SECTION 1: IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY

1.1 Product identifiers
Product Name: ACS Material Mesoporous Silica-Coated 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

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
GHS Classification
- Flammable liquids (Category 2)
- Acute toxicity, Oral (Category 2)
- Skin corrosion/irritation (Category 2)
- 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.
P331 + 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

<table>
<thead>
<tr>
<th>Substance name</th>
<th>ACS Material Mesoporous Silica Coated Upconverting Nanoparticles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>Na\text{YREF}_4(\text{RE: Yb, Er, Tm, Gd, Mn, Lu})\text{@mSiO}_2</td>
</tr>
<tr>
<td>Substance</td>
<td>Ethanol</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Ethyl alcohol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>64-17-5</td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-578-6</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>46.07 g/mol</td>
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<tr>
<td>Formula</td>
<td>C\text{2H}_6O</td>
</tr>
<tr>
<td>Substance</td>
<td>Sodium fluoride</td>
</tr>
</tbody>
</table>
CAS-No. : 7681-49-4  
EC-No. : 231-667-8  
Molecular weight : 41.99 g/mol  
Formula : NaF  
Substance : Silica  
Synonyms : Silicic anhydride  
				Silicon dioxide  
CAS-No. : 7681-49-4  
EC-No. : 231-667-8  
Molecular weight : 60.08 g/mol  
Formula : SiO$_2$  

**Hazardous components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>99.9 wt %</td>
<td>64-17-5</td>
</tr>
<tr>
<td>Sodium fluoride</td>
<td>&lt; 0.1 wt %</td>
<td>7681-49-4</td>
</tr>
<tr>
<td>Yttrium</td>
<td>&lt; 0.1 wt %</td>
<td>7440-65-5</td>
</tr>
<tr>
<td>Ytterbium</td>
<td>&lt; 0.1 wt %</td>
<td>7440-64-4</td>
</tr>
<tr>
<td>Erbium</td>
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<td>7440-52-0</td>
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<tr>
<td>Thulium</td>
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<td>7440-30-4</td>
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<tr>
<td>Gadolinium</td>
<td>&lt; 0.1 wt %</td>
<td>7440-54-2</td>
</tr>
<tr>
<td>Manganese</td>
<td>&lt; 0.1 wt %</td>
<td>7439-96-5</td>
</tr>
<tr>
<td>Lutetium</td>
<td>&lt; 0.1 wt %</td>
<td>7439-94-3</td>
</tr>
<tr>
<td>Silica</td>
<td>&lt; 0.1 wt %</td>
<td>112945-52-5</td>
</tr>
</tbody>
</table>

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

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, silicon 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

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

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control Parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>TWAEV</td>
<td>1,000.000000 ppm</td>
<td>Canada. Ontario OELs</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1,900.000000 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA</td>
<td>1,000.000000 ppm</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,880.000000 mg/m³</td>
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<tr>
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<td></td>
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<td>TWAEV</td>
<td>1,000 ppm</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>1,880 mg/m³</td>
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<td>-----------</td>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
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<td>Sodium fluoride</td>
<td>TWA</td>
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<td>Manganese</td>
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<td></td>
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<td>Schedule 1, Part 1: Permissible exposure values for airborne contaminants</td>
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<tr>
<td>----------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
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</tr>
<tr>
<td>TWA EV</td>
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<td>Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)</td>
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<tr>
<td>TWA</td>
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<td>Canada. British Columbia OEL</td>
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<tr>
<td>Remarks</td>
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<td>USA. ACGIH Threshold Limit Values (TLV)</td>
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</tr>
<tr>
<td>TWA</td>
<td>0.200000 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 fume hood 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

#### 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/cm³ 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

#### 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, hydrogen fluoride, ammonia, oxygen difluoride, chlorine trifluoride.

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

**SECTION 11: TOXICOLOGICAL INFORMATION**

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

**Inhalation**
May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.

**Ingestion**
May be fatal if swallowed. Aspiration hazard if swallowed – can enter lungs and cause damage.

**Skin**
May be harmful if absorbed through skin. May cause skin irritation.

**Eyes**
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

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**
12.6 Other adverse effects
Harmful to aquatic life.

SECTION 13: DISPOSAL CONSIDERATIONS

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

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

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
D1B  Toxic Material Causing Immediate and Serious Toxic Effects
D2A  Very Toxic Material Causing Other Toxic Effects
D2B  Toxic Material Causing Other Toxic Effects

SECTION 16: OTHER INFORMATION

<table>
<thead>
<tr>
<th>HMIS Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health hazard:</td>
</tr>
<tr>
<td>Chronic Health Hazard:</td>
</tr>
<tr>
<td>Flammability:</td>
</tr>
<tr>
<td>Physical Hazard:</td>
</tr>
</tbody>
</table>

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