propolis, extract)
New Zealand - NZIoC	Yes
Philippines - PICCS	No (kelp extract; Propolis, extract)
USA - TSCA	No (kelp extract; Propolis, extract)
Taiwan - TCSI	Yes
Mexico - INSQ	No (kelp extract; Propolis, extract)
Vietnam - NCI	Yes
Russia - FBEPH	No (kelp extract; Propolis, 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	03/14/2024
Initial Date	03/15/2024

SDS Version Summary

Version	Date of Update	Sections Updated
0.3	03/13/2024	Toxicological information - Chronic Health, Hazards identification - Classification, Disposal considerations - Disposal, Composition / information on ingredients - Ingredients

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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end of SDS