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**SECTION 1: IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY**

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**1.1 Product identifiers**

Product Name : ACS Material PEG-Modified Upconverting Nanoparticles  
Brand : ACS Material LLC  
CAS-No. : 7681-49-4(Sodium fluoride), 64-17-5(Ethanol)

**1.2 Relevant identified uses of the substance or mixture and uses advised against**

Identified uses : Laboratory chemicals, Manufacture of substances

**1.3 Details of the supplier of the safety data sheet**

Company : ACS MATERIAL LLC  
959 E Walnut St., Suite 100  
Pasadena, CA 91106  
USA

Telephone : +1 (866)-227-0656

Fax : +1 (781)-518-0284

**1.4 Emergency telephone number**

Emergency Phone #: +1 (866)-227-0656

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**SECTION 2: HAZARDS IDENTIFICATION**

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**2.1 Classification of the substance or mixture****GHS Classification**

Flammable liquids (Category 2)  
Acute toxicity, Oral (Category 2)  
Skin corrosion/irritation (Category 2, Category 3)  
Serious eye damage/eye irritation (Category 2A)  
Acute aquatic toxicity (Category 3)  
Specific target organ toxicity - single exposure (Category 3)

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.  
H300 Fatal if swallowed.  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.

H402	Harmful to aquatic life.
Precautionary statement(s)	
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P240	Ground and bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use non-sparking tools.
P243	Take action to prevent static discharges.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear eye protection/ face protection. Wear protective gloves.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of water.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

#### Target Organs

Damage to the heart, liver, nervous system, kidney, bone, gastrointestinal tract, teeth, lungs.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Substance name	:	ACS Material PEG-Modified Upconverting Nanoparticles
Formula	:	NaYREF <sub>4</sub> (RE: Yb, Er, Tm, Gd, Mn, Lu) @PEG
Substance	:	Ethanol
Synonyms	:	Ethyl alcohol
CAS-No.	:	64-17-5
EC-No.	:	200-578-6
Molecular weight	:	46.07 g/mol
Formula	:	C <sub>2</sub> H <sub>6</sub> O

Substance	:	Sodium fluoride
CAS-No.	:	7681-49-4
EC-No.	:	231-667-8
Molecular weight	:	41.99 g/mol
Formula	:	NaF
Substance	:	Poly(ethylene glycol)
Synonyms	:	PEG
CAS-No.	:	25322-68-3
EC-No.	:	500-038-2
Formula	:	(C <sub>2</sub> H <sub>4</sub> O) <sub>n</sub> H <sub>2</sub> O

**Hazardous components**

Component	Concentration	CAS-No.
Ethanol	99.9 wt %	64-17-5
Sodium fluoride	< 0.1 wt %	7681-49-4
Yttrium	< 0.1 wt %	7440-65-5
Ytterbium	< 0.1 wt %	7440-64-4
Erbium	< 0.1 wt %	7440-52-0
Thulium	< 0.1 wt %	7440-30-4
Gadolinium	< 0.1 wt %	7440-54-2
Manganese	< 0.1 wt %	7439-96-5
Lutetium	< 0.1 wt %	7439-94-3
Poly(ethylene glycol)	< 0.1 wt %	25322-68-3

For the full text of the phrases mentioned in this Section, see Section 16.

**Hazardous impurities:** None known.

**SECTION 4: FIRST AID MEASURES****4.1 Description of first aid measures****General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention.

**In case of skin contact**

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. First treatment with calcium gluconate paste.

**In case of eye contact**

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available.

**SECTION 5: FIREFIGHTING MEASURES**

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**5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Hazards arising from the substance or mixture**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, hydrogen fluoride, sodium oxides, yttrium oxides, ytterbium oxides, erbium oxides, gadolinium oxides, manganese/manganese oxides.

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Conditions of flammability**

Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

**5.5 Further information**

Use water spray to cool unopened containers..

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

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**6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

**6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

**6.3 Methods and materials for containment and cleaning up**

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**6.4 Reference to other sections**

Keep in suitable, closed containers for disposal. For disposal see section 13.

**SECTION 7: HANDLING AND STORAGE**

**7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Do not store near acids. Hygroscopic. Keep at 4-8 °C. Light, and moisture sensitive.

**7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

**8.1 Control parameters**

**Components with workplace control parameters**

Components	CAS-No.	Value	Control Parameters	Basis
Ethanol	64-17-5	TWAEV	1,000.000000 ppm 1,900.000000 mg/m <sup>3</sup>	Canada. Ontario OELs
		TWA	1,000.000000 ppm 1,880.000000 mg/m <sup>3</sup>	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWAEV	1,000 ppm 1,880 mg/m <sup>3</sup>	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		STEL	1,000.000000 ppm	Canada. British Columbia OEL
		TWA	1,000.000000 ppm	Canada. British Columbia OEL
		TWA	1,000.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		STEL	1,000.000000	USA. ACGIH Threshold Limit

			ppm	Values (TLV)
Sodium fluoride	7681-49-4	TWA	2.500000 mg/m <sup>3</sup>	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWAEV	2.500000 mg/m <sup>3</sup>	Canada. Ontario OELs
		TWA	2.500000 mg/m <sup>3</sup>	Canada. British Columbia OEL
		TWA	2.500000 mg/m <sup>3</sup>	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWAEV	2.5 mg/m <sup>3</sup>	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWA	2.500000 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
Yttrium	7440-65-5	TWA	1 mg/m <sup>3</sup>	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWA	1 mg/m <sup>3</sup>	Canada. British Columbia OEL
		TWAEV	1 mg/m <sup>3</sup>	Canada. Ontario OELs
		TWAEV	1 mg/m <sup>3</sup>	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWA	1 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
Manganese	7439-96-5	TWAEV	1.000000 mg/m <sup>3</sup>	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		STEV	3.000000 mg/m <sup>3</sup>	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWAEV	0.200000 mg/m <sup>3</sup>	Canada. Ontario OELs
		TWAEV	5 mg/m <sup>3</sup>	Québec. Regulation respecting

				occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWA	0.200000 mg/m <sup>3</sup>	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWA	0.200000 mg/m <sup>3</sup>	Canada. British Columbia OEL
	Remarks	Adverse reproductive effect.		
		TWA	0.020000 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
		TWA	0.100000 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
		TWA	0.200000 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)

**8.2 Exposure controls**

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Appropriate engineering controls**

Use mechanical exhaust or laboratory fumehood to avoid exposure.

**Personal protective equipment**

**Eye/face protection**

Use equipment for eye protection, face shield and safety glasses tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Body Protection**

Impervious clothing, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Do not let product enter drains.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

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**9.1 Information on basic physical and chemical properties**

1) Appearance	Form: Dispersion Colour: Ivory white
2) Odour	Odourless
3) Odour Threshold	No data available
4) pH	No data available
5) Melting point/freezing point	Melting point/range: -114 °C (-173 °F)
6) Initial boiling point and boiling range	78 °C (172 °F)
7) Flash point	14.0 °C (57.2 °F) - closed cup
8) Evaporation rate	No data available
9) Flammability (solid, gas)	May be combustible at very high temperature
10) Upper/lower flammability or explosive limits	Upper explosive limit: 19 %(V) Lower explosive limit: 3.3 %(V)
11) Vapour pressure	59.5 hPa (44.6 mmHg) at 20.0 °C (68.0 °F)
12) Vapour density	No data available
13) Relative density	0.789 g/cm <sup>3</sup> at 25 °C (77 °F)
14) Water solubility	Completely soluble
15) Partition coefficient: n- octanol/water	log Pow: -0.349 at 24 °C (75 °F)
16) Auto-ignition temperature	363 °C (685 °F)
17) Decomposition temperature	No data available
18) Viscosity	No data available
19) Explosive properties	No data available
20) Oxidizing properties	No data available

**9.2 Other safety information**

No data available.

**SECTION 10: STABILITY AND REACTIVITY**

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**10.1 Reactivity**

No data available.

**10.2 Chemical stability**

Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**

Vapours may form explosive mixture with air.

**10.4 Conditions to avoid**

Heat, spark and flame. Extremes of temperature and direct sunlight.

**10.5 Incompatible materials**

Alkali metals, oxidizing agents, peroxides, strong acids, halogens, oxygen, phosphorus, sulphur oxides.



**10.6 Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, hydrogen fluoride, sodium oxides, ytterbium oxides, erbium oxides, gadolinium oxides, manganese/manganese oxides.

Other decomposition products - Gaseous hydrogen fluoride (HF).  
In the event of fire: see section 5.

**SECTION 11: TOXICOLOGICAL INFORMATION**

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**11.1 Information on toxicological effects****Acute toxicity**

LD50: No data available.

LC50: No data available.

Dermal: No data available.

Intravenous - Rat - Nutritional and Gross Metabolic: Weight loss or decreased weight gain.

**Skin corrosion/irritation**

Irritating to skin.

**Serious eye damage/eye irritation**

Eyes - Rabbit - Moderate eye irritation.

**Respiratory or skin sensitisation**

No data available.

**Germ cell mutagenicity**

No data available.

**Carcinogenicity**

Carcinogenicity - Mouse – Oral

Carcinogenicity - Rat - Intramuscular

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Liver: Tumors.

Blood: Lymphomas including Hodgkin's disease.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**

Reproductive toxicity - Human - female - Oral

Effects on Newborn: Apgar score (human only). Effects on Newborn: Other neonatal measures or effects. Effects on Newborn: Drug dependence.

**Specific target organ toxicity - single exposure**

No data available.

**Specific target organ toxicity - repeated exposure**

No data available.

**Aspiration hazard**

No data available.

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.
<b>Ingestion</b>	May be fatal if swallowed. Aspiration hazard if swallowed – can enter lungs and cause damage.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	Causes eye irritation.

**Signs and Symptoms of Exposure**

Central nervous system depression, narcosis, Damage to the heart., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Fluoride ion can reduce serum calcium levels possibly causing fatal hypocalcemia. Rare earth compounds may cause delayed blood clotting leading to hemorrhages. Inhalation of rare earths may cause sensitivity to heat, itching, and increased awareness of odor and taste.

**Additional Information**

RTECS: KQ6300000(Ethanol).

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**SECTION 12: ECOLOGICAL INFORMATION**

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**12.1 Toxicity**

No data available.

**12.2 Persistence and degradability**

No data available.

**12.3 Bioaccumulative potential**

Bioaccumulation - Salmo trutta

**12.4 Mobility in soil**

No data available.

**12.5 Results of PBT and vPvB assessment**

No data available.

**12.6 Other adverse effects**

Harmful to aquatic life.

**SECTION 13: DISPOSAL CONSIDERATIONS**

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**13.1 Waste treatment methods****Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a

licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

**SECTION 14: TRANSPORT INFORMATION**

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**UN number**

ADR/RID: 1170                      IMDG: 1170                      IATA: 1170

**UN proper shipping name**

ADR/RID: Ethanol.

IMDG: ETHANOL.

IATA: Ethanol.

**Transport hazard class(es)**

ADR/RID: 3                      IMDG: 3                      IATA: 3

**Packaging group**

ADR/RID: - IMDG: - IATA: -

**Environmental hazards**

ADR/RID: no                      IMDG Marine pollutant: no                      IATA: no

**Special precautions for user**

No data available.

**SECTION 15: REGULATORY INFORMATION**

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**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

**Authorisations and/or restrictions on use**

**WHMIS Classification**

B2	Flammable liquid	Flammable liquid
D1B	Toxic Material Causing Immediate and Serious Toxic Effects	Toxic by ingestion
D2A	Very Toxic Material Causing Other Toxic Effects	Reproductive hazard
D2B	Toxic Material Causing Other Toxic Effects	Moderate skin irritant Moderate eye irritant

**SECTION 16: OTHER INFORMATION**

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**HMIS Classification**

Health hazard: 2

Chronic Health Hazard: \*

Flammability: 3

Physical Hazard: 0

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