High Performance ...
Low Cost ...
Big News!

Genesolv® SF





A New Hydrofluorocarbon Solvent for Industrial Aerosols
Specialty Cleaning
Flushing
Deposition

Miscibility, Solubility

Genesolv SF exhibits physical properties that contribute to in-plant ease of storage, handling and formulating. Among them, it is miscible with HFC-134a, HFC-152a, DME and hydrocarbon aerosol propellants. It is also miscible with many common solvents, including other fluorocarbons; chlorine solvents such as methylene chloride and trans-1,2 dichloroethylene; with hydrocarbons such as the pentanes and hexanes; and with the lower alcohols. Genesolv SF has good solubility for fluorosilicones, perfluoropolyether lubricants, and many refrigerant oils and other lubricants.

Physical Properties of Genesolv® SF

Molecular Formula		$CF_3CH_2CHF_2$
Molecular Weight		134.0
Boiling Point (∞F)		59.5
Liquid Density (g/cc @ 70oF)		1.32
Freezing Point (∞F)		<-256
Vapor Pressure:	(PSIG @ 70oF)	4.0
	(PSIG @ 130oF)	42.5
Solubility in Water		7200 PPM
Solubility of Water (in HFC-245fa)		1600 PPM
Flash Point *		None
Vapor Flame Limits **		None

* Flashpoint by ASTM D 3828-87; ASTM D1310-86

** Flame Limits measured at ambient temperature and pressure using ASTM E681-85 with electrically heated match ignition, spark ignition and fused wireignition; ambient air.

The Perfect Replacement

Honeywell's new Genesolv SF is an HFC solvent tailor-made for numerous industrial applications ... a product with performance and physical characteristics that make it the perfect replacement for HCFC-141b and other halogenated solvents. Genesolv SF is an effective, low cost solvent of particular value for industrial aerosols, and applications such as specialty cleaning, flushing and deposition.

Toxicity

Extensive testing demonstrates that Genesolv SF exhbits a low order of toxicity, and is neither mutagenic nor a teratogen. The American Industrial Hygiene Association (AIHA) has established a Workplace Environmental Exposure Level (WEEL) of 300 ppm (8 hour TWA).

Environmental Effects

Genesolv SF does not deplete the ozone. It has a relatively low Global Warming Potential. And it is not a VOC. Genesolv SF is listed on the US EPA TSCA Inventory, the European EINECS Inventory, and the Japanese MITI Inventory.

Flammability

Genesolv SF is classified as a nonflammable liquid. It has neither an open cup nor closed cup flashpoint, and does notexhibit vapor flame limits.

Stability

Genesolv SF exhibits a high degree of thermal and hydrolytic stability. In sealoed tube studies the material showed no signs of breakdown when exposed to temperatures of nearly 400∞ F for six weeks. Results were similar when the product was tested with water (300 ppm) and metals (3003 aluminum and/or 316 stainless steel).

Compatibility

Genesolv SF is compatible with common construction materials, including stainless steel, carbon steel, brass and aluminum. Contact with powdered aluminum or freshly abraded aluminum surfaces should be avoided. The product is also compatible with commonly used plastics and elastomers, including neoprene, butyl rubber, polypropylene PTFE and polycarbonate.

Storage and Handling

Genesolv SF is shipped in drums, ton cylinders and in bulk. It should be stored — in an approved container only — in a cool, well ventilated area. Container and fittings should be protected from damage. Avoid puncturing, dropping, exposure to open flames, excessive heat and direct sunlight. Valves should be tightly closed after use and when the container is empty.

Genesolv® SF

Honeywell

Material Safety Data Sheet

Genesolv® S-F

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Genesolv S-F
OTHER/GENERIC NAMES: HFC-245fa
PRODUCT USE: Aerosol solvent. See Section 15 for Regulatory Information
MANUFACTURER: Honeywell
101 Columbia Road
Box 1053
Morristown, New Jersey 07962-1053

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-707-4555

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
Chemtrec: 1-800-424-9800

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
1,1,1,3,3-Pentafluoropropane	460-73-1	100

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At high temperatures (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Non-irritating

EYES: Contact with liquid or mist may cause irritation.

INHALATION: Genesolv S-F is of low order of toxicity in animals. At high levels of exposure, cardiac arrhythmia may occur. When oxygen levels are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination , increased pulse rate and deeper respiration will occur.

INGESTION: Ingestion is an unlikely route of exposure because Genesolv S-F is a low boiling liquid, usually stored in a pressurized container. For that reason, ingestion hazards have not been evaluated. Discomfort due to volatility would be expected. Some of the inhalation effects could be expected.

DELAYED EFFECTS: None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. Remove clothing contaminated with liquid and wash before reuse.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes, lifting eyelids occasionally to facilitate irrigation. Get medical attention.

INHALATION: Immediately remove patient to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. DO NOT give epinephrine (adrenaline). Get medical attention immediately.

INGESTION: Ingestion is an unlikely route of exposure because Genesolv S-F is a low boiling liquid, usually stored in a pressurized container. For that reason, ingestion hazards have not been evaluated. DO NOT induce vomiting unless instructed to do so by a physician. DO NOT give stimulants. Get medical attention immediately.

ADVICE TO PHYSICIAN: Because of possible disturbances of cardiac rhythm, catecholamine drugs such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: None
FLASH POINT METHOD: ASTM D-3828-87 and ASTM D-1310-86
AUTOIGNITION TEMPERATURE: 774°F (412°C) Tested in a 500ml flask
UPPER FLAME LIMIT (volume % in air): None
LOWER FLAME LIMIT (volume % in air): None

FLAME PROPAGATION RATE (solids): Not applicable
OSHA FLAMMABILITY CLASS: Not applicable

EXTINGUISHING MEDIA:

Use any standard agent - choose the one most appropriate for type of surrounding fire (material itself in not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Genesolv S-F is not flammable at ambient temperatures and atmospheric pressure. However, based on other HFC response, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources. Contact with certain finely divided reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against suffocation and possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool and to knock down vapors which may result from product decomposition.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Immediately evacuate the area and provide maximum ventilation. Try to eliminate all ignition sources. Unprotected personnel should move upwind from spill. Only personnel equipped with proper respiratory and eye/skin protection should be permitted in the area until air has been tested and determined safe, including low lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Avoid breathing vapors or liquid contact with eyes, skin or clothing. Do not puncture or drop containers, expose them to open flame, excessive heat, or direct sunlight. Use approved containers only. Tank cleaning personnel should use only formal tank entry procedure based on recognized safety principles.

Genesolv S-F should not be mixed with air above atmospheric pressure for leak testing or any other purpose. Use dry nitrogen to leak test equipment pressurized with Genesolv SF.

STORAGE RECOMMENDATIONS:

Due to low boiling of 59°F (15°C), store in a cool, well-ventilated area of low fire risk. Protect container and its fittings from physical damage. Storage in subsurface locations should be avoided. Do not heat the container or store at a temperature above 125°F (51.7°C). Close valve tightly and after use and when empty. If container temperature exceeds boiling point, cool the container before opening.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Use local exhaust at filling zones and where leakage is probable. Use mechanical (general) ventilation for storage areas. All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94).

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:
Use protective, impervious gloves and clothing made of neoprene, nitrile or butyl rubber if prolonged or repeated contact with liquid is anticipated. Wash clothing promptly, if wet. Remove any non-impervious clothing and wash before re-use.

EYE PROTECTION:
For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear splash-proof goggles. Contact lenses should not be worn under such conditions.

RESPIRATORY PROTECTION:
None required for normal work situations where adequate ventilation is provided. Use NIOSH approved self-contained, positive pressure respirators for emergencies and in situations where air may be displaced by vapors.

ADDITIONAL RECOMMENDATIONS:
High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
1,1,1,3,3-Pentafluoropropane	None	None	**300 ppm TWA- 8hrs.

* = Provisional limit established by Honeywell
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
Hydrogen Fluoride: 3 ppm ACGIH TLV

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 134
CHEMICAL FORMULA: $CHF_2CH_2CF_3$
ODOR: Faint ethereal and sweetish odor
SPECIFIC GRAVITY (water = 1.0): 1.32 @ 68°F (20°C)
SOLUBILITY IN WATER (weight %): 7.18g/l @ ambient room temperature
pH: Neutral
BOILING POINT: 59°F (15°C)

MELTING POINT: Not determined
FREEZING POINT: <-256°F (< -160°C)
VAPOR PRESSURE: 17.8 psia @ 68°F (20°C)
56.3 psia @ 130°F (54.4°C)
VAPOR DENSITY (air = 1.0): 4.6
EVAPORATION RATE: >1 **COMPARED TO:** Ether = 1
% VOLATILES: 100
FLASH POINT: None
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
Product is stable under normal conditions.
Avoid sources of ignition such as sparks, hot spots, welding flames and lighted cigarettes which may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:
Strong acids and alkalis, reactive metals e.g., powdered or freshly abraded aluminum (may cause strong exothermic reaction), sodium, potassium, calcium, magnesium, zinc, molten aluminum, barium and lithium shavings. Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS:
Halogens and halogen acids; and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:
Acute Dermal (rabbit) – LD_{50} > 2,000 mg.kg
Cardiac Sensitization (dogs) – No effects noted at 35,000 ppm, the threshold for induction of cardiac arrhythmias in the presence of injected adrenalin was 44,000 ppm.
Acute Inhalation (rat): 4-hr. LC_{50} > 200,000 ppm. No lethality at 200,000 ppm. Evidence of transient anesthetic effect.
Acute Inhalation (mouse): 4-hr. LC_{50} > 100,000 ppm. No lethality at 100,000 ppm. Evidence of transient underactivity
during exposure.

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
Embryotoxicity (rats): Not a teratogen at 50,000 ppm, the highest level tested.
NOEL (pups): 50,000 ppm
NOEL (dams): 2,000 ppm (due to decrease in bodyweight gains at 10,000 ppm and 50,000 ppm)

28-day Inhalation Study (rats): NOAEL – 50,000 ppm and NOEL – 500 ppm

90-day Inhalation Study (rats): NOAEL – 2,000 ppm
Dose levels: 0, 500, 2,000, 10,000 and 50,000 ppm

Overall, subchronic studies showed dose-related increases in urinary fluoride levels, urine volumes and water consumption. Increases were noted in hematological parameters, BUN levels and serum liver enzyme activities (GOT, GPT). These increases did not follow a dose response; however, they indicate that HFC-245fa is metabolized in the liver. Significant recovery was noted in these parameters following a 2-week, non-exposure period which followed the 28-day exposure period. No histopathological effects were noted in the 28-day study. The 90-day study noted an increase in incidence and severity (trace to moderate) of mycarditis (inflammation of the heart muscle) at 10,000 and 50,000 ppm. This was not noted at the 500 or 2,000 ppm dose levels nor was it seen the the 28-day study at 50,000 ppm.

OTHER DATA:

Genetic studies: In vitro Human Lymphocyte weak positive activation without S9 at 30% v/v; not active with S9 up to 70% v/v.
In Vivo Mouse Micronucleaus – Not active up to 100,000 ppm.
Ames Test: Not active up to 100% v/v with or without S9.

12. ECOLOGICAL INFORMATION

Partition Coefficient: Log P_{OW} = 1.35 @ 21.5°C
Acute toxicity to Daphnia magna (Limit Test): NOEC > 97.9 mg/L; 48 hr. EC_{50} > 97.9 mg/L
Acute toxicity to Rainbow Trout (Limit Test): NOEC > 10 mg/L; 96 hr. EC_{50} > 81.8 mg/L

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? The product is not a RCRA waste
If yes, the RCRA ID number is: Not applicable

OTHER DISPOSAL CONSIDERATIONS:
All spent material must be disposed of in accordance with all applicable Federal and State RCRA Regulations. Consult with appropriate regulatory agencies before disposing of waste material.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: Not regulated

US DOT ID NUMBER: Not applicable

MATERIAL SAFETY DATA SHEET

Genesolv® S-F

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed

OTHER TSCA ISSUES: EPA intends to promulgate a SNUR restricting the use of 1,1,1,3,3-Pentafluoropropane. Aerosol solvents is one of the approved uses. Pertinent regulations are found at 40 CFR Part 721. Restrictions are stated in 40 CFR 721.80(j) and (p).

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE
PRESSURE

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:

Contains HFC-245fa, a greenhouse gas, a substance which may contribute to global warming.
Regulated under Section 612 (SNAP) of the Clean Air Act and 40 CFR Part 82, subpart G.

MATERIAL SAFETY DATA SHEET

Genesolv® S-F

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

Europe: ELINCS #419 170 6
Japan: MOL 2-(13)-143
Canada: Notified
Australia: Notified

16. OTHER INFORMATION

CURRENT ISSUE DATE: November, 2001
PREVIOUS ISSUE DATE: None

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

First Issue

OTHER INFORMATION: HMIS Classification: Health – 2, Flammability - 0, Reactivity - 1
NFPA Classification: Health - 2, Flammability - 0, Reactivity - 1