



# Material Safety Data Sheet

Dow AgroSciences LLC

**Product Name:** SONALAN (TM) HFP Herbicide

**Issue Date:** 10/22/2013

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Dow AgroSciences LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

## 1. Product and Company Identification

### Product Name

SONALAN <sup>TM</sup> HFP Herbicide

### COMPANY IDENTIFICATION

Dow AgroSciences LLC  
A Subsidiary of The Dow Chemical Company  
9330 Zionsville Road  
Indianapolis, IN 46268-1189  
United States

Customer Information Number:

800-992-5994

[SDSQuestion@dow.com](mailto:SDSQuestion@dow.com)

### EMERGENCY TELEPHONE NUMBER

**24-Hour Emergency Contact:**

800-992-5994

**Local Emergency Contact:**

352-323-3500

## 2. Hazards Identification

### Emergency Overview

**Color:** Orange

**Physical State:** Liquid.

**Odor:** Aromatic

### Hazards of product:

WARNING! Combustible liquid and vapor. Causes eye irritation. May cause allergic skin reaction. May cause skin irritation. May be harmful if inhaled. May cause central nervous system effects. May cause respiratory tract irritation. Aspiration hazard. Can enter lungs and cause damage. Vapor explosion hazard. Vapors may travel a long distance; ignition and/or flash back may occur. Isolate area. Keep upwind of spill. Stay out of low areas. Toxic fumes may be released in fire situations. Possible cancer hazard. May cause cancer based on animal data. Highly toxic to fish and/or other aquatic organisms. Avoid temperatures above 70 °C (158 °F).

### OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**Potential Health Effects**

**Eye Contact:** May cause severe eye irritation. May cause moderate corneal injury. Vapor may cause eye irritation experienced as mild discomfort and redness. In humans, eye irritation resulted from brief (minutes) exposure to cyclohexanone vapor concentration of 50 ppm and above.

**Skin Contact:** Brief contact may cause moderate skin irritation with local redness. Prolonged contact may cause skin irritation, even a burn. May cause drying and flaking of the skin.

**Skin Absorption:** Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Skin Sensitization:** For the active ingredient(s): Skin contact may cause an allergic skin reaction.

**Inhalation:** Vapor concentrations are attainable which could be hazardous on single exposure.

Prolonged excessive exposure to mist may cause adverse effects. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. May cause central nervous system effects. Symptoms may include headache, dizziness and drowsiness, progressing to incoordination and unconsciousness.

**Ingestion:** Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Swallowing may result in gastrointestinal irritation or ulceration.

**Aspiration hazard:** Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.

**Effects of Repeated Exposure:** For the active ingredient(s): In animals, effects have been reported on the following organs: Liver. Based on information for component(s): In animals, effects have been reported on the following organs: Kidney. Liver. Central nervous system. Blood. Eye. Respiratory tract. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. Mist may cause irritation of upper respiratory tract (nose and throat) and lungs. Exposure to high concentrations of mist/aerosol may be associated with delayed lung damage.

**Cancer Information:** For the active ingredient(s): A low incidence of urinary tract tumors was seen in only 1 of 5 chronic studies in rats with trifluralin. Trifluralin is not anticipated to be a carcinogenic risk to man. An increase in benign mammary fibroadenomas was observed in female rats dosed with Ethalfluralin. For the minor component(s): Has caused cancer in laboratory animals. However, the relevance of this to humans is unknown.

**Birth Defects/Developmental Effects:** For the active ingredient(s): Has caused birth defects in laboratory animals only at doses toxic to the mother. Based on information for component(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Has caused birth defects in lab animals only at doses producing severe toxicity in the mother.

**Reproductive Effects:** Based on information for component(s): In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. Cyclohexanone caused reduced growth and survival of offspring in an animal reproduction study. Dose levels producing this effect also caused central nervous system effects in parental animals. In animal studies, has been shown to interfere with reproduction in males. Effects have been seen only at doses that produced significant toxicity to the parent animals.

### 3. Composition Information

Component	CAS #	Amount
Ethalfluralin	55283-68-6	35.4 %
Cyclohexanone	108-94-1	14.8 %
Trifluralin	1582-09-8	0.1 %
Solvent naphtha (petroleum), light aromatic consists of:	64742-95-6	44.9 %
1,2,4-Trimethylbenzene	95-63-6	13.3 %
1,3,5-Trimethylbenzene	108-67-8	3.6 %
Cumene	98-82-8	1.8 %
Xylene	1330-20-7	0.4 %

## 4. First-aid measures

### Description of first aid measures

**General advice:** First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

**Inhalation:** Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice. If breathing is difficult, oxygen should be administered by qualified personnel.

**Skin Contact:** Take off contaminated clothing. Wash skin with soap and plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. Wash clothing before reuse. Shoes and other leather items which cannot be decontaminated should be disposed of properly.

**Eye Contact:** Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. Call a poison control center or doctor for treatment advice. Suitable emergency eye wash facility should be immediately available.

**Ingestion:** Immediately call a poison control center or doctor. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give any liquid to the person. Do not give anything by mouth to an unconscious person.

### Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

### Indication of immediate medical attention and special treatment needed

Maintain adequate ventilation and oxygenation of the patient. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done. Probable mucosal damage may contraindicate the use of gastric lavage. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

Skin contact may aggravate preexisting dermatitis. Repeated excessive exposure may aggravate preexisting lung disease.

## 5. Fire Fighting Measures

### Suitable extinguishing media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

### Special hazards arising from the substance or mixture

**Hazardous Combustion Products:** During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen fluoride. Hydrogen chloride. Carbon monoxide. Carbon dioxide.

**Unusual Fire and Explosion Hazards:** Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Dense smoke is produced when product burns.

### Advice for firefighters

**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Consider feasibility of a controlled burn to minimize environment damage. Foam fire extinguishing system is preferred

because uncontrolled water can spread possible contamination. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Eliminate ignition sources. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

**Special Protective Equipment for Firefighters:** Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

## 6. Accidental Release Measures

**Personal precautions, protective equipment and emergency procedures:** Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to Section 7, Handling, for additional precautionary measures. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. Vapor explosion hazard. Keep out of sewers. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Ground and bond all containers and handling equipment. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

**Environmental precautions:** Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

**Methods and materials for containment and cleaning up:** Contain spilled material if possible. Pump with explosion-proof equipment. If available, use foam to smother or suppress. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact Dow AgroSciences for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

## 7. Handling and Storage

### Handling

**General Handling:** Keep away from heat, sparks and flame. Keep out of reach of children. Do not swallow. Avoid breathing vapor or mist. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. No smoking, open flames or sources of ignition in handling and storage area. Electrically ground and bond all equipment. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

### Storage

Minimize sources of ignition, such as static build-up, heat, spark or flame. Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

## 8. Exposure Controls / Personal Protection

### Exposure Limits

Component	List	Type	Value
Ethalfuralin	Dow IHG	TWA	3 mg/m3
Cyclohexanone	ACGIH	TWA	20 ppm SKIN
	ACGIH	STEL	50 ppm SKIN
	OSHA Table Z-1	PEL	200 mg/m3 50 ppm
	Dow IHG	TWA	7.5 ppm SKIN
1,2,4-Trimethylbenzene	ACGIH	TWA	25 ppm
1,3,5-Trimethylbenzene	ACGIH	TWA	25 ppm
Cumene	ACGIH	TWA	50 ppm
	OSHA Table Z-1	PEL	245 mg/m3 50 ppm SKIN
Xylene	ACGIH	TWA	100 ppm BEI
	ACGIH	STEL	150 ppm BEI
	OSHA Table Z-1	PEL	435 mg/m3 100 ppm

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.

A BEI notation following the exposure guideline refers to a guidance value for assessing biological monitoring results as an indicator of the uptake of a substance from all routes of exposures.

A "skin" notation following the inhalation exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapors or by direct skin contact.

It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

### Personal Protection

**Eye/Face Protection:** Use chemical goggles. If exposure causes eye discomfort, use a full-face respirator.

**Skin Protection:** Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

**Hand protection:** Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

**Respiratory Protection:** Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

**Ingestion:** Avoid ingestion of even very small amounts; do not consume or store food or tobacco in the work area; wash hands and face before smoking or eating.

**Engineering Controls**

**Ventilation:** Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

**9. Physical and Chemical Properties**

<b>Appearance</b>	
<b>Physical State</b>	Liquid.
<b>Color</b>	Orange
<b>Odor</b>	Aromatic
<b>pH</b>	5.0 <i>Literature</i> (aqueous 50/50)
<b>Melting Point</b>	No test data available
<b>Freezing Point</b>	No test data available
<b>Boiling Point (760 mmHg)</b>	156 °C (313 °F) <i>Literature</i> (solvent).
<b>Flash Point - Closed Cup</b>	48 °C (118 °F) <i>Pensky-Martens Closed Cup ASTM D 93</i>
<b>Flammable Limits In Air</b>	<b>Lower:</b> 1.5 %(V) <i>Literature</i> (in air) <b>Upper:</b> 8.5 %(V) <i>Literature</i> (in air)
<b>Vapor Pressure</b>	10 mmHg <i>Literature</i> (solvent)
<b>Vapor Density (air = 1)</b>	1.030 <i>Literature</i> (relative to air at 25°C)
<b>Specific Gravity (H2O = 1)</b>	1.02 <i>Literature</i>
<b>Solubility in water (by weight)</b>	emulsifies in water
<b>Partition coefficient, n-octanol/water (log Pow)</b>	No data available for this product. See Section 12 for individual component data.
<b>Autoignition Temperature</b>	No test data available
<b>Decomposition Temperature</b>	No test data available
<b>Explosive properties</b>	no data available
<b>Oxidizing properties</b>	no data available
<b>Liquid Density</b>	1.017 g/cm3 <i>NAPM 2A.00</i>

**10. Stability and Reactivity****Reactivity**

No dangerous reaction known under conditions of normal use.

**Chemical stability**

Stable under recommended storage conditions. See Storage, Section 7. Thermally stable at typical use temperatures.

**Possibility of hazardous reactions**

Polymerization will not occur.

**Conditions to Avoid:** Avoid temperatures above 70 °C (158 °F). Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

**Incompatible Materials:** Avoid contact with oxidizing materials.

**Hazardous decomposition products**

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride. Hydrogen fluoride. Nitrogen oxides. Toxic gases are released during decomposition.

**11. Toxicological Information****Acute Toxicity**  
**Ingestion**

As product: Single dose oral LD50 has not been determined.

Based on information for component(s): Estimated. LD50, rat > 4,000 mg/kg

**Dermal**

As product: The dermal LD50 has not been determined.

Based on information for component(s): Estimated. LD50, rabbit > 5,000 mg/kg

**Inhalation**

As product: The LC50 has not been determined.

**Eye damage/eye irritation**

May cause severe eye irritation. May cause moderate corneal injury. Vapor may cause eye irritation experienced as mild discomfort and redness. In humans, eye irritation resulted from brief (minutes) exposure to cyclohexanone vapor concentration of 50 ppm and above.

**Skin corrosion/irritation**

Brief contact may cause moderate skin irritation with local redness. Prolonged contact may cause skin irritation, even a burn. May cause drying and flaking of the skin.

**Sensitization****Skin**

For the active ingredient(s): Skin contact may cause an allergic skin reaction.

**Respiratory**

No relevant data found.

**Repeated Dose Toxicity**

For the active ingredient(s): In animals, effects have been reported on the following organs: Liver.

Based on information for component(s): In animals, effects have been reported on the following organs: Kidney. Liver. Central nervous system. Blood. Eye. Respiratory tract. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. Mist may cause irritation of upper respiratory tract (nose and throat) and lungs. Exposure to high concentrations of mist/aerosol may be associated with delayed lung damage.

**Chronic Toxicity and Carcinogenicity**

For the active ingredient(s): A low incidence of urinary tract tumors was seen in only 1 of 5 chronic studies in rats with trifluralin. Trifluralin is not anticipated to be a carcinogenic risk to man. An increase in benign mammary fibroadenomas was observed in female rats dosed with Ethalfuralin. Did not cause cancer in laboratory animals. For the minor component(s): Has caused cancer in laboratory animals. However, the relevance of this to humans is unknown.

**Carcinogenicity Classifications:**

Component	List	Classification
Cyclohexanone	ACGIH	Confirmed animal carcinogen with unknown relevance to humans.; Group A3
Cumene	IARC	Possibly carcinogenic to humans.; 2B

**Developmental Toxicity**

For the active ingredient(s): Has caused birth defects in laboratory animals only at doses toxic to the mother. Based on information for component(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Has caused birth defects in lab animals only at doses producing severe toxicity in the mother.

**Reproductive Toxicity**

In animal studies, active ingredient did not interfere with reproduction. Based on information for component(s): In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. Cyclohexanone caused reduced growth and survival of offspring in an animal reproduction study. Dose levels producing this effect also caused central nervous system effects in parental animals. In animal studies, has been shown to interfere with reproduction in males. Effects have been seen only at doses that produced significant toxicity to the parent animals.

**Genetic Toxicology**

For the active ingredient(s): In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative. Based on information for component(s): In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were inconclusive

## 12. Ecological Information

### Toxicity

#### Data for Component: **Ethalfuralin**

Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species). Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg). Material is practically non-toxic to birds on a dietary basis (LC50 > 5000 ppm).

#### **Fish Acute & Prolonged Toxicity**

LC50, *Lepomis macrochirus* (Bluegill sunfish), static test, 96 h: 0.054 - 0.102 mg/l

LC50, *Oncorhynchus mykiss* (rainbow trout), flow-through test, 96 h: 0.136 mg/l

#### **Aquatic Invertebrate Acute Toxicity**

EC50, eastern oyster (*Crassostrea virginica*), flow-through test, 96 h, shell growth inhibition: 0.100 - 0.172 mg/l

EC50, *Daphnia magna* (Water flea), static test, 48 h, survival: > 0.365 mg/l

#### **Aquatic Plant Toxicity**

ErC50, *Pseudokirchneriella subcapitata* (green algae), static test, Growth rate inhibition, 7 d: 0.004 - 0.0091 mg/l

#### **Fish Chronic Toxicity Value (ChV)**

*Oncorhynchus mykiss* (rainbow trout), 50 d, NOEC: 0.0004 mg/l

#### **Aquatic Invertebrates Chronic Toxicity Value**

*Daphnia magna* (Water flea), 21 d, NOEC: 0.0237 mg/l

#### **Toxicity to Above Ground Organisms**

oral LD50, *Colinus virginianus* (Bobwhite quail): > 2000 mg/kg bodyweight.

dietary LC50, *Colinus virginianus* (Bobwhite quail): > 5000 mg/kg diet.

oral LD50, *Apis mellifera* (bees): > 109.9 micrograms/bee

contact LD50, *Apis mellifera* (bees): > 100 micrograms/bee

#### **Toxicity to Soil Dwelling Organisms**

LC50, *Eisenia fetida* (earthworms), 14 d: > 1,000 mg/kg

#### Data for Component: **Cyclohexanone**

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

#### **Fish Acute & Prolonged Toxicity**

LC50, *Leuciscus idus* (Golden orfe), static test, 48 h: 630 mg/l

LC50, *Pimephales promelas* (fathead minnow), static test, 96 h: 527 - 732 mg/l

#### **Aquatic Invertebrate Acute Toxicity**

EC50, *Daphnia magna* (Water flea), 24 h, immobilization: 820 mg/l

#### **Toxicity to Micro-organisms**

EC50, OECD 209 Test; activated sludge: > 1,000 mg/l

#### Data for Component: **Trifluralin**

Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species). Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg). Material is practically non-toxic to birds on a dietary basis (LC50 > 5000 ppm).

#### **Fish Acute & Prolonged Toxicity**

LC50, *Oncorhynchus mykiss* (rainbow trout), flow-through test, 96 h: 0.088 mg/l

LC50, *Lepomis macrochirus* (Bluegill sunfish), flow-through test, 96 h: 0.089 mg/l

#### **Aquatic Invertebrate Acute Toxicity**

EC50, *Daphnia magna* (Water flea), 96 h: 0.56 mg/l

EC50, water flea *Daphnia magna*, static test, 48 h: 0.245 mg/l

EC50, mussel *Mytilus edulis*, static test, 48 h: 0.096 mg/l

#### **Aquatic Plant Toxicity**

ErC50, *Pseudokirchneriella subcapitata* (green algae), 72 h: 0.0532 mg/l

ErC50, *Pseudokirchneriella subcapitata*, Growth inhibition, 96 h: 0.275 mg/l

EC50, *Lemna gibba*, Growth inhibition, 7 d: 0.043 mg/l

EbC50, diatom *Skeletonema costatum*, Growth inhibition, 120 h: 0.028 mg/l

ErC50, *Pseudokirchneriella subcapitata* (green algae), 5 d: 0.67 mg/l

EC50, *Pseudokirchneriella subcapitata*, Growth inhibition, 96 h: 0.0122 mg/l



EbC50, diatom Navicula sp., biomass growth inhibition, 5 d: 0.015 mg/l

EbC50, blue-green alga Anabaena flos-aquae, Growth inhibition, 120 h: > 0.339 mg/l

**Toxicity to Micro-organisms**

EC50, activated sludge test (OECD 209), Respiration inhibition, 3 h: > 100 mg/l

**Fish Chronic Toxicity Value (ChV)**

Oncorhynchus mykiss (rainbow trout), static test, 48 d, growth, NOEC:0.00114 mg/l,

LOEC:0.00218 mg/l

**Aquatic Invertebrates Chronic Toxicity Value**

Daphnia magna (Water flea), semi-static test, 21 d, growth, NOEC: 0.0507 mg/l

**Toxicity to Above Ground Organisms**

oral LD50, Colinus virginianus (Bobwhite quail): > 2250 mg/kg bodyweight.

dietary LC50, Colinus virginianus (Bobwhite quail): > 5000 mg/kg diet.

oral LD50, Apis mellifera (bees): > 100 micrograms/bee

contact LD50, Apis mellifera (bees): > 100 micrograms/bee

**Toxicity to Soil Dwelling Organisms**

LC50, Eisenia fetida (earthworms), 14 d: > 1,000 mg/kg

Data for Component: **Solvent naphtha (petroleum), light aromatic consists of:**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested). Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg). Material is practically non-toxic to birds on a dietary basis (LC50 > 5000 ppm).

**Fish Acute & Prolonged Toxicity**

LC50, Oncorhynchus mykiss (rainbow trout), static test, 96 h: 9.22 mg/l

**Aquatic Invertebrate Acute Toxicity**

For similar material(s): EC50, Daphnia magna (Water flea), 48 h: 3.2 mg/l

**Aquatic Plant Toxicity**

For similar material(s): ErC50, Pseudokirchneriella subcapitata (green algae), 72 h: 2.9 mg/l

**Toxicity to Above Ground Organisms**

dietary LC50, Colinus virginianus (Bobwhite quail): > 6500 mg/kg diet.

oral LD50, Colinus virginianus (Bobwhite quail): > 2150 mg/kg bodyweight.

Data for Component: **1,2,4-Trimethylbenzene**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, Pimephales promelas (fathead minnow), flow-through test, 96 h: 7.7 mg/l

**Aquatic Invertebrate Acute Toxicity**

EC50, Daphnia magna (Water flea), 48 h: 3.6 mg/l

Data for Component: **1,3,5-Trimethylbenzene**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, Carassius auratus (goldfish), flow-through test, 96 h: 12.5 mg/l

**Aquatic Invertebrate Acute Toxicity**

LC50, Daphnia magna (Water flea), static test, 48 h, mortality: 6 mg/l

**Aquatic Plant Toxicity**

EbC50, alga Scenedesmus sp., biomass growth inhibition, 48 h: 25 mg/l

**Aquatic Invertebrates Chronic Toxicity Value**

Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, NOEC: 0.4 mg/l

Data for Component: **Cumene**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, Oncorhynchus mykiss (rainbow trout), semi-static test, 96 h: 2.7 mg/l

**Aquatic Invertebrate Acute Toxicity**

EC50, Daphnia magna (Water flea), static test, 48 h, immobilization: 4.0 mg/l

**Aquatic Plant Toxicity**

EbC50, Pseudokirchneriella subcapitata (green algae), static test, biomass growth inhibition, 72 h: 2.6 mg/l

**Aquatic Invertebrates Chronic Toxicity Value**

Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, NOEC: 0.35 mg/l, LOEC: 0.66 mg/l

**Toxicity to Above Ground Organisms**

oral LD50, redwing blackbird (Agelaius phoeniceus): > 98 mg/kg

Data for Component: **Xylene**

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, Oncorhynchus mykiss (rainbow trout), 96 h: 9.2 mg/l

**Aquatic Invertebrate Acute Toxicity**

LC50, Daphnia magna (Water flea), 48 h, lethality: 14.3 mg/l

**Aquatic Plant Toxicity**

EbC50, Pseudokirchneriella subcapitata (green algae), biomass growth inhibition, 72 h: 3.2 - 4.9 mg/l

**Persistence and Degradability**

Data for Component: **Ethalfuralin**

Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

**Stability in Water (1/2-life):**

; pH 3;Stable

; pH 6;Stable

; pH 9;Stable

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
2 - 15 %	28 d	OECD 301F Test	fail

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
6.9079E-11 cm <sup>3</sup> /s	1.8 h	Estimated.

Data for Component: **Cyclohexanone**

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
87 %	14 d	OECD 301C Test	Not applicable

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
1.21E-11 cm <sup>3</sup> /s	10.6 h	Estimated.

**Theoretical Oxygen Demand:** 2.61 mg/g

Data for Component: **Trifluralin**

Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

**Stability in Water (1/2-life):**

> 1 y; pH 3 - 9;Measured

0.19 - 3.08 h;Measured

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
5 %	28 d	OECD 301B Test	fail

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
2.4004E-11 cm <sup>3</sup> /s	5.347 h	Estimated.

**Chemical Oxygen Demand:** 1.37 mg/mg

Data for Component: Solvent naphtha (petroleum), light aromatic consists of:

For the major component(s): Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%). For some component(s): Biodegradation under aerobic static laboratory conditions is low (BOD20 or BOD28/ThOD between 2.5 and 10%).

Data for Component: 1,2,4-Trimethylbenzene

Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
4 - 18 %	28 d	OECD 301C Test	Not applicable

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
1.670E-11 cm <sup>3</sup> /s	0.641 d	Estimated.

**Theoretical Oxygen Demand:** 3.19 mg/mg

Data for Component: 1,3,5-Trimethylbenzene

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
0 %	28 d	OECD 301C Test	Not applicable
50 %	4.4 d	Calculated	Not applicable

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
3.51E-11 cm <sup>3</sup> /s	3.7 h	Estimated.

**Theoretical Oxygen Demand:** 3.19 mg/mg

Data for Component: Cumene

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method	10 Day Window
86 %	28 d	OECD 301D Test	pass

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
6.90E-12 cm <sup>3</sup> /s	1.55 d	Estimated.

**Biological oxygen demand (BOD):**

BOD 5	BOD 10	BOD 20	BOD 28
40.000 %	62.000 %	70.000 %	

**Theoretical Oxygen Demand:** 3.20 mg/mg

Data for Component: Xylene

Material is expected to be readily biodegradable.

**Indirect Photodegradation with OH Radicals**

Rate Constant	Atmospheric Half-life	Method
6.5E-12 cm <sup>3</sup> /s	19.7 h	Estimated.

**Biological oxygen demand (BOD):**

BOD 5	BOD 10	BOD 20	BOD 28
37.000 %	58.000 %	72.000 %	

**Theoretical Oxygen Demand:** 3.17 mg/mg

**Bioaccumulative potential**Data for Component: Ethalfluralin

**Bioaccumulation:** Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).

**Partition coefficient, n-octanol/water (log Pow):** 5.11 Measured

**Bioconcentration Factor (BCF):** 1,330; Fish; Measured

Data for Component: Cyclohexanone**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).**Partition coefficient, n-octanol/water (log Pow):** 0.81 MeasuredData for Component: Trifluralin**Bioaccumulation:** Bioconcentration potential is high (BCF > 3000 or Log Pow between 5 and 7).**Partition coefficient, n-octanol/water (log Pow):** 5.27**Bioconcentration Factor (BCF):** 1,060 - 6,000; Pimephales promelas (fathead minnow); Estimated.Data for Component: Solvent naphtha (petroleum), light aromatic consists of:**Bioaccumulation:** For the major component(s): Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). For the minor component(s):

Bioconcentration potential is low (BCF &lt; 100 or Log Pow &lt; 3).

Data for Component: 1,2,4-Trimethylbenzene**Bioaccumulation:** Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).**Partition coefficient, n-octanol/water (log Pow):** 3.63 Measured**Bioconcentration Factor (BCF):** 33 - 275; Cyprinus carpio (Carp); MeasuredData for Component: 1,3,5-Trimethylbenzene**Bioaccumulation:** Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).**Partition coefficient, n-octanol/water (log Pow):** 3.42 Measured**Bioconcentration Factor (BCF):** 161; Pimephales promelas (fathead minnow); MeasuredData for Component: Cumene**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).**Partition coefficient, n-octanol/water (log Pow):** 3.4 - 3.7 Measured**Bioconcentration Factor (BCF):** 35.5; Fish; MeasuredData for Component: Xylene**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).**Partition coefficient, n-octanol/water (log Pow):** 3.12 Measured**Bioconcentration Factor (BCF):** 15 - 21; Fish; Measured**Mobility in soil**Data for Component: Ethalfuralin**Mobility in soil:** Expected to be relatively immobile in soil (Koc > 5000).**Partition coefficient, soil organic carbon/water (Koc):** 5,356 Measured**Henry's Law Constant (H):** 1.8E+01 Pa\*m3/mole. Estimated.Data for Component: Cyclohexanone**Mobility in soil:** Potential for mobility in soil is very high (Koc between 0 and 50).**Partition coefficient, soil organic carbon/water (Koc):** 15 Estimated.**Henry's Law Constant (H):** 1.04E-05 atm\*m3/mole MeasuredData for Component: Trifluralin**Henry's Law Constant (H):** 1.02E+01 Pa\*m3/mole.**Distribution in Environment: Mackay Level 1 Fugacity Model:**

Air	Water.	Biota	Soil	Sediment
1.56 %	0.49 %	< 0.01 %	95.74 %	2.12 %

Data for Component: Solvent naphtha (petroleum), light aromatic consists of:**Mobility in soil:** For the major component(s):, Potential for mobility in soil is low (Koc between 500 and 2000).Data for Component: 1,2,4-Trimethylbenzene**Mobility in soil:** Potential for mobility in soil is low (Koc between 500 and 2000).**Partition coefficient, soil organic carbon/water (Koc):** 720 Estimated.**Henry's Law Constant (H):** 6.16E-03 atm\*m3/mole; 25 °C MeasuredData for Component: 1,3,5-Trimethylbenzene**Mobility in soil:** Potential for mobility in soil is low (Koc between 500 and 2000).**Partition coefficient, soil organic carbon/water (Koc):** 741.65 Estimated.**Henry's Law Constant (H):** 1.97E-02 atm\*m3/mole; 25 °C Estimated.**Distribution in Environment: Mackay Level 1 Fugacity Model:**

Air	Water.	Biota	Soil	Sediment
97.26 %	0.62 %	< 0.01 %	2.08 %	0.05 %

Data for Component: Cumene**Mobility in soil:** Potential for mobility in soil is low (Koc between 500 and 2000).**Partition coefficient, soil organic carbon/water (Koc):** 800 - 2,800 Estimated.**Henry's Law Constant (H):** 1.15E-02 atm\*m3/mole; 25 °C Measured**Distribution in Environment: Mackay Level 1 Fugacity Model:**

Air	Water.	Biota	Soil	Sediment
98.38 %	0.33 %	< 0.01 %	1.26 %	0.03 %

Data for Component: Xylene**Mobility in soil:** Potential for mobility in soil is medium (Koc between 150 and 500).**Partition coefficient, soil organic carbon/water (Koc):** 443 Estimated.**Henry's Law Constant (H):** 7.45E-03 atm\*m3/mole; 25 °C Estimated.**13. Disposal Considerations**

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

**14. Transport Information****DOT Non-Bulk****Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.**Technical Name:** CONTAINS CYCLOHEXANONE, 1,2,4 - TRIMETHYLBENZENE**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III**DOT Bulk****Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.**Technical Name:** CONTAINS CYCLOHEXANONE, 1,2,4 - TRIMETHYLBENZENE**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III**IMDG****Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.**Technical Name:** CONTAINS CYCLOHEXANONE, 1,2,4 - TRIMETHYLBENZENE**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III**EMS Number:** F-E,S-E**Marine pollutant:** Yes**ICAO/IATA****Proper Shipping Name:** FLAMMABLE LIQUID, N.O.S.**Technical Name:** CONTAINS CYCLOHEXANONE, 1,2,4 - TRIMETHYLBENZENE**Hazard Class:** 3 **ID Number:** UN1993 **Packing Group:** PG III**Cargo Packing Instruction:** 366**Passenger Packing Instruction:** 355**Additional Information**

Reportable quantity: 9,033 lb – TRIFLURALIN, 22,523 lb – XYLENE

MARINE POLLUTANT (TRIFLURALIN, ETHALFLURALIN)

*This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the*

transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

## 15. Regulatory Information

### OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	Yes
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

### Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
1,2,4-Trimethylbenzene	95-63-6	13.3%
Cumene	98-82-8	1.8%

### Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Cyclohexanone	108-94-1	14.8%
1,2,4-Trimethylbenzene	95-63-6	13.3%
1,3,5-Trimethylbenzene	108-67-8	3.6%
Cumene	98-82-8	1.8%

### Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

### California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

### Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

## 16. Other Information

### Hazard Rating System

NFPA	Health	Fire	Reactivity
	2	2	0

Revision

Identification Number: 1004314 / 1016 / Issue Date 10/22/2013 / Version: 4.1

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Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

**Legend**

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

*Dow AgroSciences LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.*