Material Safety Data Sheet

Section 1 - Product and Company Information

Product Name: 5-Fluorouracil, minimum 99% TLC
Product Number: F8927
Brand: Sigma Chemical
Company: Sigma-Aldrich
Address: 3050 Spruce Street
City, State, Zip, Country: SAINT LOUIS, MO 63103 US
Technical Phone: 800-325-5832
Emergency Phone: 314-776-6555
Fax: 800-325-5062

Section 2 - Composition/information on Ingredient

Substance Name: 5-Fluorouracil
CAS #: 51-21-8
SARA 313: Yes
EC no: 200-085-6
Annex I Index Number

Formula: C4H9FN2O2
Synonyms: Adrucil, Anvil, Effucrim (free base), Efudex, 5-Fluorouracil (German), 5-Fluor-2,4-dihydroxypyrimidine (Czech), Fluorectin, Fluoreplex, 5-Fluoropyrimidine-2,4-dione, 5-Fluo-2,4-pyrimidine, 5-Fluor-2,4-pyrimidone (Czech), Fluorouracil, 5-Fluorouracil (German), Fluroxi, Fluroxilum, Flu, FU, NSC-19853, 2,4(1H,3H)-Pyrimidinedione, 5-fluor-, Uteroplex, NU 29457, Timbex-1, U-4953, Ukip

Section 3 - Hazards Identification


HMIS Rating:
Health: 3
Flammability: 0
Reactivity: 0

NFPA Rating:
Health: 3
Flammability: 0
Reactivity: 0

Section 4 - First Aid Measures

Oral Exposure: If swallowed, wash out mouth with water provided person is conscious. Call a physician.

Inhalation Exposure: If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Section 5 - Fire Fighting Measures

Autoignition Temp: N/A
Extinguishing Media: Suitable
Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

Firefighting: Protective Equipment
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Specific Hazard(s)
Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill: Evacuate area.
Procedure(s) of Personal Precaution(s)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling: User Exposure
Do not breathe dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Storage: Suitable
Keep tightly closed.

Section 8 - Exposure Controls / PPE

Engineering Controls: Mechanical exhaust required. Safety shower and eyewash.

Personal Protective Equipment
Respiratory
Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand
Compatible chemical-resistant gloves.

Eye
Chemical safety goggles.

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General Hygiene Measures
Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Physical State</th>
<th>Color</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid</td>
<td>White</td>
<td>Fine crystals</td>
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Molecular Weight: 130.08 AMU

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>pH</td>
<td>N/A</td>
</tr>
<tr>
<td>BP/VP Range</td>
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<tr>
<td>MP/MP Range</td>
<td>282 °C</td>
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<tr>
<td>Freezing Point</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor Pressure</td>
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<tr>
<td>Vapor Density</td>
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<tr>
<td>Saturated Vapor Conv.</td>
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<tr>
<td>Bulk Density</td>
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<tr>
<td>Odor Threshold</td>
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<tr>
<td>Vapor %</td>
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<tr>
<td>VOC Content</td>
<td>N/A</td>
</tr>
<tr>
<td>Water Content</td>
<td>N/A</td>
</tr>
<tr>
<td>Solvent Content</td>
<td>N/A</td>
</tr>
<tr>
<td>Evaporation Rate</td>
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</tr>
<tr>
<td>Viscosity</td>
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<tr>
<td>Partition Coefficient</td>
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<tr>
<td>Decomposition Temp.</td>
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</tr>
<tr>
<td>Flash Point °F</td>
<td>N/A</td>
</tr>
<tr>
<td>Flash Point °C</td>
<td>N/A</td>
</tr>
<tr>
<td>Explosion Limits</td>
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</tr>
<tr>
<td>Flammability</td>
<td>N/A</td>
</tr>
<tr>
<td>Autoignition Temp.</td>
<td>N/A</td>
</tr>
<tr>
<td>Solubility</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Solvent: 50 mg/ml NH4OH 1 M
Other Solvents: DMSO.

N/A = not available

Section 10 - Stability and Reactivity

Stability
Stable.

Materials to Avoid
Strong oxidizing agents, Strong bases.

Hazardous Decomposition Products
Carbon monoxides, Carbon dioxide, Nitrogen oxide, Hydrogen fluoride.

Section 11 - Toxicological Information

Hazardous Polymerization
Hazardous Polymerization
Will not occur.

Route of Exposure
Skin Contact
May cause skin irritation.

Skin Absorption
May be harmful if absorbed through the skin.

Eye Contact
May cause eye irritation.

Inhalation
May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion
Harmful if swallowed.

Sensitization
Sensitization
Causes phototoxic, photallergic reactions to light.

Target Organ(s) or System(s)
Heart: Bone marrow, Immune system, Blood.

Signs and Symptoms of Exposure
May cause nausea, vomiting, anorexia, diarrhea, stomatitis, fever, malaise, weakness, headache, depression, skin rash, erythema, bone marrow depression, bleeding syndrome, and renal impairment. Deaths have occurred.

RTECS Number: YR0350020

Toxicity Data

Oral - Rat: 230 mg/kg (LD50)
Intrapertioneal - Rat: 70 MG/KG (LD50)
Remarks: Gastrointestinal, Hypotonia, diarrhea, Gastrointestinal, Nausea or vomiting.

Subcutaneous - Rat: 217 MG/KG (LD50)
Intravenous - Rat: 246 MG/KG (LD50)
Remarks: Gastrointestinal, Hypotonia, diarrhea, Gastrointestinal, Nausea or vomiting.

Intramuscular - Rat: 240 MG/KG (LD50)
Parenteral - Rat: 500 MG/KG (LD50)
Rectal - Rat: 843 MG/KG (LD50)
Remarks: Gastrointestinal, Hypotonia, diarrhea, Gastrointestinal, Other changes.

Oral - Mouse: 115 mg/kg (LD50)
Intrapertioneal - Mouse: 100 MG/KG (LD50)
Intrapertioneal - Mouse: 100 MG/KG (LD50)
Subcutaneous - Mouse: 169 MG/KG (LD50)
Intravenous - Mouse: 81 MG/KG (LD50)
Intracerebral - Mouse: 41600 MG/KG (LD50)
Remarks: Peripheral Nerve and Sensation, Sensory change involving peripheral nerve, Sense Organs and Special Senses (Nose, Eye, Ear, and Taste), Eye Pupil.
Sense Organs and Special Senses (Nose, Eye, Ear, and Taste), Eye Other.

Oral - Dog: 30 mg/kg (LD50)
Remarks: Gastrointestinal, Nausea or vomiting.

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### Chronic Exposure - Carcinogen

Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

**Mice** - Intraperitoneal: 1500 mg/kg, 50W 1

**IARC Carcinogen List**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Group 3</th>
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</table>

### Chronic Exposure - Teratogen

<table>
<thead>
<tr>
<th>Species</th>
<th>Route of Application</th>
<th>Exposure Time</th>
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<tbody>
<tr>
<td>Woman</td>
<td>240 mg/kg Intravenous</td>
<td>11-14W (PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>35 mg/kg Intraperitoneal</td>
<td>(12-13D PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>30 mg/kg Intraperitoneal</td>
<td>(12D PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>30 mg/kg Intraperitoneal</td>
<td>(12D PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>30 mg/kg Intraperitoneal</td>
<td>(12D PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>30 mg/kg Intraperitoneal</td>
<td>(12D PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>30 mg/kg Intraperitoneal</td>
<td>(12D PREG)</td>
</tr>
<tr>
<td>Rat</td>
<td>20 mg/kg Intraperitoneal</td>
<td>(10D PREG)</td>
</tr>
<tr>
<td>Mouse</td>
<td>175 mg/kg Oral</td>
<td>(7-13D PREG)</td>
</tr>
<tr>
<td>Mouse</td>
<td>50 mg/kg Intraperitoneal</td>
<td>(13D PREG)</td>
</tr>
<tr>
<td>Mouse</td>
<td>20 mg/kg Intraperitoneal</td>
<td>(10D PREG)</td>
</tr>
<tr>
<td>Mouse</td>
<td>10 mg/kg Intraperitoneal</td>
<td>(10D PREG)</td>
</tr>
<tr>
<td>Hamster</td>
<td>24 mg/kg Intramuscular</td>
<td>(90 PREG)</td>
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<tr>
<td>Hamster</td>
<td>56 mg/kg Intramuscular</td>
<td>(11D PREG)</td>
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</table>

### Chronic Exposure - Mutagen

<table>
<thead>
<tr>
<th>Species</th>
<th>Route of Application</th>
<th>Mutation test</th>
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<tbody>
<tr>
<td>Human</td>
<td>15 mg/L</td>
<td>DNA damage</td>
</tr>
<tr>
<td>Human</td>
<td>15 mg/L</td>
<td>DNA damage</td>
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<td>1 mM/L</td>
<td>DNA damage</td>
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<tr>
<td>Human</td>
<td>1 mM/L</td>
<td>DNA damage</td>
</tr>
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<td>5 mM/L</td>
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<td>5 mM/L</td>
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<td>Human</td>
<td>2000 mM/L</td>
<td>Leukocytosis</td>
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<tr>
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<tr>
<td>Human</td>
<td>100 mg/L</td>
<td>DNA damage</td>
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<tr>
<td>Mouse</td>
<td>250 mg/kg Intraperitoneal</td>
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<td>Mouse</td>
<td>50 mg/kg Intraperitoneal</td>
<td>DNA damage</td>
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<td>DNA damage</td>
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<tr>
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<td>Mouse</td>
<td>66 mg/kg Intraperitoneal</td>
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<tr>
<td>Mouse</td>
<td>40 mg/kg Intraperitoneal</td>
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<tr>
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</tr>
<tr>
<td>Sigma Chemical - F6687 Page 5</td>
<td></td>
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</tr>
</tbody>
</table>

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Mouse 40 MG/KG Oral Asclites tumor Unscheduled DNA synthesis
Mouse 40 MG/L Oral Asclites tumor Unscheduled DNA synthesis
Mouse 40 MG/L Oral Asclites tumor Unscheduled DNA synthesis
Mouse 40 MG/L Oral Asclites tumor Other mutation test systems
Mouse 40 MG/L Intraperitoneal Asclites tumor Other mutation test systems
Mouse 50 MG/KG Intraperitoneal Unscheduled DNA synthesis
Mouse 50 MG/KG Intraperitoneal Unscheduled DNA synthesis
Mouse 50 MG/KG Intraperitoneal Leukocyte DNA inhibition
Mouse 50 MG/KG Intraperitoneal Leukocyte DNA inhibition
Mouse 100 MG/KG Intraperitoneal Leukocyte DNA inhibition
Mouse 100 MG/KG Intraperitoneal Leukocyte DNA inhibition
Mouse 55 UMOL/L Oral Leukocyte Other mutation test systems
Mouse 55 UMOL/L Oral Leukocyte Other mutation test systems
Mouse 50 UG/L Oral Lymphocyte DNA inhibition
Mouse 50 UG/L Oral Lymphocyte DNA inhibition
Mouse 50 UG/L Intraperitoneal DNA inhibition
Mouse 50 UG/L Intraperitoneal DNA inhibition
Mouse 40 MG/KG Oral Other mutation test systems
Mouse 40 MG/KG Oral Other mutation test systems
Mouse 100 NMOL/L Oral Embryo DNA inhibition
Mouse 100 NMOL/L Oral Embryo DNA inhibition
Mouse 1800 NMOL/L Oral Bone marrow DNA inhibition
Mouse 1800 NMOL/L Oral Bone marrow DNA inhibition
Mouse 1800 NMOL/L Oral Asclites tumor DNA inhibition
Mouse 1800 NMOL/L Oral Asclites tumor DNA inhibition
Mouse 1 UML/L Oral Other cell types DNA inhibition
Mouse 1 UML/L Oral Other cell types DNA inhibition
Mouse 50 MG/KG Oral Cytogenetic analysis
Mouse 50 MG/KG Oral Cytogenetic analysis
Mouse 20 MG/KG Intraperitoneal Cytogenetic analysis
Mouse 20 MG/KG Intraperitoneal Cytogenetic analysis
Mouse 250 MG/KG Intraperitoneal Asclites tumor Cytogenetic analysis
Mouse 250 MG/KG Intraperitoneal Asclites tumor Cytogenetic analysis
Mouse 50 MG/KG Intraperitoneal sperm
Mouse 50 MG/KG Intraperitoneal sperm
Mouse 50 MG/KG Intraperitoneal sperm
Mouse 50 MG/KG Intraperitoneal sperm
Mouse 41 MG/KG Intraperitoneal Micronucleus test
Mouse 41 MG/KG Intraperitoneal Micronucleus test
Mouse 41 MG/KG Intraperitoneal Cytogenetic analysis
Mouse 41 MG/KG Intraperitoneal Cytogenetic analysis
Hamster 1900 UG/L Intraperitoneal Cytogenetic analysis
Hamster 1900 UG/L Intraperitoneal Cytogenetic analysis
Mammal 100 UG/L Intraperitoneal Other cell types DNA inhibition
Mammal 100 UG/L Intraperitoneal Other cell types DNA inhibition

Chronic Exposure - Reproductive Hazard

Species Dose Route of Application Exposure Time Exposure Type
Woman 150 MG/KG Intravenous (20-31W PREG) Effects on Neonate: Other maternal measures or effects
Woman 150 MG/KG Intravenous (20-31W PREG) Effects on Neonate: Other maternal measures or effects
Rat 150 MG/KG Intravenous (7-13D PREG) Effects on Fertility: Litter size (e.g., # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetal toxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

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Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation

Contact a licensed professional waste disposal service to dispose of this material.
Section 14 - Transport Information

DOT
Proper Shipping Name: Toxic solids, organic, n.o.s.
UN# : 2811
Class: 6.1
Packing Group: Packing Group III
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Toxic solid, organic, n.o.s.
IATA UN Number: 2811
Hazard Class: 6.1
Packing Group: III

Section 15 - Regulatory Information

EU Additional Classification
Symbol of Danger: Xn
Indication of Danger
Harmful.
Risk Statements
R: 22
Harmful if swallowed.

US Classification and Label Text
Indication of Danger
Toxic (USA) Harmful (EU).
Risk Statements
Harmful if swallowed.
US Statements

United States Regulatory Information
SARA Listed: Yes
Dermal: 1 %
Notes: This product is subject to SARA section 313 reporting requirements.

TSCA Inventory Item: Yes

United States - State Regulatory Information
California Prop 65
This product contains chemical(s) known to the State of California to cause cancer.

Canada Regulatory Information
WHMIS Classification
This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: Yes

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2007 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.