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Names
- High performance industrial laminating adhesives
- ADCOTE™ 76R36B-33 adhesive
- ADCOTE 76R44 adhesive
- ADCOTE 102A adhesive
- ADCOTE 545-80 adhesive
- ADCOTE 3220 adhesive
- ADCOTE AL-44 adhesive
- MORSTIK™ 607 adhesive
- MORSTIK 701 adhesive
- Coreactant F
- Catalyst F

Product Overview
- ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives are solvent-based polyester resin and acrylic resin adhesives, respectively. Most are components of a two-part adhesive system and require an isocyanate coreactant, such as Coreactant F, for complete cure. ADCOTE adhesives are pale yellow to red in color with a sour or solvent odor. The MORSTIK adhesives are clear and colorless with a solvent odor. Coreactant F is a clear yellow liquid with a solvent odor. For further details, see Product Description.
- ADCOTE and MORSTIK high performance industrial laminating adhesives can be customized for use in a variety of film lamination applications. Exposure can occur either in facilities that manufacture these products or in the various industrial or manufacturing facilities that use these products. These products are not sold directly to consumers, but are used in products with which consumers may come into contact, such as food packaging. Products used for food-contact applications comply with relevant standards and regulations and are not considered to present a risk to consumers. For further details, see Exposure Potential.
- Most health effects are related to the solvents used in these products. Eye contact may cause moderate to severe irritation and corneal opacity. Skin contact may cause slight to severe irritation. Inhalation of vapor or mist may cause irritation of the nose, throat, and lungs as well as headache, drowsiness, and central nervous system effects. Additional effects may include slowed respiration, central nervous system effects, unconsciousness, coma, and even death. These products may be harmful if swallowed causing headache, nausea, diarrhea, vomiting, abdominal pain, liver or kidney damage, dizziness, drowsiness, lack of coordination, narcosis, central nervous system effects, and coma. Aspiration into the lungs may cause inflammation, injury, pulmonary edema, and even death. Coreactant F can be a skin sensitizer even at low concentrations in susceptible individuals. Swallowing it may...
cause severe irritation of the mouth, throat and digestive tract, with headache, nausea, and narcosis. Inhalation of solvent vapor or mist may cause irritation of the nose, throat, and lungs, as well as headache, nausea, vomiting, central nervous system effects, tightness in the chest, shortness of breath, and lung, liver, and kidney damage. Isocyanates can be respiratory sensitziers.11,12,13 For repeated exposure effects, other effects and further details, see Health Information or request the relevant Safety Data Sheet from the Dow Customer Information Group.

- The resins in ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives are expected to be inert and biodegrade slowly in the environment. The solvents would quickly evaporate and most would quickly photodegrade in the atmosphere. The resins and solvents in these products would not persist in the environment and would be removed by biological wastewater-treatment facilities. They range from practically nontoxic to moderately toxic to aquatic organisms.14,15,16 For further details, see Environmental Information.

- ADCOTE and MORSTIK high performance industrial laminating adhesives are stable under recommended storage and normal use conditions. Most contain solvents that require strict adherence to recommended storage and handling procedures. These products are flammable and should be kept away from sources of heat and ignition and from strong oxidizers.17,18,19 For further details, see Physical Hazard Information.

Manufacture of Product

- **Locations** – Rohm and Haas Company, a wholly owned subsidiary of The Dow Chemical Company, and its global affiliates manufacture ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives at facilities located in the United States in Illinois and Ohio.

- **Process** – ADCOTE and MORSTIK high performance industrial laminating adhesives are produced using proprietary materials and processes.

Product Description

ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives are solvent-based polyester resin and acrylic resin adhesives, respectively. The ADCOTE resins are two-component, curing-type adhesives that may require the use of a coreactant, such as Coreactant F, to achieve full strength. MORSTIK adhesives are self-crosslinking, pressure-sensitive adhesives that cure when the solvent evaporates.20,21,22

ADCOTE high performance industrial laminating adhesives typically contain the resin component blended with methyl ethyl ketone, dioxalane, propylene glycol methyl ether acetate, and/or toluene. ADCOTE 3220 may contain small amounts (less than 0.02%) of benzene. ADCOTE adhesives are pale yellow to red in color with a sour or solvent odor.23,24

MORSTIK high performance industrial laminating adhesives typically contain the resin component blended with ethyl acetate and isopropyl alcohol, with the resin component making up 40 to 44% of the solution. MORSTIK adhesives are clear and colorless with a solvent odor.25

Coreactant F is a clear yellow liquid with a solvent odor. It consists of a polymeric isocyanate in ethyl acetate. It may contain small amounts (less than 0.5%) of toluene disocyanate. The polymeric isocyanate component makes up 75% of the solution.26

Product Uses27,28,29

ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives are versatile products that can be customized for use in a variety of high performance film lamination applications. ADCOTE resins are primarily used for window solar films, sail cloth, or flexible food-packaging applications that require high strength film to film or film to metal foil laminations. The MORSTIK resins are primarily used in the manufacture of decals.
Product Safety Assessment: High Performance Industrial Laminating Adhesives

Exposure Potential

ADCOTE™ and MORSTIK™ industrial laminating adhesives are used in industrial and consumer products. Based on the uses for this product, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in facilities that manufacture these products or in the various industrial or manufacturing facilities that use these products. They are produced, transported, and stored in closed systems. Those working with these products in manufacturing operations could be exposed during maintenance, sampling, testing, 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 products containing high performance industrial laminating adhesives** – Dow does not sell these products for direct consumer use, but they are used in consumer products such as window solar films, sailcloth, food packaging, and decals. Contact with consumer products that contain these adhesives is not considered to present a risk to consumers. Products used for food-contact applications comply with applicable standards and regulations established by the U.S. Food and Drug Administration (FDA) and European Union (EU) Directives. 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. Spilled product should not be flushed into surface water or sanitary sewer systems. Spilled product should be collected with noncombustible absorbents (e.g., sand, earth, diatomaceous earth, vermiculite) and placed in containers for disposal according to applicable government regulations. The resins are high molecular weight polymers that are nonvolatile and would be expected to be inert in the environment. If released, the resins would likely bind to soil, suspended solids, or sediment and would be removed by typical wastewater-treatment processes. Although the resins are essentially nonbiodegradable, they would be expected to degrade slowly in the environment by physical action or exposure to sunlight. If released, the solvents would likely evaporate and most would quickly photodegrade in the atmosphere. They are readily biodegradable, including removal by biological wastewater-treatment facilities and are unlikely to persist in the environment. The bioconcentration potential of these products is low. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Large industrial spills or releases are infrequent and generally contained. If a large spill occurs, the products should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Respiratory protection is necessary for cleaning up spills and leaks. Unnecessary personnel should be evacuated from spill area. All sources of ignition should be eliminated immediately. Sparking tools should not be used. Only explosion-proof equipment should be used. All containers and handling equipment should be grounded and bonded. Noncombustible absorbents such as sand, earth, diatomaceous earth, or vermiculite should be used to collect the spilled product. Spilled product may result in a slipping hazard. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – The solvents in these products are flammable. Unnecessary entry into the area should be denied and the use of unmanned hose holders should be considered. Water spray, carbon-dioxide or dry-chemical extinguishers, or foam should be used to fight the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Vapors are heavier than air and can travel to a source of ignition and flash back. Heated material can form flammable or explosive vapors with air. Closed containers may rupture via pressure build-up when exposed to fire or extreme heat. Harmful gases may be generated during combustion or decomposition. Fire water should be kept out of waterways and sewers to minimize the potential for environmental damage. Emergency procedures should be carefully followed. See Environmental, Health, and Physical Hazard Information.

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

Health Information

Health information for ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives is summarized on the relevant Safety Data Sheets. It is important to note that health risks associated with individual products may vary based on their formulation or intended use. These products may also contain minor components or additives that have additional health risks. The Safety Data Sheet is the preferred source for specific health information. In general, the health risks posed by these adhesive solutions are associated with the solvents. An overview of health information for these products appears below.

**Polyester and acrylate resins**

- **Eye contact** – Contact may cause moderate to severe irritation with pain and tearing and may result in conjunctivitis, temporary corneal injury, and/or corneal opacity.
Skin contact – Contact may cause slight to severe irritation with the possibility of reddening and blistering. Prolonged contact may result in defatting and drying of the skin leading to irritation and dermatitis. Solvents in some products can be absorbed through the skin with the appearance of initial symptoms of inhalation exposure such as headache, nausea, dizziness, and drowsiness.

Inhalation – Inhalation of solvent vapor or mist may cause irritation of the nose, throat, and lungs, as well as headache, nausea, vomiting, drowsiness, dizziness, and lack of coordination. Additional effects may include slowed respiration, central nervous system effects, unconsciousness, coma, and even death.

Ingestion – These products may be harmful if swallowed, causing headache, nausea, diarrhea, vomiting, abdominal pain, liver or kidney damage, dizziness, drowsiness, lack of coordination, narcosis, central nervous system effects, and coma. Aspiration into the lungs may cause inflammation, injury, pulmonary edema, and even death.

Repeated exposure – Prolonged or repeated exposure to the solvents in these products may cause lung, liver, kidney, or heart damage, central nervous system effects, and blood disorders.

Other – Solvents in some of these products are classified as developmental and reproductive toxins. Increased levels of birth defects, fetal mortality, and delayed fetal development have been reported for toluene in animal exposure studies. Benzene, present at very low levels in one product, is classified as a human carcinogen.

Co-reactant –

Eye contact – Contact may cause irritation with pain, tearing, conjunctivitis, and/or temporary corneal injury.

Skin contact – Contact may cause moderate irritation and reddening. Prolonged or repeated contact may result in defatting and drying of the skin leading to irritation and dermatitis. Can be a skin sensitizer even at low concentrations in susceptible individuals.

Inhalation – Inhalation of solvent vapor or mist may cause irritation of the nose, throat, and lungs, as well as headache, nausea, vomiting, central nervous system effects, tightness in the chest, shortness of breath, and lung, liver, and kidney damage. Isocyanates can be respiratory sensizers.

Ingestion – Swallowing these products may cause severe irritation of the mouth, throat and digestive tract, with headache, nausea, and narcosis.

Repeated exposure – Prolonged or repeated overexposure to the solvents used in some of these products may cause kidney, liver, or heart damage, as well as central nervous system effects and blood disorders. Long-term exposure to diisocyanates may cause lung damage, including permanently reduced lung function.

Other – Toluene diisocyanate, present in small quantities, is classified by the International Agency for Research on Cancer (IARC) as a possible human carcinogen.

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

Environmental Information

The resins in ADCOTE™ and MORSTIK™ high-performance industrial laminating adhesives are nonvolatile polymers that would be considered inert in the environment. If released, the resins would likely bind to soil, suspended solids, or sediment and would be removed by adsorption to biosolids during typical wastewater-treatment processes. Although the resins are not biodegradable, they would be expected to degrade slowly in the environment, including degradation by physical action or exposure to sunlight. The resins are considered practically nontoxic (LC₅₀ >100 mg/L) to aquatic organisms on an acute basis and are not likely to accumulate in the food chain due to their high molecular weight (bioconcentration potential is low).

If released to the environment, the solvents in these products would quickly evaporate. Most of the solvents would photodegrade in the atmosphere and are unlikely to persist in the environment. Traces remaining in soil or water are readily biodegradable (OECD 301A screening tests show 86–100% biodegraded at 10 days), which suggests their rapid and complete removal from water and soil.
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environments, including biological wastewater-treatment facilities. The solvents range from practically nontoxic (LC₅₀ >100 mg/L) to moderately toxic (LC₅₀ 1–10 mg/L) to aquatic organisms on an acute basis.

If released to water or soil, the resin in Coreactant F would react to form insoluble and stable polyurea compounds. Small amounts that escape to the atmosphere are predicted to have a short life based on comparisons with related compounds. Coreactant F is slightly toxic to aquatic organisms on an acute basis (LC₅₀ 10–100 mg/L). The solvent is readily biodegradable (100% degraded in 10 days per OECD 301D screening test) and practically nontoxic to aquatic organisms on an acute basis (LC₅₀ >100 mg/L).

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

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Physical Hazard Information

ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives and Coreactant F contain solvents that require strict adherence to recommended storage, handling, and fire-fighting procedures. These products are flammable. Containers should be kept tightly closed in a well-ventilated area away from sources of heat and ignition. Sufficient air ventilation should be provided when handling. Vapors may be released when products are heated during processing operations. Residual vapors in empty containers may explode on ignition.

Vapors are heavier than air and may travel to a source of ignition and flash back. Heated material may form flammable or explosive mixtures with air. Closed containers may rupture via pressure build-up when exposed to fire or extreme heat.

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

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Regulatory Information

ADCOTE™ and MORSTIK™ high performance industrial laminating adhesives and Coreactant F contain solvents that are considered hazardous. Regulations exist that govern the manufacture, sale, transportation, use, and/or disposal of these products. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet or Contact Us.

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Additional Information

- Request 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 ADCOTE™ and MORSTIK™ laminating adhesives, visit the Dow Packaging Products website at www.dow.com/products/market/packaging/.

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NOTICES

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