Product Safety Assessment

MIRA-GLOS™ and MOR-GLOSS™ UV Curable Coatings, EB Curable Coatings, Solvent-Based Two Component Polyurethane Coatings, or Waterborne Acrylic Coatings

Product Safety Assessment documents are available at www.dow.com/productsafety/finder/.

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Names
• MIRA-GLOS™ Liquid Coatings
• MIRA-GLOS 4200 Liquid Coating
• MIRA-GLOS 5200 Liquid Coating
• MIRA-GLOS UVD 125/44 UV-Curable Liquid Coating
• MIRA-GLOS RT A Liquid Coating
• MIRA-GLOS RT C Coreactant
• MOR-GLOSS™ Liquid Coatings
• MOR-GLOSS 552A Liquid Coating
• MOR-GLOSS CR-40B Coreactant
• ZM-1819 UV-Curable Liquid Coating

Product Overview
• MIRA-GLOS™ and MOR-GLOSS™ Coatings are a family of curable liquid coatings. The products include two-component curing systems and single-component systems that are cured by a variety of mechanisms. Some products are water-based while others are solvent-based.1,2 For further details, see Product Description.
• MIRA-GLOS and MOR-GLOSS Coatings are used in packaging and film applications, as well as other applications that require high-gloss surfaces, abrasion resistance, and resistance to yellowing.3,4 For further details, see Product Uses.
• Exposure can occur in facilities that manufacture these coatings, during transport, or in the various industrial or manufacturing facilities that apply these coatings. Dow does not sell MIRA-GLOS or MOR-GLOSS Coatings for direct consumer use. Consumers may come into contact with packaging materials, protective films, or other products that are coated using these products. Contact with the cured coatings is not considered to present a risk to consumers.5,6,7 For further details, see Exposure Potential.
• Health considerations vary depending upon the formulation. The cured coating is not expected to present a significant risk; however, exposure to individual components in the uncured coating product may present certain risks. Eye contact may cause slight to severe irritation, with reddening, tearing, and pain. Skin contact may cause slight to severe irritation, with reddening, swelling, and itchiness. Contact may result in skin sensitization. Some components may be harmful if absorbed through skin. Inhalation of vapor or mist may cause irritation of the nose, throat, and lungs, as well as headache, nausea, dizziness, difficulty breathing, and vomiting. Components of some products may cause sensitization of the respiratory system or an allergic respiratory reaction. Some

Notes
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components may be harmful if swallowed or have additional health considerations.\textsuperscript{8,9,10} For further details, see Health Information and the relevant Safety Data Sheets.

- Health considerations vary depending upon the formulation. The cured coating is not expected to present a significant risk; however, exposure to individual components in the uncured coating product may present certain risks. Eye contact may cause slight to severe irritation, with reddening, tearing, and pain. Skin contact may cause slight to severe irritation, with reddening, swelling, and itchiness. Contact may result in skin sensitization. Some components may be harmful if absorbed through skin. Inhalation of vapor or mist may cause irritation of the nose, throat, and lungs, as well as headache, nausea, dizziness, difficulty breathing, and vomiting. Components of some products may cause sensitization of the respiratory system or an allergic respiratory reaction. Some components may be harmful if swallowed or have additional health considerations.\textsuperscript{11,12,13} Some components are classified as potential human carcinogens. For further details, see Health Information and request the relevant Safety Data Sheet from the Dow Customer Information Group.

- Cured MIRA-GLOS™ and MOR-GLOSS™ Coatings are expected to be inert in the environment. Environmental effects associated with individual products vary depending upon the formulation. The main solvent components range from readily to inherently biodegradable and are not expected to accumulate in the food chain. The main solvent components range from practically non-toxic to moderately toxic to aquatic organisms on an acute basis. These products contain other trace components that are moderately to highly toxic to aquatic organisms on an acute basis. Once cured these products are not water soluble and not readily biodegradable. If released to the environment, they would tend to partition to soil or sediment and would be removed by biological wastewater-treatment facilities with the biosolids. These products are moderately to highly toxic to aquatic organisms.\textsuperscript{14,15,16} For further details, see Environmental Information.

- In general, these products are stable under recommended storage and normal use conditions. Avoid contact with strong oxidizers, acids, bases, water, ultraviolet light, and reducing agents. Keep away from moisture, heat, or flame. Thermal decomposition may result in the production of hazardous monomers.\textsuperscript{17,18,19} For further details, see Physical Hazard Information.

**Manufacture of Product**

- **Locations** – The Dow Chemical Company and its global affiliates produce MIRA-GLOS™ and MOR-GLOSS™ Coatings at several global facilities.
- **Process** – MIRA-GLOS and MOR-GLOSS Coatings are manufactured and formulated using proprietary materials and technology.

**Product Description**\textsuperscript{20,21,22,23,24}

MIRA-GLOS™ and MOR-GLOSS™ Coatings are a family of curable liquid coatings. The products include two-component curing systems and single-component systems that cure at room temperature or by heat, ultraviolet (UV), or electron-beam (EB) technology. Some products are water-based emulsions, while others are solvent-based. Most products are acrylate-based, but some are urethanes. Before curing, these products are clear to milky liquids that are white to yellow in color. The cured coating is a solid resin providing excellent clarity and high gloss, abrasion resistance, heat resistance, and/or chemical resistance.

**Product Uses**\textsuperscript{25,26}

MIRA-GLOS™ and MOR-GLOSS™ Coatings are used in packaging and film applications, as well as in other uses that require high-gloss surfaces, abrasion resistance, and resistance to yellowing. Some examples are:

- Dishwasher detergent packaging
- Graphic arts applications
- Window film applications
- Security film applications
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**Exposure Potential**\(^{27,28,29}\)
MIRA-GLOS™ and MOR-GLOSS™ Coatings are used in the production of industrial and consumer products. Based on the uses for these products, individuals could be exposed through:

- **Workplace exposure** – Exposure can occur in facilities that manufacture these coatings, during transport, or in the various industrial or manufacturing facilities that use these coatings. They are produced, distributed, and stored in closed systems. Those working in manufacturing operations could be exposed during maintenance, sampling, testing, cleaning, application, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit exposure. See Health Information.

- **Consumer exposure to MIRA-GLOS and MOR-GLOSS Coatings** – Dow does not sell MIRA-GLOS or MOR-GLOSS Coatings for direct consumer use. Consumers may come into contact with products coated using these products. Contact with the cured product is not considered to present a risk to consumers. See Health Information.

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface water, or groundwater. Respiratory protection is necessary for cleaning up spills and leaks. Small spills should be absorbed with inert materials such as sand. The cured products will tend to float in water and will be removed in wastewater treatment facilities by adsorption to biosolids. The solvents in the coatings mixtures range from insoluble to miscible in water. The main solvent components will likely evaporate from the coating. If released to water, the water-soluble components will likely remain with the water. Because the main solvent components range from readily to inherently biodegradable, they will likely be removed from water and soil environments, including wastewater treatment plants. Several products contain diphenyl ketone, proprietary amines, a photoinitiator and other trace components that are not water soluble. If released to the environment, these components would tend to float in water and would likely be removed in biological wastewater treatment facilities by adsorption to biosolids. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the product should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Appropriate protective equipment must be worn when handling a spill of this material. This material is a potent sensitizer. If exposed to material during cleanup operations, immediately remove all contaminated clothing and wash exposed skin areas with soap and water. Wash contaminated clothing before re-use, and do not take clothing home to be laundered. Keep spills and cleaning runoff out of municipal sewers and open bodies of water. Evacuate personnel to safe areas and ventilate the area. Floor may be slippery; use care to avoid falling. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Sweep up or vacuum up spillage and collect in suitable containers for disposal. Avoid all contact, and avoid breathing vapor. Spills on porous surfaces can contaminate groundwater. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Use extinguishing media appropriate to the surrounding fire. Closed containers may rupture via pressure build-up when exposed to fire or extreme heat. During a fire, irritating and/or highly toxic gases and/or fumes may be generated during combustion. Do not permit water to enter the containers. Closed containers may explode when heated or contents contaminated with water. In the event if a fire, wear self-contained breathing apparatus. Cool closed containers exposed to fire with water spray. Remain upwind and avoid breathing smoke. Contain runoff. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

**Health Information**\(^{30,31,32}\)
Health information for MIRA-GLOS™ and MOR-GLOSS™ Coatings is summarized on the relevant Safety Data Sheets. These materials may also contain minor components or additives that have additional health risks. It is important to note that health risks associated with individual products may vary based on their formulation or intended use. The Safety Data Sheet is the preferred source for specific health information. An overview of health information for MIRA-GLOS and MOR-GLOSS Coatings appears below. The cured coatings are essentially inert solid materials, and contact is not considered to present a significant risk.

**Eye contact** – Contact may cause slight to severe eye irritation, with reddening, tearing, or pain.

**Skin contact** – Contact may cause slight to severe skin irritation, with reddening, swelling, and itchiness. Skin sensitization may occur with some products. Components of some products may be harmful if absorbed through the skin.

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**Inhalation** – Inhalation of vapor or mist may cause irritation of nose, throat, and lungs, headache, nausea, dizziness, difficulty breathing, and vomiting. Components of some products may cause sensitization of the respiratory system or an allergic respiratory reaction.

**Ingestion** – Components of some products may be harmful if swallowed. Swallowing these products may cause gastrointestinal irritation, abdominal pain, vomiting, nausea, diarrhea, and dizziness. Irritation to mouth, throat, and stomach may occur.

**Repeated exposure** – In repeated exposure to laboratory animals, components of some products (ketone photoinitiator) have been reported to affect the blood, liver, kidney, and bone marrow, and some components have been reported to affect the upper respiratory tract and lungs.

**Other** – Components of some products have been shown to cause cancer (diphenyl ketone, CAS No. 119-61-9) or birth defects (methyl pyrrolidone, CAS No. 872-50-4) in laboratory testing. Some components are classified as potential human carcinogens.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

**Environmental Information**

Environmental information for MIRA-GLOS™ and MOR-GLOSS™ Coatings is summarized on the relevant Safety Data Sheets. These materials may also contain solvents or additives that have additional environmental impact. It is important to note that environmental impact associated with individual products may vary based on their formulation or intended use. The Safety Data Sheet is the preferred source for specific environmental information. An overview of environmental information for MIRA-GLOS and MOR-GLOSS Coatings appears below. Cured MIRA-GLOS and MOR-GLOSS Coatings are expected to be inert in the environment.

The cured products are insoluble and will tend to float in water and adsorb to soil or sediment. Although the cured products are not biodegradable, they will be expected to slowly degrade in the environment, including degradation by physical action or by exposure to sunlight. The cured products would likely be removed in biological wastewater treatment plants by adsorption to biosolids. Due to their high molecular weight, the cured products are not expected to accumulate in the food chain and are not expected to be toxic to fish and other aquatic organisms.

The main solvent components in the products range from low to high volatility, and may evaporate from products containing them. The solvents range from insoluble to miscible in water. The aqueous soluble components when introduced into the aquatic environment will have a tendency to remain in water with a minimal tendency to bind to soil or sediment. The main solvent components are unlikely to persist in the environment. These components range from readily to inherently biodegradable, which suggests that the solvents will likely be removed from water and soil environments, including biological wastewater treatment facilities. The main solvent components are unlikely to accumulate in the food chain and range from practically non-toxic (LC50/EC50 > 100 mg/L in the most sensitive species tested) to moderately toxic (LC50/EC50 between 1.0 and 10 mg/L in the most sensitive species tested) to fish and other aquatic organisms on an acute basis.

Several products contain diphenyl ketone, proprietary amines, a ketone photoinitiator and other trace components. These chemicals are not water-soluble and not biodegradable. If released to the environment, these components would tend to float in water and bind to soil or sediment, and would likely be removed in biological wastewater treatment facilities by adsorption to biosolids. These components are not expected to accumulate in the food chain, and range from moderately toxic (LC50/EC50 between 1.0 and 10 mg/L in the most sensitive species tested) to highly toxic (LC50/EC50 between 0.1 and 1.0 mg/L in the most sensitive species tested) to fish and other aquatic organisms on an acute basis.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.
Physical Hazard Information

MIRA-GLOS™ and MOR-GLOSS™ Coatings present different hazards depending upon the product. The Safety Data Sheet is the preferred source for specific physical hazard information.

In general, these products are stable under recommended storage and normal use conditions. Avoid contact with strong oxidizers, acids, bases, water, ultraviolet (UV) light and reducing agents. Keep these products away from moisture, heat, or sources of ignition. Thermal decomposition may result in the generation of harmful gases.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of MIRA-GLOS™ and MOR-GLOSS™ Coatings. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet.

Additional Information

- Request the relevant Safety Data Sheets and Technical Data Sheets from the Dow Customer Information Group (www.dow.com/assistance/dowcig.htm)
- Contact Us (www.dow.com/assistance/dowcig.htm)

For more business information about MIRA-GLOS™ and MOR-GLOSS™ Coating products, contact the Dow Customer Information Group at www.dow.com/assistance/dowcig.htm.

References


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