Safety Data Sheet

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name | **Ammonium Hydroxide less than 10%**

Synonyms | Ammonia aqueous; Aqua Ammonia

Product Code | 70370

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

Relevant identified use(s) | Semiconductor Uses

1.3 Details of the supplier of the safety data sheet

Manufacturer | Air Liquide

2700 Post Oak Blvd.
Houston, TX 77056
United States
www.us.airliquide.com
sds@airliquide.com

Telephone (Technical) | 713-896-2896

Telephone (Technical) | 800-819-1704

1.4 Emergency telephone number

Manufacturer | 800-424-9300

Manufacturer | +1 703-527-3887

Section 2: Hazards Identification

EU/EEC

According to Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP | Skin Corrosion 1B - H314
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335

DSD/DPD | Irritant (Xi)

R36/37/38

2.2 Label Elements

CLP

DANGER

Hazard statements | H314 - Causes severe skin burns and eye damage.

H335 - May cause respiratory irritation

Precautionary statements

Prevention | P260 - Do not breathe mist/vapours/spray.
P264 - Wash thoroughly after handling.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response | P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 - Call a POISON CENTER or doctor/physician if you feel unwell.
P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P321 - Specific treatment, see supplemental first aid information.
P363 - Wash contaminated clothing before reuse.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 - Immediately call a POISON CENTER or doctor/physician.
P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Storage/Disposal | P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD

Risk phrases | R36/37/38 - Irritating to eyes, respiratory system and skin.

Safety phrases | S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

2.3 Other Hazards

CLP | According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD | This product is considered dangerous according to the European Directive 67/548/EEC.

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

OSHA HCS 2012 | Skin Corrosion 1C - H314
Serious Eye Damage 1 - H318
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335

2.2 Label elements

OSHA HCS 2012

DANGER

Hazard statements | Causes severe skin burns and eye damage. - H314
Causes serious eye damage - H318
May cause respiratory irritation - H335

Precautionary statements

Prevention | Do not breathe mist/vapours/spray. - P260
Wash thoroughly after handling. - P264

Use only outdoors or in a well-ventilated area. - P271
Wear protective gloves/protective clothing/eye protection/face protection. - P280

Response | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - P304+P340
Call a POISON CENTER or doctor/physician if you feel unwell. - P312
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. - P303+P361+P353
Specific treatment, see supplemental first aid information. - P321
Wash contaminated clothing before reuse. - P363
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - P305+P351+P338
Immediately call a POISON CENTER or doctor/physician. - P310
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. - P301+P330+P331

Storage/Disposal | Store in a well-ventilated place. Keep container tightly closed. - P403+P233
Store locked up. - P405
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501

2.3 Other hazards

OSHA HCS 2012 | Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

2.1 Classification of the substance or mixture

WHMIS | Corrosive - E

2.2 Label elements

WHMIS

| Corrosive - E

2.3 Other hazards

WHMIS | In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

3.1 Substances

Composition				
Chemical Name	**Identifiers**	**%**	**LD50/LC50**	**Classifications According to Regulation/Directive**
Ammonium hydroxide	**CAS:**1336-21-6 **EC Number:**215-647-6 **EU Index:**007-001-01-2	< 10%	Ingestion/Oral-Rat LD50 • 350 mg/kg	**EU DSD/DPD:** Annex VI, Table 3.2: C; R34 N; R50 **EU CLP:** Annex VI, Table 3.1: Skin Corr. 1B, H314; STOT SE 3: Resp. Irrit, H335; Aquatic Acute 1, H400 **OSHA HCS 2012:** Acute Tox. 4 (orl); Eye Dam. 1; Skin Corr. 1C; STOT SE 3: Resp. Irrit.

3.2 Mixtures

| Material does not meet the criteria of a mixture in accordance with Regulation (EC) No 1272/2008.

See Section 16 for full text of H-statements and R-phrases.

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation
| Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Get medical attention immediately.

Skin
| For minor skin contact, avoid spreading material on unaffected skin. In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Remove and isolate contaminated clothing. Get medical attention immediately.

Eye
| Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. Get medical attention immediately.

Ingestion
| If swallowed, rinse mouth with water (only if the person is conscious) Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Give plenty of water to drink. Do not use mouth-to-mouth method if victim ingested the substance. Obtain medical attention immediately if ingested.

4.2 Most important symptoms and effects, both acute and delayed

| Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician
| All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media
| LARGE FIRES: Dry chemical, CO2, alcohol-resistant foam or water spray.
SMALL FIRES: Dry chemical, CO2 or water spray.

Unsuitable Extinguishing Media
| No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards
| Containers may explode when heated.
Acid reacts with most metals to release hydrogen gas, which can form explosive mixtures with air.

Hazardous Combustion Products
| When involved in a fire, this material may decompose and produce irritating vapors, and toxic gases (e.g., nitrogen oxides and ammonia).

5.3 Advice for firefighters

| Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
Wear positive pressure self-contained breathing apparatus (SCBA).
SMALL FIRES: Move containers from fire area if you can do it without risk.
Runoff from fire control may cause pollution.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions

| Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures

| ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Do not get water inside container.

6.2 Environmental precautions

| Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures

| Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Dike to collect large liquid spills.
A vapor suppressing foam may be used to reduce vapors.
Use water spray to reduce vapors or divert vapor cloud drift.
Neutralize residue with neutralizing agent appropriate for basic materials. Test area with litmus paper to ensure neutralization is complete.

6.4 Reference to other sections

| Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

| Handle and open container with care. Use only with adequate ventilation. Use caution when combining with water; DO NOT add water to corrosive liquid, ALWAYS add corrosive liquid to water while stirring to prevent release of heat, steam and fumes. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe mist, vapours, spray. Do not get in eyes, on skin, or on clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

Storage

| Keep container tightly closed. Store in a cool, dry, well-ventilated place. Keep away from incompatible materials. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

7.3 Specific end use(s)

| Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines

| Currently there are no applicable exposure limits established for this material.

8.2 Exposure controls

Engineering Measures/Controls

| Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

| Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face	Wear chemical splash safety goggles.
Skin/Body	Wear appropriate gloves.
Environmental Exposure Controls	Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Clear, colorless liquid with an ammonia odor.
Color	Clear, colorless.	Odor	Ammonia
Odor Threshold	Data lacking		
General Properties			
Boiling Point	156 F(68.8889 C)	Melting Point	< 20 F(< -6.6667 C)
Decomposition Temperature	Data lacking	pH	11.5 to 12
Specific Gravity/Relative Density	Data lacking	Water Solubility	Soluble
Viscosity	Data lacking	Explosive Properties	Data lacking
Oxidizing Properties:	Data lacking		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	Data lacking
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Not flammable	UEL	Not applicable
LEL	Not applicable	Autoignition	Not applicable
Flammability (solid, gas)	Not relevant.		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable

10.3 Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4 Conditions to avoid

Excess heat.

10.5 Incompatible materials

This product would be incompatible with strong organic and inorganic acids, acrolein,

dimethyl sulfate, halogens, fluorine, iodine, nitromethane, oleum, beta-propiolactone, propylene oxide, silver compounds including nitrate, oxide and permanganate, and lead and zinc salts.

10.6 Hazardous decomposition products

Combustion: Thermal decomposition of this product can generate nitrogen oxides and ammonia. Hydrolysis: None known.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Components		
Impurities, Stabilizers, etc...		
Ammonium hydroxide (< 10%)	1336-21-6	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 350 mg/kg; *Gastrointestinal*:**Other changes**; *Liver*:**Other changes**; *Kidney, Ureter, and Bladder*:**Other changes**; Inhalation-Human TCLo • 408 ppm; *Lungs, Thorax, or Respiration*:**Fibrosis, focal (pneumoconiosis)**; *Lungs, Thorax, or Respiration*:**Acute pulmonary edema**; **Irritation:** Eye-Rabbit • 44 µg • Severe irritation

GHS Properties	Classification
Acute toxicity	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Aspiration Hazard	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Carcinogenicity	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Germ Cell Mutagenicity	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Skin corrosion/Irritation	**EU/CLP** • Skin Corrosion 1B **OSHA HCS 2012** • Skin Corrosion 1C
Skin sensitization	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
STOT-RE	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
STOT-SE	**EU/CLP** • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation **OSHA HCS 2012** • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
Toxicity for Reproduction	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Respiratory sensitization	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Serious eye damage/Irritation	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Serious Eye Damage 1

Potential Health Effects

Inhalation

Acute (Immediate) May cause respiratory irritation. May cause corrosive burns - irreversible damage.

Chronic (Delayed) Repeated or prolonged exposure to corrosive fumes may cause bronchial irritation with

chronic cough.

Skin

Acute (Immediate) | Causes severe skin burns and eye damage.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive materials will cause dermatitis.

Eye

Acute (Immediate) | Causes serious eye damage.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive materials or fumes may cause conjunctivitis.

Ingestion

Acute (Immediate) | May cause irreversible damage to mucous membranes.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive materials or fumes may cause gastrointestinal distrubances.

Key to abbreviations

LD = Lethal Dose

TC = Toxic Concentration

Section 12 - Ecological Information

12.1 Toxicity

| Material data lacking.

12.2 Persistence and degradability

| Material data lacking.

12.3 Bioaccumulative potential

| Material data lacking.

12.4 Mobility in Soil

| Material data lacking.

12.5 Results of PBT and vPvB assessment

| No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects

| No studies have been found.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

Product waste | Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste | Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	NDA	Not Regulated	NDA	NDA	NDA

TDG	NDA	Not Regulated	NDA	NDA	NDA
IMO/IMDG	NDA	Not Regulated	NDA	NDA	NDA
IATA/ICAO	NDA	Not Regulated	NDA	NDA	NDA

14.6 Special precautions for user | None specified.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | Data lacking.

Section 15 - Regulatory Information

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

SARA Hazard Classifications | Acute

State Right To Know				
Component	**CAS**	**MA**	**NJ**	**PA**
Ammonium hydroxide	1336-21-6	Yes	Yes	Yes

Inventory						
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**China**	**EU EINECS**	**EU ELNICS**
Ammonium hydroxide	1336-21-6	Yes	No	Yes	Yes	No

Inventory (Con't.)		
Component	**CAS**	**TSCA**
Ammonium hydroxide	1336-21-6	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

- Ammonium hydroxide — 1336-21-6 — E

Canada - WHMIS - Ingredient Disclosure List

- Ammonium hydroxide — 1336-21-6 — 1 %

Environment

Canada - CEPA - Priority Substances List

- Ammonium hydroxide — 1336-21-6 — Not Listed

China

Environment

China - Ozone Depleting Substances - First Schedule

- Ammonium hydroxide — 1336-21-6 — Not Listed

China - Ozone Depleting Substances - Second Schedule

- Ammonium hydroxide — 1336-21-6 — Not Listed

China - Ozone Depleting Substances - Third Schedule

• Ammonium hydroxide	1336-21-6	Not Listed

Other

China - Annex I & II - Controlled Chemicals Lists

• Ammonium hydroxide	1336-21-6	Not Listed

China - Dangerous Goods List

• Ammonium hydroxide	1336-21-6	Not Listed

China - Export Control List - Part I Chemicals

• Ammonium hydroxide	1336-21-6	Not Listed

Europe

Other

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification

• Ammonium hydroxide	1336-21-6	C; R34 N; R50

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

• Ammonium hydroxide	1336-21-6	5%<=C<10%: Xi; R:36/37/38 10%<=C: C; R:34

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

• Ammonium hydroxide	1336-21-6	C N R:34-50 S:(1/2)-26-36/37/39-45-61

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

• Ammonium hydroxide	1336-21-6	B

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

• Ammonium hydroxide	1336-21-6	S:(1/2)-26-36/37/39-45-61

Germany

Environment

Germany - TA Luft - Types and Classes

• Ammonium hydroxide	1336-21-6	Not Listed

Germany - Water Classification (VwVwS) - Annex 1

• Ammonium hydroxide	1336-21-6	Not Listed

Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes

• Ammonium hydroxide	1336-21-6	ID Number 211, hazard class 2 - hazard to waters

Germany - Water Classification (VwVwS) - Annex 3

• Ammonium hydroxide	1336-21-6	Not Listed

Other

Germany - Specifically Regulated Chemicals in TRGS

• Ammonium hydroxide	1336-21-6	Not Listed

Portugal

Other

Portugal - Prohibited Substances

• Ammonium hydroxide	1336-21-6	Not Listed

United Kingdom

Environment

United Kingdom - Pollution Inventory - Schedule 1 - Thresholds for Releases to Air

• Ammonium hydroxide	1336-21-6	Not Listed

Other

United Kingdom - Workplace Exposure Limits (WELs) - Substances in Review

• Ammonium hydroxide	1336-21-6	Not Listed

United Kingdom - List of Dangerous Substances in Water

• Ammonium hydroxide	1336-21-6	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Ammonium hydroxide	1336-21-6	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Ammonium hydroxide	1336-21-6	1000 lb final RQ; 454 kg final RQ

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - EPA - Designated Generic Categories - Aqueous Ammonia

• Ammonium hydroxide	1336-21-6	NH3 Equiv. Wt. % = 48.59

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Ammonium hydroxide	1336-21-6	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Ammonium hydroxide	1336-21-6	Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Ammonium hydroxide	1336-21-6	

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Ammonium hydroxide	1336-21-6	Not Listed

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Relevant Phrases (code & full text)

H400 - Very toxic to aquatic life

R34 - Causes burns.
R50 - Very toxic to aquatic organisms.

Last Revision Date 22/December/2014

Preparation Date 22/December/2014

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Key to abbreviations

NDA = No data available