Product Stewardship Summary

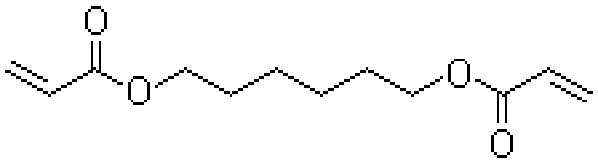
Hexanediol Diacrylate

General Statement

Hexanediol diacrylate is a difunctional acrylic monomer that can be polymerized by free radicals. Hexanediol diacrylate is a low hazard material and risk of adverse health effects associated with both occupational and consumer use of this chemical is anticipated to be low.

Chemical Identity

Name: Hexanediol diacrylate
Brand Names: Not Applicable
Chemical name (IUPAC): 1,6-hexanedioldiacrylate
CAS number(s): 13048-33-4
EC number: 235-921-9
Molecular formula: $C_{12}H_{18}O_4$
Structure:



Uses and Applications

Hexanediol diacrylate is used in ultra violet (UV) and electron beam (EB) applications as a reactive component in formulating coatings and inks, furniture and floor coatings, coatings on plastic substrates, varnishes for packing items and more.

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Physical/Chemical Properties

Phys/Chem Safety Assessment

Property	Value
Form	Substance
Physical state	Liquid
Color	Colorless
Odor	No odor
Density	1.02 g/cm^3 @ 20°C
Melting / boiling point	7.8 / 98.8 °C
Flammability	No data available
Explosive properties	No data available
Self-ignition temperature	235 °C
Vapor pressure	0.001 hPa @ 20°C
Mol weight	226.27 g/mol
Water solubility	343 mg/L @ 20°C
Flash point	>110°C
Octanol-water partition coefficient (Logk_{ow})	2.62 - 3.08 @25°C

Exposure, Hazard and Safety Assessment

The following section describes possible exposures scenarios and hazards associated with hexanediol diacrylate. The exposure assessment describes both the amount of and the frequency with which a chemical substance reaches a person, a population of people, or the environment. Hazard refers to the inherent properties of a substance that make it capable of causing harm to human health or the environment. The safety assessment reports the possibility of a harmful event arising from exposure to a chemical or physical agent under specific conditions. Just because a substance may possess potentially harmful properties does not mean that it automatically poses a risk. It is not possible to make that determination without understanding the exposure.

Human Health Effects

Human Exposure Assessment

Consumer: Hexanediol diacrylate is an acrylic monomer used in UV-cured inks, adhesives, sealants and coatings. Consumer products are not anticipated to contain the unreacted monomer of hexanediol diacrylate and therefore consumer exposures are anticipated to be negligible.

Worker: In industrial settings, hexanediol diacrylate is manufactured and handled in closed processes as much as possible, which ensures that worker exposure to hexanediol diacrylate is minimized. The proper use of personal protective equipment during loading, unloading, sampling or during maintenance operations, will further minimize potential exposures to hexanediol diacrylate.

Human Hazard Assessment

Hexanediol diacrylate has low acute and repeat exposure toxicity following both oral and dermal exposures. It is a skin and eye irritant and dermal exposures may result in skin sensitization. Hexanediol diacrylate is neither mutagenic or genotoxic, is not classified as a carcinogen and is not associated with reproductive or developmental toxicity.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Low acute toxicity
Irritation / corrosion Skin / eye / respiratory test	Skin contact causes irritation. Eye contact causes irritation. May cause an allergic skin reaction.
Toxicity after repeated exposure Oral / inhalation / dermal	Does not cause significant toxicity to internal organs after repeated exposure in animal studies by oral or dermal route of exposure.
Genotoxicity / Mutagenicity	Neither mutagenic or genotoxic.
Carcinogenicity	Is not classified as a carcinogen based on available data.
Reproductive/Developmental Toxicity	Does not cause reproductive effects in animal studies. Developmental effects are not expected at non-irritating concentrations.

Human Health Safety Assessment

Consumer: Hexanediol diacrylate is mainly used as a reactive component in formulated coatings and inks with no anticipated consumer exposure to unreacted monomer. Therefore, hexanediol diacrylate is not anticipated to be associated with a risk to consumer health.

Worker: In industrial settings hexanediol diacrylate is manufactured and handled primarily in closed processes, which limit exposure. Based on good manufacturing processes and industrial hygiene, the occupational health risk associated with hexanediol diacrylate is low.

Environmental Effects

Environmental Exposures
Hexanediol diacrylate is readily biodegradable and has low potential for bioaccumulation. In air, hexanediol diacrylate will be rapidly degraded by photochemical processes.

Environmental Hazard Assessment

Effect Assessment	Result
Aquatic toxicity	Toxic to aquatic organisms.

Fate and behavior	Result
Biodegradation	Readily biodegradable.
Bioaccumulation potential	Not bioaccumulative (log K_{ow} = 2.81).
PBT / vPvB conclusion	Not considered to be either PBT or vPvB.

Environmental Safety Assessment

Hexanediol diacrylate is toxic to aquatic organisms. In spite of a relatively high toxicity it is anticipated to present a low overall risk to aquatic environments. This conclusion is based on the fact that hexanediol diacrylate is readily biodegradable and not bioaccumulative and therefore will be quickly removed from the aquatic environment through degradation.

Risk Management Recommendations

Exposure to hexanediol diacrylate in the workplace can be controlled by sufficient ventilation, proper handling and storage techniques, and the use of appropriate personal protective equipment as recommended in the SDS. Consumer products are not anticipated to contain significant levels of hexanediol diacrylate.

A selection of occupational exposure limits are presented, below.

- American Industrial Hygiene Association (AIHA) Workplace Environmental Exposure Levels
  WEEL: (8h TWA): 1 mg/m^3; Dermal Sensitization Notation

Regulatory Agency Review

Hexanediol diacrylate is on the following lists:

AIHA - Workplace Environmental Exposure Levels (WEELs)
AIHA - Workplace Environmental Exposure Levels (WEELs) - Under Review
Australian Inventory of Chemical Substances (AICS)
China - Chemical Inventory of Existing Chemical Substances (IECSC) - CAS Numbers
DOE Protective Action Criteria (PAC)
ECHA - List of Pre-registered Substances
Environment Canada - Domestic Substances List (DSL)
Environment Canada - Domestic Substances List (DSL) Categorization of Existing Substances
EPA - Chemical Update System (CUS) - 2002
EPA - Master Testing List
EPA - Master Testing List (1996)
EPA - Office of Pollution Prevention and Toxics (OPPT) High Production Volume (HPV) Program - 1990
EPA - TSCA - 8(a) - Preliminary Assessment Information Rules (PAIR)
EPA - TSCA - Inventory
EPA - TSCA - Test Submissions - Section 4
ETUC - Priority List for REACH Authorisation
EU - European Inventory of Existing Commercial Substances (EINECS)
EU - Table 3.1 of Annex VI to the CLP Regulation
EU - Table 3.2 of Annex VI to the CLP Regulation
International Council of Chemical Associations (ICCA) - High Production Volume (HPV) Initiative
Mexico - National Inventory of Chemical Substances
Minnesota - List of Hazardous Substances
Minnesota Department of Health - Toxic Free Kids Act - Chemicals of High Concern
New Zealand - Inventory of Chemicals (NZIoC)
OECD - High Production Volume (HPV) Chemicals - 2004
OECD - High Production Volume (HPV) Chemicals - 2007
Philippine Inventory of Chemicals and Chemical Substances (PICCS)

Regulatory Information / Classification and Labeling

Under the Globally Harmonized System for classification and labeling (GHS), substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (Extended) SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

GHS Classification:

Eye Irritation, Category 2
Skin Irritation, Category 2
Skin Sensitization, Category 1

Hazard Statements:

H315: Causes skin irritation
H317: May cause allergic skin reaction
H319: Causes serious eye irritation

Signal Word: Warning

Precautionary Statements:

P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
P264: Wash skin thoroughly after handling.
P272: Contaminated work clothing must not be allowed out of the workplace.
P280: Wear eye protection/face protection/protective gloves.
P302: IF ON SKIN: Wash with plenty of soap and water.
P305: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P321: Specific treatment-refer to supplemental first aid instructions.
P333: If skin irritation or rash occurs: Get medical advice/ attention.
P337: If eye irritation persists: Get medical advice/ attention.
P362: Take off contaminated clothing and wash before reuse.
P501: Dispose of contents/ container to an approved waste disposal plant

Hazard Pictograms:

Conclusion

Hexanediol diacrylate is a useful reactive monomer component in coating and ink formulations. Consumer products will not contain appreciable levels of hexanediol diacrylate and, therefore, exposure and health risks to consumers is considered negligible. In the occupational setting responsible handling of hexanediol diacrylate will prevent the potential for skin or eye irritation and skin sensitization allowing workers to use materials containing hexanediol diacrylate safely.

Contact Information with Company

Ashland Inc.
5200 Blazer Parkway
Dublin, Ohio 43017 http://www.ashland.com/contact

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Additional Information

For more information on GHS, visit http://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf or http://live.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.
Ashland product stewardship summaries are located at http://www.ashland.com/sustainability/product/product-stewardship

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REACH registration is specific to Importers/Manufacturers that place the chemical on the EU market, and is specific to registered uses. Inclusion on the list of REACH Registered Substances does not automatically imply registration by Ashland.

Inclusion on the New Zealand Inventory of Chemicals applies only to the pure substance listed. The importer of record must determine whether or not their substances are in compliance.