

## GPS Safety Summary

This Product Safety Summary is intended to provide a brief overview of the information on the risk assessment results of the chemical product that we manufacture based on the chemical industry's Global Product Strategy (GPS) to the general public as a social responsibility of a company that manufacture chemical substances.

This summary is not intended to provide technical information including effects on human health and the environment and details of risk assessment. In addition, it is not intended to be prepared as a document to replace a Safety Data Sheet (SDS) or a risk assessment report like a Chemical Safety Report under the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) (REACH CSR). Although the summary is prepared based on the laws, materials, information and data that are available at the present moment, it does not provide any assurances.

### SUBSTANCE NAME

## Isobutyraldehyde (2-methylpropanal, CAS No. 78-84-2)

### GENERAL STATEMENT

Isobutyraldehyde is a colorless clear liquid with specific scent of aldehyde. It is used as intermediate of industrial product such as synthetic raw material, such as raw material for polymer and polymerization initiator.

Isobutyraldehyde causes skin irritation, serious eye irritation, is suspected to cause <genetic defects> hereditary disease and may cause respiratory irritation.

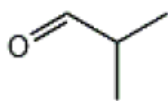
Although harmful to aquatic life, Isobutyraldehyde is readily biodegradable and its bioaccumulation is considered to be low.

It is recommended to wear appropriate protective masks, gloves when sampling or transfer for manufacturing. It is also advised to take effective measures to prevent leakage and conduct regular monitoring and maintenance and inspection of facilities to minimize the effect on environmental organism

### CHEMICAL IDENTITY

Item	Contents
Generic name	Isobutyraldehyde
Trade name	Isobutyraldehyde
Chemical name	2-methylpropanal (IUPAC name: 2-methylpropanal)
CAS No.	78-84-2
Other numbers	Reference No. listed in the official gazettes (Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc., Industrial Safety and Health Act) (2)-494 EC No. 201-149-6
Molecular formula	C <sub>4</sub> H <sub>8</sub> O

Structural formula



Other information

None in particular

## USES AND APPLICATIONS

Intended uses of our product      Industrial intermediate (synthetic raw material, raw material for polymer or polymerization initiator)

## PHYSICAL/CHEMICAL PROPERTIES

Appearance (physical state)	Liquid
Color	Colorless
Odor	Specific scent of aldehyde
Specific gravity (relative density)	None
Melting point/boiling point	-65.9 °C / 64°C (101300 Pa)
Combustibility/flammability	Highly flammable liquid and vapor
Flash point	-25 °C(Closed)
Limit of combustion or explosion	10.6 vol % / 1.6 vol %
Auto ignition temperature	196 °C
Vapor pressure	15300 Pa (20°C)
Molecular weight	72.1
Water solubility	6.7 g/100 ml (20°C)
Octanol-water partition coefficient	LogKow: 1.2

## HEALTH EFFECTS

Effect assessment	Results (GHS <sup>*1</sup> hazard classification)
Acute toxicity (oral ingestion)	Not classified <sup>*2</sup>
Acute toxicity (inhalation)	Not applicable <sup>*3</sup> (gas) Not classified (vapor) Classification not possible <sup>*4</sup> (dust/mist)
Acute toxicity (dermal)	Not classified
Skin corrosion/irritation	Causes skin irritation (Category 2)
Serious eye damage/eye irritation	Causes serious eye irritation (Category 2A)
Respiratory sensitization	Classification not possible
Skin sensitization	Classification not possible
Germ cell mutagenicity	Suspected of causing genetic defects (Category 2)
Carcinogenicity	Classification not possible
Reproductive toxicity	Classification not possible
Specific target organ toxicity (Single exposure)	May cause respiratory irritation (Category 3)
Specific target organ toxicity (Repeated exposure)	Classification not possible
Aspiration hazard	Classification not possible
Source/remarks	<sup>*1</sup> GHS: Globally Harmonized System of Classification and Labelling of Chemicals.

This system enables us to classify chemicals by hazard type and degree according to globally harmonized rules.

<sup>\*2</sup> Not classified: Hazardousness much lower than the lowest hazard class specified by GHS

<sup>\*3</sup> Not applicable: Because the physical properties defined by GHS are not met, the chemical is not included in the target chemicals of the classification.

<sup>\*4</sup> Classification not possible: The data needed for judging classification are not available at all or sufficient data are not collected for classification.

## ENVIRONMENTAL EFFECTS

Effect assessment	Results (GHS hazard classification)
Hazardous to the aquatic environment (acute)	Harmful to aquatic life (Category 3)
Hazardous to the aquatic environment (chronic)	Not classified
Environmental fate/dynamics	Results
Transfer in the environment	Its volatility from the water system is low and its adsorptivity to soil is not high.
Biodegradability	Readily biodegradable
Bioaccumulation	Bioaccumulation is low.
Conclusion of PBT/vPvB	Not judged to be PBT <sup>*</sup> and vPvB <sup>**</sup> . <sup>*</sup> PBT: Persistent, bioaccumulative and toxic (Remaining in the environment and having high bioaccumulative and strong toxic properties) <sup>**</sup> vPvB: very Persistent and very Bioaccumulative (Readily remaining in the environment and having very high bioaccumulative property)

## EXPOSURE

Details	No.	Potential exposure in the process of use of our products (exposure route)
Occupational Exposure	1-1	In the operation of manufacture or use, there is potential for worker exposure via skin or inhalation during the work of closed and continuous process at the time of maintenance, sampling, trouble of plant or so on, exist. There is also potential for worker exposure via skin or inhalation in the process such time as transfer to ship or large capacity of container of substance or mixture with special facility.
Consumer exposure	2-1	This material is not used by consumers and therefore the potential for consumer exposure is extremely low.
Environmental exposure	3-1	There is potential for environmental exposure mainly into atmospheric environment and water system in the process of manufacturing of the substance, using intermediate for other substances. However isobutyraldehyde is manufactured in a closed system process. Therefore the possibility of environment release is very low. Because it is liquid at normal temperature and normal pressure, in the case of environmental release, it disperses in water system. It is likely to be degraded in the water system relatively rapidly.
Note		If there is the potential for exposure in the other uses, take appropriate measures in reference to the risk management recommends.

## RISK MANAGEMENT RECOMMENDATIONS

Details	No.	Management recommendations based on our risk assessment results
Occupational Exposure	1-1	Wear appropriate protective masks, clothing and gloves made of materials that isobutylaldehyde does not penetrate during sampling operation or transfer. The operation manager instructs workers how to select and use the appropriate protective equipment and how to manage the work place.
Consumer exposure	2-1	None
Environmental exposure	3-1	Install exhaust-gas and sewage treatment equipment and take effective measures to prevent leakage. Take care of regular confirmation of discharge volume, daily maintenance and handling.
Other warnings Note		For the measures and actions to be taken for regular handling, emergency situations, disposal and transportation, see Section 4, 5, 6, 7, 8, 13 and 14, SDS issued by Mitsubishi Chemical Corporation.

## STATE AGENCY REVIEW

Assessment document	Review condition
OECD HPV	<a href="http://www.chem.unep.ch/irptc/sids/OECDSDS/78842.pdf">http://www.chem.unep.ch/irptc/sids/OECDSDS/78842.pdf</a>
National Institute of Evaluation and Technology (NITE) - Preliminary Risk Assessment of Chemical Substances	None
Ministry of Environment - Preliminary Environment Risk Assessment of Chemical Substances	<a href="http://www.env.go.jp/chemi/report/h22-01/pdf/chpt2/2-2-2-05.pdf">http://www.env.go.jp/chemi/report/h22-01/pdf/chpt2/2-2-2-05.pdf</a>
REACH	<a href="http://apps.echa.europa.eu/registered/registered-sub.aspx">http://apps.echa.europa.eu/registered/registered-sub.aspx</a>

## REGULATORY INFORMATION / LABELLING INFORMATION

### Main regulatory information

Law	Regulatory condition
UN class	3
UN No.	2045
Fire Service Act	Hazardous Material Class 4, Class 1 Petroleum, water-insoluble, Hazard Class II
Ship Safety Act	Hazardous Substance List, Separate Table 1 Flammable Liquids
Poisonous and Deleterious Substances Control Act	Not applicable
Act on the Evaluation of	Type II Monitoring Chemical Substance (before amendment)

<p>Chemical Substances and Regulation of Their Manufacture, etc. Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof Civil Aeronautics Act Other Law</p>	<p>Class I designated chemical substances</p> <p>Substances Approved for Transportation, 3. Flammable Liquids Ship Safety Act: Flammable liquid in Appended Table 1, Article 2-3 of the Notification for Establishing Standards for the Carriage of Dangerous Goods in Ships Act on Port Regulations: Ordinance for Enforcement Article 12, Hazardous Substance List, Flammable Liquids Act for the Prevention of Marine Pollution and Maritime Disasters: Marine Pollutants in the Case of Bulk Transportation (Class Y) Offensive Odor Control Law: Ordinance for Enforcement Article 1, Specific offensive odor substance</p>
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## Labelling information

## Pictograms or symbols



## Signal Word

Danger

## Hazard statement

- Highly flammable liquid and vapor
- Causes skin irritation
- Causes serious eye irritation
- Suspected of causing genetic defects
- May cause respiratory irritation
- Harmful to aquatic life

**CONTACT INFORMATION WITHIN COMPANY**

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**DATE OF ISSUE / REVISION, ADDITIONAL INFORMATION**

Ver. 1 : Issued on march 10, 2014 (JP version 1: issued on July 30, 2012)

Revised : None

Special remarks: None