

according to Regulation UK SI 2019/758 and UK SI 2020/1577 as amended

Creation Date 24-Nov-2010

Revision Date 25-Jan-2024

Revision Number 4

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Description:	Bromine
Cat No. :	33220
Synonyms	Bromine molecule.; Diatomic bromine; Dibromine
Index No	035-001-00-5
CAS No	7726-95-6
EC No	231-778-1
Molecular Formula	Br2
REACH registration number	-

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

Recommended Use Sector of use	Laboratory chemicals. SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites
Product category	PC21 - Laboratory chemicals
Process categories	PROC15 - Use as a laboratory reagent
Environmental release category	ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)
Uses advised against	No Information available

1.3. Details of the supplier of the safety data sheet

Company

Avocado Research Chemicals Ltd. (Part of Thermo Fisher Scientific) Shore Road, Heysham Lancashire, LA3 2XY, United Kingdom Office Tel: +44 (0) 1524 850506 Office Fax: +44 (0) 1524 850608

E-mail address

begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11 Emergency Number **US**:001-201-796-7100 / **Europe**: +32 14 57 52 99 **CHEMTREC** Tel. No. **US**:001-800-424-9300 / **Europe**:001-703-527-3887

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - According to GB-CLP Regulations UK SI 2019/720 and UK SI 2020/1567

Physical hazards

Bromine

Based on available data, the classification criteria are not met

Health hazards

Acute Inhalation Toxicity - Vapors Skin Corrosion/Irritation Serious Eye Damage/Eye Irritation

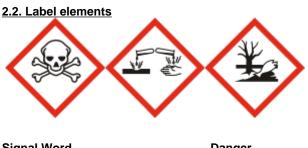
Environmental hazards

Acute aquatic toxicity

Category 1 (H330) Category 1 A (H314) Category 1 (H318)

Category 1 (H400)

Full text of Hazard Statements: see section 16



Signal Word

Danger

Hazard Statements

H314 - Causes severe skin burns and eye damage H330 - Fatal if inhaled H400 - Very toxic to aquatic life

Precautionary Statements

P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P310 - Immediately call a POISON CENTER or doctor/physician P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing

P280 - Wear protective gloves/protective clothing/eye protection/face protection

P273 - Avoid release to the environment

2.3. Other hazards

In accordance with Annex XIII of the REACH Regulation, inorganic substances do not require assessment Lachrymator (substance which increases the flow of tears) This product does not contain any known or suspected endocrine disruptors

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Component	CAS No	EC No	Weight %	CLP Classification - According to GB-CLP Regulations UK SI 2019/720 and UK SI 2020/1567
Bromine	7726-95-6	EEC No. 231-778-1	>95	Acute Tox. 1 (H330) Skin Corr. 1A (H314) Eye Dam. 1 (H318) Aquatic acute 1 (H400)

Bromine

Component	Specific concentration limits (SCL's)	M-Factor	Component notes
Bromine	-	100	-

REACH registration number	-

Full text of Hazard Statements: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek immediate medical attention/advice.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Seek immediate medical attention/advice.
Ingestion	Do NOT induce vomiting. Call a physician or poison control center immediately.
Inhalation	Remove to fresh air. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately. If not breathing, give artificial respiration.
Self-Protection of the First Aider	Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.
4.2. Most important symptoms and	effects, both acute and delayed
	Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
4.2 Indication of any immediate me	dial attention and anapial treatment needed

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Extinguishing media which must not be used for safety reasons

No information available.

5.2. Special hazards arising from the substance or mixture

Very toxic by inhalation. May be fatal if inhaled. Corrosive material. May intensify fire; oxidizer. Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products

Hydrogen halides, Thermal decomposition can lead to release of irritating gases and vapors.

Bromine

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear self-contained breathing apparatus and protective suit. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing.

6.2. Environmental precautions

Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

6.3. Methods and material for containment and cleaning up

Wear self-contained breathing apparatus and protective suit. Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Use only under a chemical fume hood. Wear personal protective equipment/face protection. Do not breathe mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not ingest. If swallowed then seek immediate medical assistance.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area.

Technical Rules for Hazardous Substances (TRGS) 510 Class 6.1B Storage Class (LGK) (Germany)

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits

List source(s): **EU** - Commission Directive (EU) 2019/1831 of 24 October 2019 establishing a fifth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC and amending Commission Directive 2000/39/EC **UK** - EH40/2005 Work Exposure Limits, Fourth edition. Published 2020. **IRE** - 2021 Code of Practice for the Chemical Agents Regulations, Schedule 1. Published by the Health and Safety Authority

Bromine

Revision Date 25-Jan-2024

Component	The United Kingdom	European Union	Ireland
Bromine	STEL: 0.2 ppm 15 min	TWA: 0.1 ppm (8hr)	TWA: 0.1 ppm 8 hr.
	STEL: 1.3 mg/m ³ 15 min	TWA: 0.7 mg/m ³ (8hr)	TWA: 0.7 mg/m ³ 8 hr.
	TWA: 0.1 ppm 8 hr		STEL: 0.3 ppm 15 min
	TWA: 0.66 mg/m ³ 8 hr		STEL: 2 mg/m ³ 15 min

Biological limit values

This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies

Derived No Effect Level (DNEL) / Derived Minimum Effect Level (DMEL)

See table for values

Component	Acute effects local (Inhalation)	Acute effects systemic (Inhalation)	Chronic effects local (Inhalation)	Chronic effects systemic (Inhalation)
Bromine 7726-95-6 (>95)	DNEL = 0.7mg/m ³	DNEL = 0.7mg/m ³	DNEL = 0.7mg/m ³	DNEL = 0.7mg/m ³

Predicted No Effect Concentration (PNEC)

See values below.

Component	Fresh water	Fresh water sediment	Water Intermittent	Microorganisms in sewage treatment	,
Bromine 7726-95-6 (>95)	PNEC = 1µg/L				

Component	Marine water	Marine water sediment	Marine water intermittent	Food chain	Air
Bromine	PNEC = 1µg/L				
7726-95-6 (>95)					

8.2. Exposure controls

Engineering Measures

Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection	Goggles	(European standard	I - EN 166)	
Hand Protection	Protectiv	ve gloves		
Glove material Butyl rubber Natural rubber Nitrile rubber Neoprene PVC	Breakthrough time See manufacturers recommendations	Glove thickness	EU standard EN 374	Glove comments (minimum requirement)
Skin and body prot	ection Long sle	eved clothing.		

Inspect gloves before use.

Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)

Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.

Remove gloves with care avoiding skin contamination.

Respiratory Protection	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly
Large scale/emergency use	Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced Recommended Filter type: Particulates filter conforming to EN 143 Acid gases filter Type E Yellow Inorganic gases and vapours filter Type B Grey
Small scale/Laboratory use	Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Recommended half mask:- Valve filtering: EN405; or; Half mask: EN140; plus filter, EN 141; Particle filtering: EN149:2001 When RPE is used a face piece Fit Test should be conducted
Environmental exposure controls	Prevent product from entering drains. Do not allow material to contaminate ground water system. Local authorities should be advised if significant spillages cannot be contained.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical State	Liquid	
Appearance Odor Odor Threshold Melting Point/Range Softening Point Boiling Point/Range Flammability (liquid) Flammability (solid,gas) Explosion Limits	Red brown Strong No data available -7.2 °C / 19 °F No data available 58.7 °C / 137.7 °F No data available Not applicable No data available	Liquid
Flash Point Autoignition Temperature Decomposition Temperature pH Viscosity Water Solubility Solubility in other solvents Partition Coefficient (n-octanol/wat	Not applicable No data available No data available No information available 0.314 cs at 25 °C 35 g/L (20°C) No information available er)	Method - No information available
Component Bromine	log Pow 1.03	
Vapor Pressure Density / Specific Gravity Bulk Density Vapor Density Particle characteristics	230 mbar @ 20 °C 3.111 Not applicable 5.51 (Air = 1.0) Not applicable (liquid)	Liquid (Air = 1.0)
9.2. Other information		
Molecular Formula Molecular Weight	Br2 159.82	

SAFETY DATA SHEET						
Bromine	-	-	Revision Date 25-Jan-2024			
10.1. Reactivity	None known, based on informa	ation available				
10.2. Chemical stability	Stable under normal conditions	s. May intensify fire; oxidizer.				
10.3. Possibility of hazardous reaction	ons					
Hazardous Polymerization Hazardous Reactions		Hazardous polymerization does not occur. None under normal processing.				
10.4. Conditions to avoid	Incompatible products. Excess	Incompatible products. Excess heat.				
10.5. Incompatible materials	Organic materials. Strong oxidizing agents. Ammonia. Fluorine. Metals. Reducing Agent.					
10.6. Hazardous decomposition products Hydrogen halides. Thermal decomposition can lead to release of irritating gases and vapors.						
SEC	TION 11: TOXICOLOG	ICAL INFORMATION				
11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008						
Product Information						
(a) acute toxicity; Oral Dermal Inhalation	Based on available data, the c Based on available data, the c Category 1					
Component	LD50 Oral	LD50 Dermal	LC50 Inhalation			
Bromine	LD50 = 2600 mg/kg (Rat)	-	LC50 = 2.7 mg/L (Rat, 4hrs)			
(b) skin corrosion/irritation;	Category 1 A					
(b) skill corrosion/irritation,	Calegory TA					
(c) serious eye damage/irritation;	Category 1					
(d) respiratory or skin sensitization; Respiratory Skin	Based on available data, the c Based on available data, the c					
(e) germ cell mutagenicity;	Based on available data, the c	lassification criteria are not me	t			
(f) carcinogenicity;	Based on available data, the c	lassification criteria are not me	ıt			

Based on available data, the classification criteria are not met

Based on available data, the classification criteria are not met

Based on available data, the classification criteria are not met

(g) reproductive toxicity;

(h) STOT-single exposure;

(i) STOT-repeated exposure;

Target Organs	None known.
(j) aspiration hazard;	Based on available data, the classification criteria are not met
Symptoms / effects,both acute and delayed	Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.
11.2. Information on other hazards	

Endocrine Disrupting Properties	Assess endocrine disrupting properties for human health.	This product does not contain any
	known or suspected endocrine disruptors.	

SECTION 12: ECOLOGICAL INFORMATION

```
12.1. Toxicity
Ecotoxicity effects
```

Bromine

Very toxic to aquatic organisms. The product contains following substances which are hazardous for the environment.

Component	Microtox	M-Factor
Bromine		100

12.2. Persistence and degradability	Not readily biodegradable
Persistence	Persistence is unlikely, based on information available.
Degradability	Not relevant for inorganic substances.
Degradation in sewage treatment plant	Contains substances known to be hazardous to the environment or not degradable in waste water treatment plants.

12.3. Bioaccumulative potential Bioaccumulation is unlikely

Component	log Pow	Bioconcentration factor (BCF)
Bromine	1.03	No data available

<u>12.4. Mobility in soil</u>	The product contains volatile organic compounds (VOC) which will evaporate easily from all surfaces Will likely be mobile in the environment due to its volatility. Disperses rapidly in air
<u>12.5. Results of PBT and vPvB</u> assessment	In accordance with Annex XIII of the REACH Regulation, inorganic substances do not require assessment.
<u>12.6. Endocrine disrupting</u> properties Endocrine Disruptor Information	This product does not contain any known or suspected endocrine disruptors
<u>12.7. Other adverse effects</u> Persistent Organic Pollutant Ozone Depletion Potential	This product does not contain any known or suspected substance This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues/Unused Products

Should not be released into the environment. Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in

	accordance with local regulations.			
Contaminated Packaging	Dispose of this container to hazardous or special waste collection point.			
European Waste Catalogue (EWC)	According to the European Waste Catalog, Waste Codes are not product specific, but application specific.			
Other Information	Do not flush to sewer. Waste codes should be assigned by the user based on the application for which the product was used. Do not empty into drains. Large amounts will affect pH and harm aquatic organisms. Do not let this chemical enter the environment.			

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

Bromine

<u>14.1. UN number</u> <u>14.2. UN proper shipping name</u> <u>14.3. Transport hazard class(es)</u> Subsidiary Hazard Class <u>14.4. Packing group</u>	UN1744 BROMINE 8 6.1 I
ADR	
<u>14.1. UN number</u> <u>14.2. UN proper shipping name</u> <u>14.3. Transport hazard class(es)</u> Subsidiary Hazard Class <u>14.4. Packing group</u>	UN1744 BROMINE 8 6.1 I
IATA	FORBIDDEN FOR IATA TRANSPORT
<u>14.1. UN number</u> <u>14.2. UN proper shipping name</u> <u>14.3. Transport hazard class(es)</u> Subsidiary Hazard Class <u>14.4. Packing group</u>	UN1744 BROMINE FORBIDDEN FOR IATA TRANSPORT 8 6.1 I
14.5. Environmental hazards	Dangerous for the environment Product is a marine pollutant according to the criteria set by IMDG/IMO
14.6. Special precautions for user	No special precautions required.
14.7. Maritime transport in bulk according to IMO instruments	Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

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

International Inventories

Europe (EINECS/ELINCS/NLP), China (IECSC), Taiwan (TCSI), Korea (KECL), Japan (ENCS), Japan (ISHL), Canada (DSL/NDSL), Australia (AICS), New Zealand (NZIoC), Philippines (PICCS). US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

Component	CAS No	EINECS	ELINCS	NLP	IECSC	TCSI	KECL	ENCS	ISHL
Bromine	7726-95-6	231-778-1	-	-	Х	Х	KE-03605	Х	-
Component	CAS No	TSCA	TSCA In	ventory	DSL	NDSL	AICS	NZIoC	PICCS

Bromine

Revision Date 25-Jan-2024

	notification - Active-Inactive							
Bromine	7726-95-6	Х	ACTIVE	Х	-	Х	Х	Х

Legend: X - Listed '-' - Not Listed

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization		REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Bromine	7726-95-6	-	Use restricted. See item 75. (see link for restriction details)	-

REACH links

https://echa.europa.eu/substances-restricted-under-reach

Seveso III Directive (2012/18/EC)

	Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements
l	Bromine	7726-95-6	20 tonne	100 tonne

Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of dangerous chemicals

Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)? Not applicable

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work .

Take note of Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values

National Regulations

UK - Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment

WGK Classification

See table for values

Component	Germany - Water Classification (AwSV)	Germany - TA-Luft Class		
Bromine	WGK2			

Component	Switzerland - Ordinance on the Reduction of Risk from handling of hazardous substances preparation (SR 814.81)	Switzerland - Ordinance on Incentive Taxes on Volatile Organic Compounds (OVOC)	Switzerland - Ordinance of the Rotterdam Convention on the Prior Informed Consent Procedure	
Bromine Prohibited and Restricted 7726-95-6 (>95) Substances				

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3

H330 - Fatal if inhaled

Training Advice

Chemical incident response training.

H314 - Causes severe skin burns and eye damage

- H318 Causes serious eye damage
- H400 Very toxic to aquatic life

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) **CAS** - Chemical Abstracts Service Inventory EINECS/ELINCS - European Inventory of Existing Commercial Chemical DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances/EU List of Notified Chemical Substances Substances List **PICCS** - Philippines Inventory of Chemicals and Chemical Substances **ENCS** - Japanese Existing and New Chemical Substances IECSC - Chinese Inventory of Existing Chemical Substances AICS - Australian Inventory of Chemical Substances KECL - Korean Existing and Evaluated Chemical Substances NZIOC - New Zealand Inventory of Chemicals WEL - Workplace Exposure Limit TWA - Time Weighted Average IARC - International Agency for Research on Cancer ACGIH - American Conference of Governmental Industrial Hygienists Predicted No Effect Concentration (PNEC) **DNEL** - Derived No Effect Level **RPE** - Respiratory Protective Equipment LD50 - Lethal Dose 50% LC50 - Lethal Concentration 50% EC50 - Effective Concentration 50% NOEC - No Observed Effect Concentration POW - Partition coefficient Octanol:Water PBT - Persistent, Bioaccumulative, Toxic vPvB - very Persistent, very Bioaccumulative ICAO/IATA - International Civil Aviation Organization/International Air ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road Transport Association IMO/IMDG - International Maritime Organization/International Maritime MARPOL - International Convention for the Prevention of Pollution from Dangerous Goods Code Ships ATE - Acute Toxicity Estimate **OECD** - Organisation for Economic Co-operation and Development BCF - Bioconcentration factor VOC - (Volatile Organic Compound) Key literature references and sources for data

https://echa.europa.eu/information-on-chemicals Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Prepared ByHealth, Safety and Environmental DepartmentCreation Date24-Nov-2010Revision Date25-Jan-2024Revision SummaryNew emergency telephone response service provider.

This safety data sheet complies with Regulation UK SI 2019/758 and UK SI 2020/1577 as amended.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

Bromine