Product Safety Assessment

*DOW™ Markers and Dyes*

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

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Names

- AUTOMATE™ X Series liquid dyes
- AUTOMATE™ HF Series liquid dyes
- OILSOL™ Series powder dyes
- MORTRACE™ Series liquid markers
- SPECTRACE™ Series liquid markers
- AUTOMATE™ Red BXL liquid dye
- AUTOMATE™ Yellow 8 liquid dye
- AUTOMATE™ Black liquid dye
- AUTOMATE™ Blue 8A liquid dye
- AUTOMATE™ Black 1XS liquid dye
- AUTOMATE™ Bronze 1XS liquid dye
- AUTOMATE™ Brown 2XS liquid dye
- AUTOMATE™ Green MX liquid dye
- AUTOMATE™ Orange 2XS liquid dye
- AUTOMATE™ Purple XS liquid dye
- AUTOMATE™ Red 10BXS liquid dye
- AUTOMATE™ Red G XS liquid dye
- AUTOMATE™ Brown 2HD XS liquid dye
- AUTOMATE™ Green HFX liquid dye
- AUTOMATE™ Orange 2HF XS liquid dye
- AUTOMATE™ Red 9BHF liquid dye
- AUTOMATE™ Red IKHF liquid dye
- AUTOMATE™ Red IKHF D-50 liquid dye
- AUTOMATE™ Yellow HF liquid dye
- AUTOMATE™ Blue 8AHF liquid dye
- Fluorescent Yellow 131SC liquid dye
- OILSOL™ Red Tax powder dye
- ACCUTRACE™ Series Markers

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**Product Overview**

- DOW™ markers and dyes are formulated either as liquids, usually in one of several aromatic solvent blends, or as a powder. They are completely miscible in most petroleum-based products and organic solvents.\(^1\)\(^2\)\(^3\)\(^4\)\(^5\) For further details, see Product Description.
- DOW™ markers and dyes are used to add identifying characteristics such as color to fuels, solvents, explosives, coatings, adhesives, and petroleum products.\(^6\)\(^7\)\(^8\)\(^9\)\(^10\) For further details, see Product Uses.
- Exposure can occur either in facilities that manufacture DOW markers and dyes or in the various industrial or manufacturing facilities that use these products. Dow™ does not sell markers and dyes for direct consumer use, but they are sold at low levels (typically 50 parts per million, ppb, or less) and can be used at as high as 2,000 ppm in a variety of industrial and consumer products – such as fuels – with which consumers may come into contact.\(^11\)\(^12\)\(^13\) For further details, see Exposure Potential.
- Direct eye and skin contact with liquid formulations may cause slight to severe irritation. Eye and skin contact with powder formulations may cause slight irritation. Inhalation or ingestion
of liquid formulations may cause headache, dizziness, gastrointestinal effects, respiratory effects, central nervous system effects, and even death. Prolonged or repeated exposure to the liquid formulations may affect the kidney, liver, spleen, and other organs. Some of the solvents and solvent dyes in these products have been shown to cause cancer in laboratory animals.\(^1\)\(^2\)\(^3\)\(^4\)\(^5\) For further details, see Health Information.

- The solvents in DOW™ markers and dyes are biodegradable, have a low to moderate potential for bioconcentration, and range from practically non-toxic to very toxic to aquatic organisms on an acute basis. The main dye components are expected to slowly degrade through chemical and biological processes, have a low to moderate potential to bioconcentrate (accumulate in the food chain), and are expected to be moderately to very highly toxic to aquatic organisms. For further details, see Environmental Information.

- DOW markers and dyes are stable. They range from flammable to combustible depending on the solvent used. Avoid contact with acids, alkalis, oxidizers, reducing agents, and amines.\(^1\) For further details, see Physical Hazard Information.

### Manufacture of Product

- **Location** – The Dow Chemical Company and its foreign affiliates produce dyes and markers in various global facilities.
- **Process** – These dyes and markers are produced using proprietary chemistries, processes, and blending techniques.

### Product Description

AUTOMATE™ Series, MORTRACE™ Series, SPECTRACE™ Series, ACCUTRACE™ Series, Fluorescent Yellow 131SC liquid dyes, and OILSOL™ Red Tax powder dye are solvent-based markers and dyes. They are aromatic liquids, ranging in color from dark red to dark blue, and are miscible in most petroleum-based products and organic solvents.

AUTOMATE™ X Series liquid dyes contain 25 to 50% active dye in a xylene-based blend of aromatic solvents.\(^2\) The solvent blend may contain smaller amounts (less than 15%) of other solvents such as ethylbenzene (CAS No. 100-41-4), dipropylene glycol monomethyl ether (CAS No. 34590-94-8), and heavy aromatic solvent (CAS No. 64742-94-5).

AUTOMATE™ HF Series liquid dyes and Fluorescent Yellow 131SC liquid dye contain 30 to 50% dyes in a naphtha-based blend of aromatic solvents.\(^3\)\(^4\)\(^5\) The solvent blend may also contain other solvents such as ethylbenzene, dipropylene glycol monomethyl ether, and other naphthalenic solvents.

MORTRACE™ Series and SPECTRACE™ Series products are dyes in blends of heavy aromatic naphtha (CAS No. 64742-94-5) and alkylated phenols with trace amounts (<1.0%) of naphthalene (CAS No. 91-20-3).

OILSOL™ Red Tax powder dye is a red-brown, odorless powder product containing predominantly a C.I. Solvent Red 24 (CAS No. 70879-65-1) mixture dye. OILSOL™ Red Tax powder dye may contain traces of C.I. Solvent Yellow 3 (CAS No. 97-56-3).

ACCUTRACE™ Series products are proprietary patented molecular markers used for the identification of petroleum products. The product is blended in high flash solvent system for ease of handling and application by the end user.

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Product Uses

AUTOMATE™ Series, MORTRACE™ Series, SPECTRACE™ Series, ACCUTRACE™ Series, and Fluorescent Yellow 131SC liquid dyes and OILSOL™ Red Tax powder dye are used to add identifying characteristics such as color to a large number of industrial products with the following specific applications:

- AUTOMATE™ X (single-phase) Series liquid dyes are used to add color to petroleum fuels, lubricants, hydraulic oils, greases, solvents, explosives, and adhesives for leak, brand, and fuel-grade detection.
- AUTOMATE™ HF (high-flash) Series liquid dyes are used to add color to fuels, solvents, explosives, coatings, and adhesives for leak detection where low solubility and poor stability limit the use of powder solvent dyes.
- Fluorescent Yellow 131SC liquid dye is used for black-light leak detection in process fluids, including engine oil and hydraulic oils and for pipeline batch interface marking.
- MORTRACE™ Series and SPECTRACE™ Series liquid markers are used for brand authentication and in government-sponsored fuel-marking programs to identify tax-free and subsidized fuels. They add little or no color to the marked fuel, but can be detected by a simple field-test procedure.
- ACCUTRACE™ Series liquid markers are used for brand authentication and in government-sponsored fuel-marking programs to identify tax-free and subsidized fuels. They add no color to the marked fuel, but can be detected by a state of art roadside and lab test equipment.
- OILSOL™ Red Tax powder dye is used to color fuels, lubricants, solvents, explosives, adhesives, and pyrotechnic smokes.

Exposure Potential

DOW™ markers and dyes are used in the formulation of a variety of industrial and consumer (fuel and automotive fluid) products. Based on the uses for this product, the public could be exposed through:

- Workplace exposure – Exposure can occur either in a facility that manufactures or formulates DOW markers and dyes or in the various industrial facilities that use these products. 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 DOW markers and dyes – Dow does not sell these products for direct consumer use, but they are used at low levels (typically 50 ppm or less but can also be used as high as 2,000 ppm) in a variety of industrial and consumer products – such as fuel and automotive fluids – with which consumers may come into contact. See Health Information.
- Environmental releases – Engineering controls in facilities that manufacture or formulate DOW markers and dyes are designed to limit environmental exposure. When used as fuel markers, environmental exposure may occur under scenarios where fuel releases occur. In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface water, or groundwater. For small spills, these products should be absorbed with inert materials such as sand. Respiratory protection is necessary for cleaning up spills and leaks. If released to the environment, the dye components are expected to bind to soils and sediments, while the solvents may evaporate from soil or surface water and partition to the atmosphere. Other solvent components are likely to associate primarily with soils or sediments. The main components of DOW marker and dye formulations will degrade in the environment.
environment and would be expected to be removed by wastewater-treatment facilities. 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 material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. An approved positive pressure, self-contained breathing apparatus (SCBA) with a full-face mask is recommended for emergency work. If the release involves products with flammable solvents, eliminate all sources of ignition immediately. Use only explosion-proof equipment; ground and bond all containers and handling equipment. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use water spray or fog, carbon-dioxide or dry-chemical extinguishers, or foam to fight the fire. Use of a direct water stream may spread the fire. Dusts of OILSOL™ Red Tax powder dye can form explosive mixtures with air. These products range from flammable to combustible depending on the solvent blend. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Keep fire water out of waterways and sewers to minimize the potential for environmental damage. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

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

### Health Information

Health information for DOW™ markers and dyes 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. The Safety Data Sheet is the preferred source for specific health information. These materials may also contain minor components or additives that have additional health risks. An overview of health information for these products appears below.

**Eye contact** – Direct eye contact with liquid formulations may cause slight to severe irritation, including conjunctivitis. Eye contact with powder formulations may cause slight irritation.

**Skin contact** – Direct skin contact with liquid formulations may cause slight to moderate irritation. Prolonged skin exposure may result in drying of the skin and dermatitis. Skin contact with the powder formulations may cause slight irritation.

**Inhalation** – Inhalation of high concentrations of vapor or mist may cause irritation of the nose, throat, and lungs, as well as dizziness, headache, nausea, vomiting, diarrhea, anesthetic effects, and drowsiness. Prolonged exposure could result in central nervous system effects and, even death. Inhalation of dust from powder formulations may cause irritation of the nose, throat, and lungs.

**Ingestion** – These products may be harmful if swallowed and may cause gastrointestinal irritation, including abdominal pain and nausea. Ingestion may also cause headache, dizziness, labored breathing, lack of coordination, light-headedness and, even death. Aspiration of some products into the lungs may cause lung damage, including inflammation and fluid in the lungs. Powder formulations may be harmful if swallowed and may cause gastrointestinal irritation.

**Repeated exposure** – Prolonged or repeated exposure to solvents and certain dyes in these formulations may cause serious health effects:

- Prolonged or repeated exposure to xylene may cause reversible liver impairment and reversible kidney impairment.
• Prolonged or repeated exposure to naphtha may cause liver and kidney damage.
• Prolonged or repeated exposure to ethylbenzene may cause adverse kidney, liver, lung, pituitary, thyroid, and testicular effects. Ethylbenzene has been classified as a “possible cancer-causing agent” by the International Agency for Research on Cancer (IARC).
• Prolonged or repeated exposure to naphthalene may cause an increased risk of respiratory cancer (particularly nose and lung cancer) based on preliminary testing in laboratory animals. Lifetime exposure to naphthalene has resulted in increased tumors of the nose in laboratory animals according to a National Toxicology Program (NTP) report.
• Prolonged or repeated exposure to dipropylene glycol monomethyl ether may cause liver and kidney effects.
• Prolonged or repeated exposure to 2,6-bis(1-methylpropyl)-4-((4-nitrophenyl)azo)phenol may cause liver, spleen, and blood effects.
• Prolonged or repeated exposure to C.I. Solvent Red 164 may cause adverse reproductive effects according to preliminary testing in laboratory animals.
• C.I. Solvent Orange 2, C.I. Solvent Yellow 14, and C.I. Solvent Yellow 3 have been classified as carcinogens by the State of California Office of Environmental Health Hazard Assessment.

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

Environmental Information

Environmental information for DOW™ markers and dyes are summarized on the relevant Safety Data Sheets. It is important to note that environmental risks associated with individual products vary based on their formulation or intended use. These materials may contain minor components or additives that have additional risks. The Safety Data Sheet is the preferred source for specific information. An overview of environmental information appears below.

Dye components used in DOW marker and dye formulations are generally insoluble in water and have low volatility. If released to water, dye components are therefore expected to float on the water or bind to particulates, soils, or sediments. The majority of dye components are expected to degrade slowly in the environment in response to chemical and biological processes. These components have a low-to-moderate potential to bioconcentrate and are anticipated to be moderately to very highly toxic to aquatic organisms on an acute basis.

The solvents utilized in DOW marker and dye formulations range from highly volatile to nearly non-volatile. If released to the environment, a portion of the highly volatile solvents would be expected to partition to air, where photodegradation is predicted to occur. Less volatile solvents range from very soluble to slightly soluble, and generally have a high potential to bind to soils and sediments. The majority of the solvents utilized in these formulations are expected to be rapidly degraded in the environment by chemical and biological processes, although some are anticipated to biodegrade slowly. They show a low to moderate potential for bioconcentration, and the aquatic toxicity ranges from practically non-toxic to very toxic on an acute basis.

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

Physical Hazard Information

DOW™ markers and dyes are considered stable. They range from flammable to combustible depending on the solvent blend used. Avoid sources of ignition such as sparks, open flame, and heated surfaces.

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Avoid contact with acids, alkalis, strong oxidizers, reducing agents, and amines.

For more information, request the 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 DOW™ markers and dyes. 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.

**Additional Information**

- Request the relevant Safety Data Sheet from the Dow Customer Information Group (www.dow.com/assistance/dowcig.htm)
- Contact Us (http://www.dow.com/en-us/contact-us)

For more business information about DOW™ markers and dyes, visit the Dow Products page at www.dow.com/products and search the relevant product name.

**References**

1. OILSOL™ Red Tax Powder Material Safety Data Sheet, Composition and Physical and Chemical Properties.
2. AUTOMATE™ Blue 8A Liquid Dye Material Safety Data Sheet, Composition and Physical and Chemical Properties.
3. AUTOMATE™ Orange 2HFXS Liquid Dye Material Safety Data Sheet, Composition and Physical and Chemical Properties.
4. AUTOMATE™ Green HFX Liquid Dye Material Safety Data Sheet, Composition and Physical and Chemical Properties.
5. AUTOMATE™ Red BXL Liquid Dye Material Safety Data Sheet, Composition and Physical and Chemical Properties.
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