Section 1: Identification

1.1 Identification
Product Name: Palladium(II) Chloride Solution

1.2 Relevant identified uses of the substance or mixture and uses advised against
Use of the substance/mixture: Catalyst

1.3 Details of the supplier of the safety data sheet
Nano3D Systems LLC
1110 NE Circle Blvd., ATAMI/Bldg. 11
Corvallis, OR 97330

1.4 Emergency telephone number
Emergency number Chemtrec: 800-424-9300

Section 2: Hazard(s) identification

2.1 Classification of the substance or mixture
Classification (GHS-US)
- Flammable liquids (Category 2) H225
- Acute toxicity, Oral (Category 3) H301
- Corrosive to metals (Category 1) H290
- Skin sensitization (Category 1) H317
- Eye irritation (Category 2A) H319
- Specific target organ toxicity - single exposure (Category 3), Central nervous system H336

2.2 Label elements
GHS-US labeling
Hazard pictogram (GHS-US)

Signal word (GHS-US): Danger

Hazard statements (GHS-US):
- H225 – Highly flammable liquid and vapor
- H290- May be corrosive to metals
- H301 – Toxic if swallowed
- H317 – May cause allergic skin reaction
- H319 – Causes serious eye irritation
- H336 – May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements (GHS-US):
- P210 – Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- P233 – Keep container tightly closed.
2.3 Other Hazards

May form explosive peroxides
Section 3: Composition/information on ingredients

3.1 Substance
Not applicable

3.2 Mixture

<table>
<thead>
<tr>
<th>Name</th>
<th>Product Identifier</th>
<th>%</th>
<th>Classification (GHS-US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl alcohol</td>
<td>(CAS-No.) 67-63-0</td>
<td>Trade Secret</td>
<td>Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336</td>
</tr>
<tr>
<td>Palladium(II) Chloride</td>
<td>(CAS-No.) 7647-10-1</td>
<td>Trade Secret</td>
<td>Acute Tox. 3; Eye Irrit. 2A; Skin Sens. 1; H301, H317, H319</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>CAS-No.) 7647-01-0</td>
<td>Trade Secret</td>
<td>Corrosive to metals. 1; Eye irrit. 2A; Skin Sens. 1</td>
</tr>
</tbody>
</table>

Section 4: First Aid Measures

4.1 Description of first aid measures

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

Inhalation: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

Skin contact: Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

Eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

Ingestion: 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

Inhalation: No information available

Skin contact: No information available
Palladium(II) Chloride Solution

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4.3 Indication of any immediate medical attention and special treatment needed
No further information available

Section 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media : None

5.2 Special hazards arising from the substance or mixture
Fire hazard : Flammable, hydrogen chloride gas release
Explosion hazard : Vapors form explosive mixture with air

5.3 Advice for firefighters
Protection during firefighting : Wear self-contained breathing apparatus for firefighting if necessary.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel : Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

6.1.2 For emergency personnel : No additional information available

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.
Section 7: Handling and storage

7.1 Precautions for safe handling

Precautions for safe handling: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the buildup of electrostatic charge.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions: 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. Handle and store under inert gas. hygroscopic

Section 8: Exposure controls/personal protection

8.1 Control parameters

<table>
<thead>
<tr>
<th>Isopropyl Alcohol (CAS-No.) 67-63-0</th>
<th>TWA</th>
<th>980.00 mg/m$^3$</th>
<th>USA. NIOSH Recommended Exposure Limits</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Palladium(II) Chloride (CAS-No.) 7647-10-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No occupational exposure limit values</td>
</tr>
</tbody>
</table>

| Hydrochloric Acid (CAS-No.) 7647-01-0 |
### 8.2 Exposure controls

**Appropriate engineering controls**: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Hand 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.

**Eye protection**: Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**: Complete suit protecting against chemicals, the type of protective equipment must be selected.
### Section 9: Physical and chemical properties

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Deep-Orange</td>
</tr>
<tr>
<td>Odor</td>
<td>alcohol-like</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No information available</td>
</tr>
<tr>
<td>pH</td>
<td>No information available</td>
</tr>
<tr>
<td>Melting point</td>
<td>-89.5 °C (Isopropanol)</td>
</tr>
<tr>
<td>Freezing point</td>
<td>-89.5 °C (Isopropanol)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>82 °C (Isopropanol)</td>
</tr>
<tr>
<td>Flash point</td>
<td>12.0 °C (Isopropanol)</td>
</tr>
<tr>
<td>Relative evaporation rate (butyl acetate = 1)</td>
<td>3.0</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No information available</td>
</tr>
<tr>
<td>Explosion limits</td>
<td>2 – 12.7 % (V)</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>32.4 mmHg @ 20 °C</td>
</tr>
<tr>
<td>Relative density</td>
<td>No information available</td>
</tr>
<tr>
<td>Relative density at 20 °C</td>
<td>0.785 g/cm³</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Miscible</td>
</tr>
<tr>
<td>Log Pow</td>
<td>0.05</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>425 °C</td>
</tr>
<tr>
<td>Viscosity</td>
<td>No information available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No information available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No information available</td>
</tr>
</tbody>
</table>

#### 9.2 Other information

No further information available

### Section 10: Stability and reactivity

#### 10.1 Reactivity

No information available

#### 10.2 Chemical Stability

Stable under recommended storage conditions. Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard
Palladium(II) Chloride Solution
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after 1 year.

10.3 Possibility of hazardous reactions
Vapors may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidizing agents, Acid anhydrides, Aluminum, Halogenated compounds, Acids

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products – Titanium oxides

Section 11: Toxicological information
11.1 Control parameters
Acute toxicity : No information available

Isopropyl Alcohol (CAS-No.) 67-63-0
LD50 Oral - Rat - 5,045 mg/kg
LC50 Inhalation - Rat - 8 h - 16000 ppm
LD50 Dermal - Rabbit - 12,800 mg/kg

Palladium(II) Chloride (CAS-No.) 7647-10-1
LD50 Oral - rat - 2,704 mg/kg
LD50 Oral - mouse - > 1,000 mg/kg
LD50 Oral - rat - 200 mg/kg

Skin corrosion/irritation : Mild skin irritation
Serious eye damage/irritation : Eye irritation
Respiratory or skin sensitization : No information available
Germ cell mutagenicity : Human, lymphocyte, DNA inhibition
Carcinogenicity : Carcinogenicity - mouse - Oral

Reproductive toxicity : Rat – Intratesticular
Paternal Effects: Spermatogenesis (including
Palladium(II) Chloride Solution
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genetic material, sperm morphology, motility, and count. Paternal Effects: Testes, epididymis, sperm duct.

Mouse – Subcutaneous
Paternal Effects: Testes, epididymis, sperm duct.

Specific target organ toxicity (single exposure) : Inhalation, Oral - May cause drowsiness or dizziness.
Specific target organ toxicity (repeated exposure) : No information available
Aspiration hazard : No information available

Additional information
Central nervous system depression, prolonged or repeated exposure can cause: Nausea, Headache, Vomiting, narcosis, Drowsiness, Overexposure may cause mild, reversible liver effects., Aspiration may lead to: Lung oedema, Pneumonia. Contact with skin can cause: Dermatitis, Allergic reactions

Section 12: Ecological information

12.1 Toxicity

Isopropyl Alcohol (CAS-No.) 67-63-0
Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 9,640.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 5,102.00 mg/l - 24 h
Immobilization EC50 - Daphnia magna (Water flea) - 6,851 mg/l - 24 h
Toxicity to algae EC50 - Desmodesmus subspicatus (green algae) - > 2,000.00 mg/l - 72 h
EC50 - Algae - > 1,000.00 mg/l - 24 h

Palladium(II) Chloride (CAS-No.) 7647-10-1
No information available

12.2 Persistence and degradability

Isopropyl Alcohol (CAS-No.) 67-63-0
No information available

Palladium(II) Chloride (CAS-No.) 7647-10-1
No information available
12.3 Bioaccumulative potential

**Isopropyl Alcohol (CAS-No.) 67-63-0**
No bioaccumulation is to be expected (log Pow <= 4).

**Palladium(II) Chloride (CAS-No.) 7647-10-1**
No information available

12.4 Mobility in soil

**Isopropyl Alcohol (CAS-No.) 67-63-0**
No information available

**Palladium(II) Chloride (CAS-No.) 7647-10-1**
No information available

12.4 Other adverse effects

No information available

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: Transportation information

14.1 Transportation information

**Department of Transportation (DOT)**

UN number: 1219 Class: 3 Packing group: II
Proper shipping name: Isopropanol solution
Reportable Quantity (RQ):
Poison Inhalation Hazard: No
Palladium(II) Chloride Solution

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Section 15: Regulatory information

15.1 US Federal regulations

Isopropyl Alcohol (CAS-No.) 67-63-0
SARA Title III, Sections 302, 311, 312, 313

Palladium(II) Chloride (CAS-No.) 7647-10-1
SARA Title III, Sections 302, 311, 312, 313

15.2 US State regulations

Isopropyl Alcohol (CAS-No.) 67-63-0
Massachusetts Right To Know
Pennsylvania Right To Know
New Jersey Right To Know

Palladium(II) Chloride (CAS-No.) 7647-10-1
Pennsylvania Right To Know
New Jersey Right To Know

Section 16: Other information

HMIS Rating
Health 2
Chronic Health *
Flammability 3
Physical 0

NFPA Rating
Health 3
Fire 3
Reactivity 0

SDS Preparation date: September 10, 2017  Supersedes previous version: New SDS

This SDS contains revisions in the following sections(s): Not applicable. New SDS.