Safety Data Sheet

Version 4.0 SDS Number 300000002997
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1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Airopak ®
Product Use Description	:	General Industrial
Manufacturer/Importer/Distributor	:	Versum Materials US, LLC 7201 Hamilton Blvd. Allentown, PA 18195-1501 Exporter EIN No.475632014 www.versummaterials.com
Telephone	:	(610)481-4911
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2. HAZARDS IDENTIFICATION

GHS classification

Oxidizing gases - Category 1
Gases under pressure - Compressed gas.
Acute toxicity - Inhalation Category 2
Skin corrosion - Category 1A
Serious Eye Damage - Category 1

GHS label elements

Hazard pictograms/symbols

Signal Word: Danger

Hazard Statements:

H270:May cause or intensify fire; oxidiser.
H280:Contains gas under pressure; may explode if heated.

H314:Causes severe skin burns and eye damage.
H330:Fatal if inhaled.
Extremely reactive.
EUH071:Corrosive to the respiratory tract.

Precautionary Statements:

Prevention	:	P220:Keep away from clothing and other combustible materials. P244:Keep valves and fittings free from oil and grease. P260:Do not breathe dust/fume/gas/mist/vapours/spray. P264:Wash hands thoroughly after handling. P271:Use only outdoors or in a well-ventilated area P280:Wear protective gloves/protective clothing/eye protection/face protection.
Response	:	P301+P330+P331 :IF SWALLOWED: rinse mouth. Do NOT induce vomiting. P304+P340 :IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. 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 CENTRE/doctor.
Storage	:	P403+P233:Store in a well-ventilated place. Keep container tightly closed.

Hazards not otherwise classified

Sharp, pungent odor that can be detected at very low levels.
Can cause severe burns if inhaled or upon skin contact.
Use a back flow preventative device in the piping.
Use only with equipment of compatible materials of construction, rated for cylinder pressure.
Use only with equipment cleaned for oxygen service and rated for cylinder pressure.
Open valve slowly.
Close valve after each use and when empty.
Extremely reactive.
Corrosive to respiratory tract
High pressure, oxidizing gas.
Vigorously accelerates combustion.
Keep oil, grease, and combustibles away.
May react violently with combustible materials.
Extremely reactive.
May react violently with water.
Do not breathe gas.
Corrosive to eyes, respiratory system and skin.
Wear self-contained breathing apparatus and protective suit.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)

Fluorine	7782-41-4	20 %
Nitrogen	7727-37-9	80 %

Concentration is nominal. For the exact product composition, please refer to technical specifications.

4. FIRST AID MEASURES

General advice : The potential for hydrogen fluoride formation exists with every exposure, therefore its toxicity must also be considered. If additional information is needed consult the Safetygram – "Medical treatment Protocol for Hydrofluoric Acid Burns" available on the company website.
Prompt medical attention is required in all cases of exposure. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact : Seek medical treatment immediately. Irrigate eye intermittently for 20 minutes with an aqueous calcium gluconate 1% solution, if available. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Keep eye wide open while rinsing.

Skin contact : A physician should be consulted for all exposures . Alternative treatment is to soak the affected areas in an iced 0.13% water solution (1:750) of Zephiran® chloride (benzalkonium chloride solution, NF). Use ice cubes, not shaved ice, to prevent frostbite. If soaking is impractical, soaks or compresses may be used. (Do not us Zephiran® for burns of the eye.) Burns covering an area greater than eight square inches require immediate treatment by a physician. If immersion is impractical, soaked compresses of the same solution should be applied to the area. Immersion or compresses must be used continuously for two hours. With gloved hand apply 2.5% calcium gluconate gel to the burn area. Burns covering an area greater than 25 square centimeters (4 square inches) require immediate treatment by a medical doctor. Remove contaminated clothing. Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and badly. Flush with copious amounts of water until treatment is available.

Ingestion : Ingestion is not considered a potential route of exposure.

Inhalation : As soon as possible give 2.5% to 3% calcium gluconate solution by nebulizer. Move to fresh air. In case of shortness of breath, give oxygen. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Mouth to mouth resuscitation is not recommended. If unconscious place in recovery position and seek medical advice. Consult a doctor.

Most important symptoms/effects - acute and delayed : Acute or chronic respiratory conditions.

Immediate Medical Attention and Special Treatment

Treatment	:	Individuals with anemia or pre-existing kidney, heart, liver or nervous system disease may be at increased risk. If pain persists after above topical treatments, it may be necessary to inject 5% aqueous calcium gluconate beneath, around and into the burn area. This will more likely be necessary in the treatment of extensive burns or small burns where treatment has been delayed. Do not use local anesthetics. Resolution of pain is means to determine effective medical treatment. The patient should be observed for clinical symptoms of hypocalcemia following ingestion or inhalation or following extensive burns. Serum calcium, potassium and magnesium determinations must be performed immediately and periodically to monitor for hypocalcemia and electrolyte imbalance. EKGs should be done immediately and periodically to monitor for arrhythmias, hypocalcemia and hyperkalemia. If additional information is needed, consult the Safetygram "Treatment Protocol for Hydrofluoric Acid Burns available on our website. If exposed or concerned: Get medical attention/advice.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	None.
Extinguishing media which must not be used for safety reasons.	:	Most common media will react with product and wil l not extinguish the fire.
Specific hazards	:	Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Oxidant. Strongly supports combustion. May react violently with combustible materials. Some materials which are noncombustible in air may burn in the presence of an oxidizer. Use of water may result in the formation of very toxic aqueous solutions. Move away from container and cool with water from a protected position. Keep adjacent cylinders cool by spraying with large amounts of water until the fire burns itself out.
Special protective equipment for fire-fighters	:	Use self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures	:	Evacuate personnel to safe areas. Use self-contained breathing apparatus or positive pressure air line with mask and escape pack in areas where concentration is unknown or above the exposure limits. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ventilate the area.
Environmental precautions	:	Should not be released into the environment. Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	:	Ventilate the area. Approach suspected leak areas with caution.
Additional advice	:	Large releases may require considerable downwind evacuation. If possible, stop flow of product. If leak is from cylinder or cylinder valve, call the emergency telephone number. If the leak is in the user's system, close the

cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs. Increase ventilation to the release area and monitor concentrations.

7. HANDLING AND STORAGE

Handling

Carbon steel, stainless steel or copper are suitable materials of construction. Any equipment that uses this product must be first thoroughly cleaned, rinsed with solvent, and dried. The equipment should then be treated (passivated) with increasing concentrations and/or pressures of fluorine as a final cleaning process. This treatment or passivation process, will allow the fluorine to react with and eliminate any impurities without ignition of equipment and will impart a protective fluoride surface layer. (Contact your supplier for proper passivation procedures.) Monel and nickel are preferred materials for high temperature applications. Inexperienced or first time users of product should contact supplier for additional information on the storage, handling and use of this product. Lead is the preferred gasket material. Systems that contain moisture may form hydrofluoric acid. To initially limit the amount of gas in the system introduce it in steps by opening and closing the valves in succession. Systems that use fluorine may, over time, become contaminated with powder residue. This material is composed of metal fluorides and should be handled with caution as it may contain small amounts of hydrofluoric acid. Further information on Fluorine can be found on our web site at http//www.airproducts.com/productstewardship/ or by contacting supplier. Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shock. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Keep container valve outlets clean and free from contaminates particularly oil and water. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis. Installation of a cross purge assembly between the cylinder and the regulator is recommended. When returning cylinder install valve outlet cap or plug leak tight. Never permit oil, grease, or other readily combustible substances to come into contact with valves or containers containing oxygen or other oxidants. Do not use rapidly opening valves (e.g. ball valves). Open valve slowly to avoid pressure shock. Never pressurize the entire system at once. Use only with equipment cleaned

for oxygen service and rated for cylinder pressure. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F).

Storage

Open/close valve slowly. Close when not in use. Wear Safety Eye Protection. Check Safety Data Sheet before use. Use a back flow preventative device in the piping. Use only with equipment of compatible materials of construction, rated for cylinder pressure. Use only with equipment cleaned for oxygen service and rated for cylinder pressure. Open valve slowly. Close valve after each use and when empty. Read and follow the Safety Data Sheet (SDS) before use. Extremely reactive. Corrosive to respiratory tract Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Full containers should be stored so that oldest stock is used first. Keep containers tightly closed in a cool, well-ventilated place. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Local codes may have special requirements for toxic gas storage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Keep container tightly closed in a dry and well-ventilated place. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Display "No Smoking or Open Flames" signs in the storage areas. Return empty containers in a timely manner. Flammable storage areas should be separated from oxygen and other oxidizers by a minimum distance of 20 ft. (6.1 m.) or by a barrier of non-combustible material at least 5 ft. (1.5 m.) high, having a fire resistance rating of at least 1/2 hour.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance whit local regulations. Keep away from combustible material. Where necessary containers containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition. Segregate from flammable gases and other flammable materials in store.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

Respiratory protection	:	Use self-contained breathing apparatus or positive pressure air line with mask and escape pack in areas where concentration is unknown or above the exposure limits. Users of breathing apparatus must be trained.
Hand protection	:	Sturdy work gloves are recommended for handling cylinders. Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Eye protection	:	Safety glasses recommended when handling cylinders. A full faceshield should be worn in addition to safety glasses when connecting, disconnecting or opening cylinders.

Skin and body protection	:	Direct contact with high concentrations of this p roduct can react with and may ignite most materials used for personal protective eq Loose fitting leather gloves and jacket when connecting, disconnecting or opening cylinder valve. Safety shoes are recommended when handling cylinders. Encapsulated chemical protective suit in emergency situations.
Special instructions for protection and hygiene	:	Ensure adequate ventilation, especially in confined areas. Provide good ventilation and/or local exhaust to prevent accumulation of concentrations above exposure limits. Gloves must be clean and free of oil and grease.

Exposure limit(s)

Fluorine	Time Weighted Average (TWA): ACGIH	1 ppm	-
Fluorine	Short Term Exposure Limit (STEL): ACGIH	2 ppm	-
Fluorine	Recommended exposure limit (REL): NIOSH	0.1 ppm	0.2 mg/m3
Fluorine	Permissible exposure limit: OSHA Z1	0.1 ppm	0.2 mg/m3
Fluorine	Time Weighted Average (TWA): OSHA Z1A	0.1 ppm	0.2 mg/m3
Fluorine	Time Weighted Average (TWA) Permissible Exposure Limit (PEL): US CA OEL	0.1 ppm	0.2 mg/m3
Fluorine	Time Weighted Average (TWA): OSHA Z2	-	2.5 mg/m3
Fluorine	Time Weighted Average (TWA): TN OEL	0.1 ppm	0.2 mg/m3

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Compressed gas. Colorless gas
Odor	:	Pungent. Irritating.
Odor	:	Mixture contains one or more component(s) which have the following odor: No odor warning properties. Pungent.
Odor threshold	:	No data available.
pH	:	Not applicable.
Melting point/range	:	No data available.
Boiling point/range	:	-317 °F (-194 °C)
Flash point	:	Not applicable.
Evaporation rate	:	Not applicable.
Flammability (solid, gas)	:	Refer to product classification in Section 2
Upper/lower explosion/flammability limit	:	No data available.

Vapor pressure	:	No data available.
Water solubility	:	Reacts violently with water.
Relative vapor density	:	No data available.
Relative density	:	1.0359 (air = 1) Lighter or similar to air.
Partition coefficient (n-octanol/water)	:	Not applicable.
Auto-ignition temperature	:	No data available.
Decomposition temperature	:	No data available.
Viscosity	:	Not applicable.
Molecular Weight	:	30 g/mol

10. STABILITY AND REACTIVITY

Chemical Stability	:	Stable under normal conditions.
Conditions to avoid	:	No data available.
Materials to avoid	:	Water. Brass. Viton, Buna-N or Neoprene elastomers. Alcohols. Reacts energetically with water. Reaction with water or contaminants or excessive heat may result in sufficient pressure to burst container. Flammable materials. Organic materials. Avoid oil, grease and all other combustible materials.
Hazardous decomposition products	:	No data available.
Possibility of hazardous Reactions/Reactivity	:	Can react with water and form oxygen difluoride and hydrogen oxyfluoride.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Likely routes of exposure

Effects on Eye	:	Irritating to eyes. Causes severe eye burns.
Effects on Skin	:	Causes skin irritation. Causes skin burns.

Inhalation Effects	:	May be fatal if inhaled. Irritating to respiratory system. Can cause severe lung damage. Delayed adverse effects possible. Prolonged exposure to small concentrations may result in pulmonary edema. Delayed fatal pulmonary edema possible.
Ingestion Effects	:	No data available.
Symptoms	:	No data available.

Acute toxicity

Acute Oral Toxicity	:	No data is available on the product itself.
Inhalation	:	LC50 (1 h) : 925 ppm Method : ISO TC58 (Calcul)/ATE
Acute Dermal Toxicity	:	No data is available on the product itself.
Skin corrosion/irritation	:	No data available.
Serious eye damage/eye irritation	:	No data available.
Sensitization.	:	No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity	:	No data available.
Reproductive toxicity	:	No data is available on the product itself.
Germ cell mutagenicity	:	No data is available on the product itself.
Specific target organ systemic toxicity (single exposure)	:	No data available.
Specific target organ systemic toxicity (repeated exposure)	:	No data available.
Aspiration hazard	:	No data available.

Delayed and Immediate Effects and Chronic Effects from Short and Long Term Exposure

Chronic fluoride exposure may cause bone or joint changes in humans (fluorosis).Acute or chronic respiratory conditions.
Asthma.

Animals exposed to hydrogen fluoride have exhibited kidney, lung, heart and liver damage., Direct toxicity of this

material may be accompanied by fluoride absorption and systemic depletion of calcium ion, an essential electrolyte. Chronic exposure may cause abnormal calcification in the bone structure (fluorosis) due to low level systemic absorption offluoride. Fluoride toxicity from acute inhalation exposure to this product is unlikely due to the noxious and corrosive nature of this gas. Death from respiratory tract damage would likely occur before significant amounts of fluoride are absorbed., The potential for hydrogen fluoride formation exists with every exposure; therefore, its toxicity must also be considered.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity	:	May cause pH changes in aqueous ecological systems.
Toxicity to other organisms	:	No data available.

Persistence and degradability

Biodegradability	:	No data is available on the product itself.
Mobility	:	Because of its high volatility, the product is unlikely to cause ground pollution.
Bioaccumulation	:	Refer to Section 9 "Partition Coefficient (n-octanol/water)".

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	:	The flow rate of the gas must be controlled to prevent overheating the disposal unit. Do not use water. A five to fifteen percent (by weight in water) solution of potassium hydroxide is a common liquid scrubbing medium. Do not attempt to dispose of residual or unused quantities. Small quantities may be disposed by slowly flowing gas in to a caustic liquid or solid scrubber. Soda lime, a sodium hydroxide-calcium oxide mixture, or calcium carbonate are suitable solid scrubber media. Do not use activated carbon or charcoal as a disposal media. Doing so may cause an explosive reaction. In accordance with local and national regulations. Contact supplier if guidance is required. Return unused product in original cylinder to supplier. Must not be discharged to atmosphere.
Contaminated packaging	:	Return cylinder to supplier.

14. TRANSPORT INFORMATION

DOT

UN/ID No.	:	UN3306
Proper shipping name	:	Compressed gas, toxic, oxidizing, corrosive, n.o.s., (Fluorine, Nitrogen)
Class or Division	:	2.3
Label(s)	:	2.3 (5.1, 8)
PIH Zone	:	B
RQ Substance	:	Yes

Marine Pollutant : No

* NOTE: This product contains a USDOT Hazardous Substance and will meet the Reportable Quantity definition when shipped to, from, or within the United States, in the amount specified in 49CFR 172.101 Appendix A.

IATA

Transport Forbidden

IMDG

UN/ID No.	:	UN3306
Proper shipping name	:	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S., (Fluorine, Nitrogen)
Class or Division	:	2.3
Label(s)	:	2.3 (5.1, 8)
RQ Substance	:	Yes
Marine Pollutant	:	No

* NOTE: This product contains a USDOT Hazardous Substance and will meet the Reportable Quantity definition when shipped to, from, or within the United States, in the amount specified in 49CFR 172.101 Appendix A.

TDG

UN/ID No.	:	UN3306
Proper shipping name	:	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S., (Fluorine, Nitrogen)
Class or Division	:	2.3
Label(s)	:	2.3 (5.1, 8)
RQ Substance	:	Yes
Marine Pollutant	:	No

* NOTE: This product contains a USDOT Hazardous Substance and will meet the Reportable Quantity definition when shipped to, from, or within the United States, in the amount specified in 49CFR 172.101 Appendix A.

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

15. REGULATORY INFORMATION

Toxic Substance Control Act (TSCA) 12(b) Component(s):

None.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on Inventory.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.
Japan	ENCS	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification
Acute Health Hazard Fire Hazard. Sudden Release of Pressure Hazard.

EPA SARA Title III Section 313 (40 CFR 372) Component(s) above 'de minimus' level
Fluorine

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

NFPA Rating

Health	:	4
Fire	:	0
Instability	:	0
Special	:	OX

HMIS Rating

Health	:	3
Flammability	:	0
Physical hazard	:	3

Prepared by	:	Versum Materials, Product Regulatory Department
Telephone	:	(610)481-4911
Preparation Date	:	03/18/2017

For additional information, please visit Versum Materials' Product Stewardship web site.
http://www.versummaterials.com/productstewardship/