NAFION ® Solution

1 Identification of substance:

- **Product details:**
  - **Trade name: Perfluorosulfonic acid-PTFE copolymer, 5% w/w solution**
- **Stock number:** NS-05

Manufacturer/Supplier:
Fuel Cell Earth LLC.
1 Melvin St Unit C
Wakefield, MA 01880
Emergency Phone: (617) 532-0582
CHEMTREC: (800) 424-9300
Web Site: **www.fuelcellearth.com**

- **Information department:** Health, Safety and Environmental Department
- **Emergency information:**

  During normal hours the Health, Safety and Environmental Department.

  After normal hours call Chemtrec at (800) 424-9300.

2 Composition/Data on components:

Chemical characterization:
Description: (CAS#)
Perfluorosulfonic acid-PTFE copolymer
(CAS# 31175-20-9), 5%
Methanol
(CAS# 67-56-1), <5%
1-Propanol
(CAS# 71-23-8), 15-30%
2-Propanol
(CAS# 67-63-0), 15-30%
Water
(CAS# 7732-18-5), Balance

3 Hazards identification

Hazard description:
Xn Harmful
F Highly flammable
Information pertaining to particular dangers for man and environment
R 11 Highly flammable.
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 40/20/21/22 Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if

swallowed.
R 41 Risk of serious damage to eyes.
R 67 Vapours may cause drowsiness and dizziness

4 First aid measures

After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.

- **After swallowing** Seek immediate medical advice.

5 Fire fighting measures

Suitable extinguishing agents
Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards caused by the material, its products of combustion or resulting gases:
In case of fire, the following can be released:
Carbon monoxide and carbon dioxide
Hydrogen fluoride (HF)
Sulfur oxides (SOx)
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Person-related safety precautions:
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources
Measures for environmental protection:
Do not allow material to be released to the environment without proper governmental permits.
Measures for cleaning/collecting:
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
Keep away from ignition sources.
Additional information:
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
7 Handling and storage
Handling

Information for safe handling:
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Information about protection against explosions and fires:
Keep ignition sources away.
Protect against electrostatic charges.
Fumes can combine with air to form an explosive mixture.

- **Storage**
- **Requirements to be met by storerooms and receptacles:**

  Store in a cool location.
- **Information about storage in one common storage facility:**

  Store away from oxidizing agents.

  Aqueous solutions are incompatible with alkali and alkaline earth metals and many reactive organic and inorganic chemicals.
- **Further information about storage conditions:**

  Keep container tightly sealed.

  Store in cool, dry conditions in well sealed containers.

8 Exposure controls and personal protection

- **Additional information about design of technical systems:**

  Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:

1-Propanol

ppm

ACGIH TLV 200; 250-STEL (skin)

Belgium TWA 200; 250-STEL (skin)

Denmark TWA 200 (skin)

Finland TWA 200; 250-STEL (skin)

France TWA 200; 250-STEL (skin)

Hungary TWA 100; 200-STEL

Netherlands TWA 200 (skin)

Poland TWA 200

Russia TWA 10 mg/m3-STEL

Sweden TWA 150; 250-STEL (all isomers)

Switzerland TWA 200 (skin)

USA PEL 200; 250-STEL (skin)

Methyl alcohol

ppm

ACGIH TLV 200; 250-STEL, A4 (skin)

Belgium TWA 200; 250-STEL, (skin)

Denmark TWA 200 (skin)

Finland TWA 200; 250-STEL (skin)

France TWA 200; 1000-STEL

Germany TWA 200

Hungary TWA 50; 100-STEL

Ireland TWA 200; 250-STEL (skin)

Netherlands TWA 200 (skin)

Poland TWA 100

Russia TWA 200; 5 mg/m3-STEL (skin)

Sweden TWA 200; 250-STEL (skin)

Switzerland TWA 200; 400-STEL (skin)

United Kingdom TWA 200; 250-STEL (skin)

OSHA PEL 200

Isopropyl alcohol (2-Propanol)

ppm

ACGIH TLV 400; 500-STEL

Belgium TWA 400; 500-STEL

Denmark TWA 200 (skin)

France TWA 400

Germany TWA 200

Ireland TWA 400; 500-STEL (skin)

Netherlands TWA 250

Russia TWA 400-STEL

Sweden TWA 150; 250-STEL

Switzerland TWA 400; 800-STEL

United Kingdom TWA 400; 500-STEL

OSHA PEL 400

- **Additional information:** No data

- **Personal protective equipment**
- **General protective and hygienic measures**

  The usual precautionary measures for handling chemicals should be followed.

  Keep away from foodstuffs, beverages and feed.

  Remove all soiled and contaminated clothing immediately.

  Wash hands before breaks and at the end of work.

  Avoid contact with the eyes.

  Avoid contact with the eyes and skin.
- **Breathing equipment:**

  Use suitable respirator when high concentrations are present.
- **Protection of hands:** Impervious gloves
- **Eye protection:**

  Safety glasses

  Tightly sealed goggles
- **Body protection:** Protective work clothing.

9 Physical and chemical properties:

- **Form:** Liquid
- **Color:**

  Colorless

  Yellow

- **Odor:** Alcohol-like
- **Value/Range Unit Method**
- **Change in condition**
- **Melting point/Melting range:** Not determined
- **Boiling point/Boiling range:** Not determined
- **Sublimation temperature / start:** Not determined
- **Flash point:** 6 ° C approx
- **Ignition temperature:** Not determined
- **Decomposition temperature:** Not determined
- **Explosion limits:**
- **Lower:** Not determined
- **Upper:** Not determined
- **Vapor pressure:** Not determined
- **Density:** at 20 ° C 0.85-0.95 g/cm³
- **Solubility in / Miscibility with**
- **Water:** Fully miscible

10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**
  Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:**
  Oxidizing agents
  Aqueous solutions are incompatible with alkali and alkaline earth metals and many reactive organic and inorganic chemicals.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:**
  Carbon monoxide and carbon dioxide

Hydrogen fluoride

Sulfur oxides (SOx)

11 Toxicological information

Acute toxicity:

LD/Lc50 values that are relevant for classification:

ORL-RAT LD50: 5628 MG/KG (METHANOL)
ORL-MUS LD50: 7300 MG/KG (METHANOL)
SKN-RBT LD50: 15800 MG/KG (METHANOL)
ORL-HMN LDLo: 143 MG/KG (METHANOL)
ORL-RAT LD50: 5045 MG/KG (ISOPROPANOL)
ORL-MUS LD50: 3600 MG/KG (ISOPROPANOL)
SKN-RBT LD50: 12800 MG/KG (ISOPROPANOL)
ORL-HMN LD50: 3570 MG/KG (ISOPROPANOL)
ORL-RAT LD50: 1870 MG/KG (1-PROPANOL)
ORL-MUS LD50: 6800 MG/KG (1-PROPANOL)
ORL-RBT LD50: 2825 MG/KG (1-PROPANOL)
SKN-RBT LD50: 4050 MG/KG (1-PROPANOL)
IHL-MUS LC50: 48000 MG/KG (1-PROPANOL)

- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:**

  Strong irritant with the danger of severe eye injury.

  Irritating effect.
- **Sensitization:** No sensitizing effects known.

Subacute to chronic toxicity:

Symptoms of methanol overexposure may include intoxication, headache, drowsiness, nausea, vomiting, blurred vision, blindness, coma and death. It is a defatting agent and can cause skin and eye irritation. Absorption through the skin is possible. Chronic exposure may cause liver and eye injury. 2-Propanol (isopropyl alcohol) may act as a local irritant and in high concentrations as a narcotic with symptoms such as headache, nausea, dizziness, vomiting, mental depression, anesthesia, and coma. Similar symptoms may be caused by ingestion. It can cause corneal burns on contact with the eyes and has caused teratogenic, mutagenic and reproductive effects in laboratory animals.

- **Subacute to chronic toxicity:**

  Inhalation of n-propanol may have a mild narcotic effect. Large doses may cause narcosis and CNS depression. Mutagenic and carcinogenic effects have been reported. May cause liver damage.
- **Additional toxicological information:**

  Danger through skin absorption.

  To the best of our knowledge the acute and chronic toxicity of this

substance is not fully known.

IARC-3: Not classifiable as to carcinogenicity to humans.

12 Ecological information:

- **General notes:**

  Do not allow material to be released to the environment without proper governmental permits.

13 Disposal considerations

- **Product:**
- **Recommendation**

  Consult state, local or national regulations for proper disposal.

- **Uncleaned packagings:**
- **Recommendation:**

  Disposal must be made according to official regulations.

- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

14 Transport information

DOT regulations:
Hazard class: 3
Identification number: UN1987
Packing group: III
Proper shipping name (technical name):
Alcohols, n.o.s., methanol/1-propanol/2- propanol
Land transport ADR/RID (cross-border)
ADR/RID class: 3 Flammable liquids
Item: 31c
Danger code (Kemler): 30
UN-Number: 1987
Description of goods: Alcohols, n.o.s., methanol/1-propanol/2-propanol
Maritime transport IMDG:
IMDG Class: 3
UN Number: 1987
Packaging group: III
Proper shipping name: Alcohols, n.o.s., methanol/1-propanol/2-propanol
Air transport ICAO-TI and IATA-DGR:
ICAO/IATA Class: 3
UN/ID Number: 1987

Packaging group: III
Proper shipping name: Alcohols, n.o.s., methanol/1-propanol/2-propanol

15 Regulations

- **Product related hazard informations:**

- **Hazard symbols:**

  Xn Harmful F Highly flammable

Risk phrases:
11 Highly flammable.
20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
40/20/21/22 Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.
41 Risk of serious damage to eyes.
67 Vapours may cause drowsiness and dizziness
Safety phrases:
9 Keep container in a well-ventilated place.
16 Keep away from sources of ignition - No smoking.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
60 This material and its container must be disposed of as hazardous waste.
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.
Information about limitation of use:
For use only by technically qualified individuals.
This product is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

16 Other information:

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

- **Department issuing MSDS:** Health, Safety and Environmental Department.
- **Contact:** Ennio Verderese