

CID 944



# Nitric acid

## Safety and Hazards ?

### 1.1 Hazards Identification ? ↗

#### 1.1.1 GHS Classification ? ↗

Showing 1 of 6 [View More](#) ↗

<b>Pictogram(s)</b>	  Oxidizer      Corrosive
<b>Signal</b>	<b><u>Danger</u></b>
<b>GHS Hazard Statements</b>	H272: May intensify fire; oxidizer [ <b><u>Danger</u></b> Oxidizing liquids; Oxidizing solids] H314: Causes severe skin burns and eye damage [ <b><u>Danger</u></b> Skin corrosion/irritation]
<b>Precautionary Statement Codes</b>	P210, P220, P221, P260, P264, P280, P301+P330+P331, P303+P361+P353, P304+P340, P305+P351+P338, P310, P321, P363, P370+P378, P405, and P501 (The corresponding statement to each P-code can be found at the <a href="#">GHS Classification</a> page.)

[▶ EU REGULATION \(EC\) No 1272/2008](#)

#### 1.1.2 Hazard Classes and Categories ? ↗

Showing 2 of 6 [View More](#) ↗

Ox. Liq. 2

Skin Corr. 1A

[▶ EU REGULATION \(EC\) No 1272/2008](#)


Ox. Liq. 2 (98.51%)

Met. Corr. 1 (10.89%)

Skin Corr. 1A (99.93%)

[▶ European Chemicals Agency \(ECHA\)](#)

#### 1.1.3 NFPA Hazard Classification ? ↗


<b>NFPA 704 Diamond</b>	 4-0-0-OX
<b>NFPA Health Rating</b>	4 - Materials that, under emergency conditions, can be lethal.
<b>NFPA Fire Rating</b>	0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.
<b>NFPA Instability Rating</b>	0 - Materials that in themselves are normally stable, even under fire conditions.
<b>NFPA Specific Notice</b>	OX - Oxidizer: Materials that possess oxidizing properties.

► [Occupational Safety and Health Administration \(OSHA\)](#)

### 1.1.4 EPA Safer Chemical



Chemical: Nitric acid (aqueous)

 Yellow triangle - The chemical has met Safer Choice Criteria for its functional ingredient-class, but has some hazard profile issues. Specifically, a chemical with this code is not associated with a low level of hazard concern for all human health and environmental endpoints. (See [Safer Choice Criteria](#)). While it is a best-in-class chemical and among the safest available for a particular function, the function fulfilled by the chemical should be considered an area for safer chemistry innovation.

► [EPA Safer Choice](#)

### 1.1.5 Substance of Very High Concern (SVHC)



OSHA Highly Hazardous Chemicals, Toxics and Reactives

Chemical: Nitric Acid (94.5% by weight or greater)

Threshold: 500 [lb]

Note: Nitric Acid (94.5% by weight or greater) in quantities at or above 500lb presents a potential for a catastrophic event as a toxic or reactive highly hazardous chemical.

► [Occupational Safety and Health Administration \(OSHA\)](#)

### 1.1.6 Health Hazards



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death. Reaction with [water](#) or moist air may release toxic, corrosive or flammable gases. Reaction with [water](#) may generate much heat that will increase the concentration of fumes in the air. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution [water](#) may be corrosive and/or toxic and cause pollution. (ERG, 2016)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).*

► [CAMEO Chemicals](#)

### 1.1.7 Fire Hazards



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. For UN1796, UN1826, UN2031 at high concentrations and for UN2032, these may act as oxidizers, also consult ERG Guide 140. Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.). Substance may react with [water](#) (some violently), releasing corrosive and/or toxic gases and runoff. Contact with metals may evolve flammable [hydrogen](#) gas. Containers may explode when heated or if contaminated with [water](#). (ERG, 2016)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).*

▶ [CAMEO Chemicals](#)

Not combustible but enhances combustion of other substances. Gives off irritating or toxic fumes (or gases) in a fire. Risk of fire and explosion on contact with incompatible substances. See Chemical Dangers.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

Corrosives, Reactive - 2nd degree

▶ [NJDOH RTK Hazardous Substance List](#)

## 1.1.8 Fire Potential



Contact of concentrated nitric acid with combustible materials may increase the hazard from fire and may lead to an explosion.

*National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-107*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.1.9 Skin, Eye, and Respiratory Irritations



Nitric acid is a potent irritant to the eyes and mucous membranes.

*American Conference of Governmental Industrial Hygienists. Documentation of the TLV's and BEI's with Other World Wide Occupational Exposure Values. CD-ROM Cincinnati, OH 45240-4148 2010.*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.2 Safety and Hazard Properties



### 1.2.1 Acute Exposure Guideline Levels (AEGLs)



#### 1.2.1 AEGLs Table



AEGLs	10 min	30 min	60 min	4 hr	8 hr
AEGL 1: Notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure (Unit: ppm)	0.16	0.16	0.16	0.16	0.16
AEGL 2: Irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape (Unit: ppm)	43	30	24	6.0	3.0

AEGL 3: Life-threatening health effects or death (Unit: ppm)	170	120	92	23	11
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▶ [EPA Acute Exposure Guideline Levels \(AEGLs\)](#)

## 1.2.2 AEGLs Notes



AEGLs Status: Final

▶ [EPA Acute Exposure Guideline Levels \(AEGLs\)](#)

## 1.2.2 Flammable Limits



Not combustible

*Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

### Flammability

Noncombustible Liquid, but increases the flammability of combustible materials.

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

## 1.2.3 OSHA Standards



Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 2 ppm (5 mg/cu m).

*29 CFR 1910.1000 (USDOL); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 5, 2011: <https://www.ecfr.gov>*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Vacated 1989 OSHA PEL TWA 2 ppm (5 mg/cu m); STEL 4 ppm (10 mg/cu m) is still enforced in some states.

*NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 368*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.2.4 NIOSH Recommendations



Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 2 ppm (5 mg/cu m).

*NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 4 ppm (10 mg/cu m).

*NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.3 First Aid Measures

### 1.3.1 First Aid

**Eye:** If this chemical contacts the eyes, immediately wash the eyes with large amounts of [water](#), occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. **Skin:** If this chemical contacts the skin, immediately flush the contaminated skin with [water](#). If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with [water](#). Get medical attention promptly. **Breathing:** If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. **Swallow:** If this chemical has been swallowed, get medical attention immediately. (NIOSH, 2016)

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). <https://www.cdc.gov/niosh/npg> (accessed August 2016).*

▶ [CAMEO Chemicals](#)

([See procedures](#))

**Eye:**Irrigate immediately - If this chemical contacts the eyes, immediately wash (irrigate) the eyes with large amounts of [water](#), occasionally lifting the lower and upper lids. Get medical attention immediately.

**Skin:**[Water](#) flush immediately - If this chemical contacts the skin, immediately flush the contaminated skin with [water](#). If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with [water](#). Get medical attention promptly.

**Breathing:**Respiratory support

**Swallow:**Medical attention immediately - If this chemical has been swallowed, get medical attention immediately.

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

### 1.3.2 Inhalation First Aid

Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.3.3 Skin First Aid

Wear protective gloves when administering first aid. First rinse with plenty of [water](#) for at least 15 minutes, then remove contaminated clothes and rinse again. Refer immediately for medical attention .

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.3.4 Eye First Aid

Rinse with plenty of [water](#) for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.3.5 Ingestion First Aid



Rinse mouth. Give nothing to drink. Do NOT induce vomiting. Refer immediately for medical attention.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.4 Fire Fighting



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: Note: Some foams will react with the material and release corrosive/toxic gases. SMALL FIRE: CO2 (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam. LARGE FIRE: [Water](#) spray, fog or alcohol-resistant foam. Move containers from fire area if you can do it without risk. Use [water](#) spray or fog; do not use straight streams. Dike fire-control [water](#) for later disposal; do not scatter the material. FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get [water](#) inside containers. Cool containers with flooding quantities of [water](#) until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. (ERG, 2016)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).*

▶ [CAMEO Chemicals](#)

Use [water](#) in large amounts, [carbon dioxide](#). NO powder, foam. In case of fire: keep drums, etc., cool by spraying with [water](#). NO direct contact of the substance with [water](#).

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.4.1 Fire Fighting Procedures



Approach fire from upwind to avoid hazardous vapors & toxic decomposition products. Use flooding quantities of [water](#) as spray or fog. Use [water](#) spray to keep fire-exposed containers cool. Extinguish fire using agent suitable for surrounding fire.

*National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-107*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

If material /is/ involved in /a/ fire, extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use [water](#) in flooding quantities as fog. Cool all affected containers with flooding quantities of [water](#). Apply [water](#) from as far a distance as possible.

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 630*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

If material /is/ involved in /a/ fire, use [water](#) in flooding quantities as fog. Cool all affected containers with flooding quantities of [water](#). Apply [water](#) from as far a distance as possible. /Nitric acid, red, fuming/

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.5 Accidental Release Measures



### 1.5.1 Isolation and Evacuation



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids. SPILL: See ERG Table 1 - Initial Isolation and Protective Action Distances on the UN/NA 2032 datasheet. FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2016)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).*

▶ [CAMEO Chemicals](#)

### 1.5.2 Spillage Disposal



Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT absorb in saw-dust or other combustible absorbents. Ventilation. Collect leaking liquid in sealable containers. Cautiously neutralize remainder with [sodium carbonate](#). Then wash away with plenty of [water](#).

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.5.3 Cleanup Methods



Spilled nitric acid must not be absorbed with sawdust or other flammable material (because of the fire hazard); instead, its spread must be prevented by the construction of earth barriers.

*Thiemann M et al; Ullmann's Encyclopedia of Industrial Chemistry 7th ed. (2010). NY, NY: John Wiley & Sons; Nitric Acid, Nitrous Acid, and Nitrogen Oxides. Online Posting Date: June 15, 2000*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1. Ventilate area of spill or leak. 2. Flush with copious quantities of [water](#) & neutralize with alkaline material (such as soda ash, lime, etc).

*Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Environmental considerations: Air spill: Apply [water](#) spray or mist to knock down vapors. Vapor knockdown [water](#) is corrosive or toxic and should be diked for containment.

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Environmental considerations: Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Dike surface flow using soil, sand bags, foamed [polyurethane](#), or foamed concrete. Absorb bulk

liquid with fly ash or cement powder. Neutralize with agricultural lime (CaO), crushed limestone, or [sodium bicarbonate](#).

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Environmental considerations: [Water](#) spill: Neutralize with agricultural lime ([slaked lime](#)), crushed limestone, or [sodium bicarbonate](#). Air spill: Apply [water](#) spray or mist to knock down vapors. Vapor knockdown [water](#) is corrosive or toxic and should be diked for containment.

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.5.4 Disposal Methods



SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or [water](#); effects on animal and plant life; and conformance with environmental and public health regulations.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Disposal of waste nitric acid into sewers or watercourses should not be permitted until the pH of the soln is /SRP: adjusted/ to a range of 5.5-8.5.

*International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1444*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Recovering: [Sodium carbonate-calcium hydroxide](#) is added to form the neutral soln of [nitrate](#) of [sodium](#) and [calcium](#). This soln can be discharged after dilution with [water](#). Also, nitric acid can be recovered and reused. Recommendable methods: Neutralization & discharge to sewer. Not recommendable method: Landfill. Peer-review: Prior to neutralization dilute 10 times. Beware - Potential toxic. (Peer-review conclusions of an IRPTC expert consultation (May 1985))

*United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 216*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.5.5 Preventive Measures



SRP: The scientific literature for the use of contact lenses by industrial workers is inconsistent. The benefits or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



Vapor hazard index (VHI) is defined as concn of saturated vapor divided by TLV multiplied by 1000. The dimension of the vapor hazard index is temp dependent and is an indication of vapor hazard potential. Vapor hazard index 100% nitric acid= 28= good fume cupboard required at 20 °C; 70% nitric acid= 2= extra precautions advisable in case of accidents at 20 °C.

*Pitt MJ; Chem Ind (London) 20: 804-6 (1982)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Personnel protection: Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages unless wearing appropriate personal protective equipment. Wash away any material which may have contacted the body with copious amounts of [water](#) or soap and [water](#). If material leaking (not on fire) consider evacuation from downwind area based on amount of material spilled, location and weather conditions.

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Environmental considerations: Air spill: Apply [water](#) spray or mist to knock down vapors. Vapor knockdown [water](#) is corrosive or toxic and should be diked for containment.

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Preventive Measures (Complete) data for NITRIC ACID (9 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.6 Handling and Storage



### 1.6.1 Nonfire Spill Response



Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / [Water](#)-Sensitive)]: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. A vapor-suppressing foam may be used to reduce vapors. DO NOT GET [WATER](#) INSIDE CONTAINERS. Use [water](#) spray to reduce vapors or divert vapor cloud drift. Avoid allowing [water](#) runoff to contact spilled material. Prevent entry into waterways, sewers, basements or confined areas. SMALL SPILL: Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal. (ERG, 2016)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. <https://www.phmsa.dot.gov/hazmat/outreach-training/erg> (accessed April 26, 2016).*

▶ [CAMEO Chemicals](#)

### 1.6.2 Safe Storage



Separated from combustible substances, reducing agents, bases, organic chemicals and food and feedstuffs. Cool. Dry. Keep in a well-ventilated room. Store only in original container.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.6.3 Storage Conditions



As a rule, nitric acid is stored in stainless steel tanks and transported in stainless steel containers.

*Thiemann M et al; Ullmann's Encyclopedia of Industrial Chemistry 7th ed. (2010). NY, NY: John Wiley & Sons; Nitric Acid, Nitrous Acid, and Nitrogen Oxides. Online Posting Date: June 15, 2000*

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Store in a cool, dry, well-ventilated location. Separate from alkalies, metals, organics, and other oxidizing materials.

*National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-107*

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Storage areas should be separated from other premises, well-ventilated, sheltered from sunlight and sources of heat ... should have a cement floor ... contain no substances with which ... acid might react. Large stocks ... surrounded by curbs or sills ... In the event of leakage & provisions for neutralization should be made. A fire hydrant ... should be ... outside ... storage premises. ... Electrical equipment should be of the [water](#)-proof type and resistant to acid attack. Safety lighting is desirable.

*International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1444*

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.7 Exposure Control and Personal Protection



### 1.7.1 Recommended Exposure Limit (REL)



REL-TWA (Time Weighted Average)

2 ppm (5 mg/m<sup>3</sup>)

- ▶ [Occupational Safety and Health Administration \(OSHA\)](#)

REL-STEL (Short Term Exposure Limit)

4 ppm (10 mg/m<sup>3</sup>)

- ▶ [Occupational Safety and Health Administration \(OSHA\)](#)

TWA 2 ppm (5 mg/m<sup>3</sup>) ST 4 ppm (10 mg/m<sup>3</sup>)

- ▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

### 1.7.2 Permissible Exposure Limit (PEL)



PEL-TWA (8-Hour Time Weighted Average)

2 ppm (5 mg/m<sup>3</sup>)

- ▶ [Occupational Safety and Health Administration \(OSHA\)](#)

### CAPEL-STEL (California PEL - Short Term Exposure Limit)

4 ppm (10 mg/m<sup>3</sup>)

- ▶ Occupational Safety and Health Administration (OSHA)

TWA 2 ppm (5 mg/m<sup>3</sup>) [See Appendix G](#)

- ▶ The National Institute for Occupational Safety and Health (NIOSH)

## 1.7.3 Immediately Dangerous to Life or Health (IDLH)



25 ppm (NIOSH, 2016)

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). <https://www.cdc.gov/niosh/npg> (accessed August 2016).*

- ▶ CAMEO Chemicals

25 ppm

*NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)*

- ▶ Hazardous Substances Data Bank (HSDB); Occupational Safety and Health Administration (OSHA)

25 ppm

See: [7697372](#)

- ▶ The National Institute for Occupational Safety and Health (NIOSH)

## 1.7.4 Threshold Limit Values (TLV)



8 hr Time Weighted Avg (TWA): 2 ppm; 15 min Short Term Exposure Limit (STEL): 4 ppm.

*American Conference of Governmental Industrial Hygienists; 2011 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices . Cincinnati, OH 2011, p. 44*

- ▶ Hazardous Substances Data Bank (HSDB)

2 ppm as TWA; 4 ppm as STEL.

- ▶ ILO International Chemical Safety Cards (ICSC)

### TLV-TWA (Time Weighted Average)

2 ppm [1992]

- ▶ Occupational Safety and Health Administration (OSHA)

### TLV-STEL (Short Term Exposure Limit)

4 ppm [1992]

- ▶ Occupational Safety and Health Administration (OSHA)

## 1.7.5 Other Standards Regulations and Guidelines



Emergency Response Planning Guidelines (ERPGs) for nitric acid WFNA:

ERPG	Maximum Airborne Concentration
The ERPG-1: The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.	1 ppm (Odor should be detectable near ERPG-1)
The ERPG-2: The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.	6 ppm
The ERPG-3: The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.	78 ppm

*American Industrial Hygiene Association. 2010 Emergency Response Planning Guidelines (ERPG) Workplace Environmental Exposure Level (WEEL). American Industrial Hygiene Association Guideline Foundation. Fairfax, VA 2010., p. 26*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.7.6 Inhalation Risk



A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20 °C.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.7.7 Effects of Short Term Exposure



The substance is corrosive to the eyes, skin and respiratory tract. Corrosive on ingestion. Inhalation may cause asthma-like reactions (RADS). Exposure could cause asphyxiation due to swelling in the throat. Inhalation of high concentrations may cause pneumonitis and lung oedema.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.7.8 Effects of Long Term Exposure



Repeated or prolonged inhalation may cause effects on the teeth. This may result in tooth erosion. The substance may have effects on the upper respiratory tract and lungs. This may result in chronic inflammation of the respiratory tract and reduced lung function. Mists of this strong inorganic acid are carcinogenic to humans.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.7.9 Personal Protective Equipment (PPE)



Skin: Wear appropriate personal protective clothing to prevent skin contact. Eyes: Wear appropriate eye protection to prevent eye contact. Wash skin: The worker should immediately wash the skin when it becomes contaminated. Remove: Work clothing that becomes wet or significantly contaminated should be removed and replaced. Change: No recommendation is made specifying the need for the worker to change clothing after the work shift. Provide: Eyewash fountains should be provided (when concentration is pH<2.5) in areas where there is any possibility that workers could

be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. Facilities for quickly drenching the body should be provided (when concentration is pH<2.5) within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (NIOSH, 2016)

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). <https://www.cdc.gov/niosh/npg> (accessed August 2016).*

▶ [CAMEO Chemicals](#)

Personnel protection: Wear appropriate chemical protective gloves, boots and goggles. Wear positive pressure self-contained breathing apparatus when fighting fires involving this material. If contact with the material /is/ anticipated, wear appropriate chemical protective clothing.

*Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 631*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Air mask; Rubber acid suit, hood, boots & gloves; Chemical goggles; Safety shower & eye bath.

*U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Respiratory protection at 250 mg/cu m or less: A chemical cartridge respirator with a full facepiece providing protection against nitric acid. A gas mask with a chin-style or a front- or back-mounted organic vapor canister providing protection against nitric acid. Any supplied-air respirator with a full facepiece, or helmet or hood. Any self-contained breathing apparatus with a full facepiece. A Type-C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode. Respiratory protection at greater than 250 mg/cu m: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type-C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

*Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Vendor recommendations concerning the protective qualities of materials are as follows: Natural rubber, [neoprene](#), nitrile, polyethylene, chlorinated polyethylene, [polyvinyl chloride](#), [viton](#) and saranex received excellent or good ratings from less than three vendors (no fair or poor ratings), good and fair ratings, with good ratings predominating, from several vendors; Butyl, nitrile/polyvinyl [chloride](#), polyurethane, [polyvinyl alcohol](#) received fair or poor ratings from less than three vendors, good and fair ratings, with fair ratings predominating, from several vendors. /Nitric acid, > 70%/

*ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.65 (1983)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Personal Protective Equipment (PPE) (Complete) data for NITRIC ACID (13 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

([See protection codes](#))

Skin: Prevent skin contact - Wear appropriate personal protective clothing to prevent skin contact.

Eyes: Prevent eye contact - Wear appropriate eye protection to prevent eye contact.

Wash skin: When contaminated

Remove: When wet or contaminated

Change: No recommendation

Provide: Eyewash (pH<2.5), Quick drench (pH<2.5)

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

## 1.7.10 Respirator Recommendations



NIOSH/OSHA

Up to 25 ppm:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*

(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

## 1.7.11 Fire Prevention



NO contact with incompatible materials: See Chemical Dangers

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.7.12 Exposure Prevention



AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.7.13 Inhalation Prevention



Use ventilation, local exhaust or breathing protection.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.7.14 Skin Prevention



Protective gloves. Protective clothing. Apron.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.7.15 Eye Prevention



Wear face shield or eye protection in combination with breathing protection.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

### 1.7.16 Ingestion Prevention



Do not eat, drink, or smoke during work.

- ▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.8 Stability and Reactivity



### 1.8.1 Air and Water Reactions



Fumes in air. Soluble in all proportions with [water](#). Dissolution in [water](#) produces heat, fumes, and spattering.

- ▶ [CAMEO Chemicals](#)

### 1.8.2 Reactive Group



Acids, Strong Oxidizing

- ▶ [CAMEO Chemicals](#)

### 1.8.3 Reactivity Alerts



Strong Oxidizing Agent

Known Catalytic Activity

Water-Reactive

[▶ CAMEO Chemicals](#)

## 1.8.1 CSL Reaction Information



CSL No	CSL00004
Reactants/Reagents	<a href="#">Acetic anhydride</a> ; NITRIC ACID
Reaction Class	Nitration
GHS Category	Explosive
Warning Message	Can explode and/or have large exotherm. Use only 1 eq. HNO3 and in high dilution.
Source Reference	User-Reported
CSL Status	Approved
Modified Date	6/29/2018

[▶ Pistoia Alliance Chemical Safety Library](#)

CSL No	CSL00008
Reactants/Reagents	NITRIC ACID; <a href="#">TERT-BUTYL CARBAZATE</a>
Reaction Class	BOCN3 formation
GHS Category	Explosive
Warning Message	Explosion during workup when half of the solvent was evaporated
Source Reference	User-Reported
CSL Status	Approved
Modified Date	6/29/2018

[▶ Pistoia Alliance Chemical Safety Library](#)

CSL No	CSL00055
Reactants/Reagents	ACETONE; NITRIC ACID
GHS Category	Explosive
Warning Message	Potentially explosive
Source Reference	User-Reported
CSL Status	Approved
Modified Date	8/7/2018

[▶ Pistoia Alliance Chemical Safety Library](#)

CSL No	CSL00067
Reactants/Reagents	<a href="#">Acetic anhydride</a> ; <a href="#">ACETIC ACID</a> ; NITRIC ACID
GHS Category	Explosive
Warning Message	Potentially explosive



Source Reference	User-Reported
CSL Status	Approved
Modified Date	8/7/2018

► [Pistoia Alliance Chemical Safety Library](#)

CSL No	CSL00068
Reactants/Reagents	METHANOL; NITRIC ACID
GHS Category	Explosive
Warning Message	Potentially explosive in the presence of polar molecules
Source Reference	User-Reported
CSL Status	Approved
Modified Date	8/7/2018

► [Pistoia Alliance Chemical Safety Library](#)

CSL No	CSL00110
Reactants/Reagents	NITRIC ACID; ACETONITRILE
Reaction Class	Nitration
GHS Category	Explosive
Warning Message	Mixtures of fuming nitric acid and <a href="#">acetoneitrile</a> are high explosives.
Source Reference	Bretherick's
CSL Status	Approved
Additional Info	Note that <a href="#">acetoneitrile</a> is one of many chemicals that can form explosive mixtures with fuming nitric acid
Modified Date	5/24/2018

► [Pistoia Alliance Chemical Safety Library](#)

## 1.8.4 Reactivity Profile



NITRIC ACID, RED FUMING is a powerful oxidizing agent and nitrating agent. Accelerates the burning of combustible material and may cause charring and then ignition of combustible materials. May ignite alcohols, amines, [ammonia](#), [beryllium](#) alkyls, boranes, [dicyanogen](#), hydrazines, hydrocarbons, [hydrogen](#), nitroalkanes, powdered metals, silanes, or thiols on contact [Bretherick 1979. p.174]. Can react violently with finely divided [antimony](#) [Pascal 10:504. 1931-34]. Reacts violently with [bromine pentafluoride](#) [Mellor 2, Supp. 1:172. 1956]. Reacts with [hydrogen selenide](#) and [hydrogen sulfide](#) with incandescence [Berichte 3:658]. Mixtures with finely divided [magnesium](#) are explosive [Pieters 1957 p. 28]. Oxidizes [magnesium phosphide](#) with incandescence [Mellor 8:842. 1946-47]. Mixtures with [acetic anhydride](#) containing over 50% nitric acid by mass may act as detonating explosives [BCISC 42:2. 1971]. An etching agent prepared with equal portions of [acetone](#), nitric acid, and 75% aqueous [acetic acid](#) exploded four hours after it was prepared and placed in a closed bottle. The explosive material may have been [tetranitromethane](#) [Chem. Eng. News 38: 56. 1960]. Reacts violently with [phosphine](#) [Edin. Roy. Soc. 13:88. 1835]. Explodes in contact with [phosphorus trichloride](#) [Comp. Rend. 28:86]. Reacts exothermically with [phthalic acid](#) or [phthalic anhydride](#) in the presence of [sulfuric acid](#) to give potentially explosive phthaloyl nitrates or nitrites or nitro derivatives of these compounds [Chem. & Ind. 20:790. 1972]. Reacts energetically with [sodium azide](#) [Mellor 8, Supp 2:315. 1967]. Reacts

with [uranium](#) with explosive violence [Katz and Rabinowitch 1951].

▶ [CAMEO Chemicals](#)

## 1.8.5 Hazardous Reactivities and Incompatibilities



Reacts violently with combustible or readily oxidizable materials such as alcohols, turpentine, [charcoal](#), organic refuse. Reacts with most metals to release [hydrogen](#) gas.

*O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1138*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Can react explosively with many reducing agents.

*Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2418*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Reacts explosively with metallic powders, carbides, cyanides, sulfides, alkalis, & turpentine.

*National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-107*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

A jet of [ammonia](#) will ignite in nitric acid vapor.

*Bretherick, L. Handbook of Reactive Chemical Hazards. 4th ed. Boston, MA: Butterworth-Heinemann Ltd., 1990, p. 1152*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Hazardous Reactivities and Incompatibilities (Complete) data for NITRIC ACID (108 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.9 Transport Information



### 1.9.1 DOT Emergency Guidelines



If ... THERE IS NO FIRE, go directly to the Table of Initial Isolation and Protective Action Distances /(see table below)/ ... to obtain initial isolation and protective action distances. IF THERE IS A FIRE, or IF A FIRE IS INVOLVED, go directly to the appropriate guide /(see guide(s) below)/ and use the evacuation information shown under PUBLIC SAFETY. /Nitric acid, fuming; Nitric acid, red fuming/

Table: Table of Initial Isolation and Protective Action Distances for Nitric acid, fuming; Nitric acid, red fuming

<b>Small Spills (from a small package or small leak from a large package)</b>		
First ISOLATE in all Directions 30 meters (100 feet)	Then PROTECT persons Downwind during DAY: 0.1 kilometers (0.1 miles)	Then PROTECT persons Downwind during NIGHT: 0.3 kilometers (0.2 miles)
<b>Large Spills (from a large package or from many small packages)</b>		
First ISOLATE in all Directions 150 meters	Then PROTECT persons Downwind	Then PROTECT persons Downwind during

(500 feet)

during DAY: 0.6 kilometers (0.4 miles)

NIGHT: 1.1 kilometers (0.7 miles)

*U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008315*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/GUIDE 157: SUBSTANCES - TOXIC AND/OR CORROSIVE (NON-COMBUSTIBLE/[WATER](#) -SENSITIVE)/ Health: TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns, or death. Reaction with [water](#) or moist air will release toxic, corrosive or flammable gases. Reaction with [water](#) may generate much heat which will increase the concentration of fumes in the air. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution [water](#) may be corrosive and/or toxic and cause pollution. /Nitric acid, fuming; Nitric acid, red fuming; Nitric acid, other than red fuming/

*U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008260-1*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/GUIDE 157: SUBSTANCES - TOXIC AND/OR CORROSIVE (NON-COMBUSTIBLE/[WATER](#) -SENSITIVE)/ Fire or Explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.). Substance will react with [water](#) (some violently), releasing corrosive and/or toxic gases. Contact with metals may evolve flammable [hydrogen](#) gas. Containers may explode when heated or contaminated with [water](#). /Nitric acid, fuming; Nitric acid, red fuming; Nitric acid, other than red fuming/

*U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008260-1*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/GUIDE 157: SUBSTANCES - TOXIC AND/OR CORROSIVE (NON-COMBUSTIBLE/[WATER](#) -SENSITIVE)/ Public Safety: CALL Emergency Response Telephone Number ... As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Nitric acid, fuming; Nitric acid, red fuming; Nitric acid, other than red fuming/

*U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008260-1*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more DOT Emergency Guidelines (Complete) data for NITRIC ACID (9 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.9.2 DOT ID and Guide



### 2032 157

▶ [DOT Emergency Response Guidebook](#)

### 2031 157 (other than red fuming)

### 2032 157 (fuming)

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

## 1.9.3 Shipping Name/ Number DOT/UN/NA/IMO



UN 2032; Nitric acid, red fuming

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 2031; Nitric acid other than red fuming, with at least 65 percent, but not more than 70 percent nitric acid; Nitric acid other than red fuming, with more than 20 percent and less than 65 percent nitric acid; Nitric acid other than red fuming with not more than 20 percent nitric acid; Nitric acid other than red fuming, with more than 70 percent nitric acid

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

IMO 8.0; Nitric acid other than red fuming, with more than 70% nitric acid; Nitric acid other than red fuming, with not more than 70% nitric acid; Nitric acid, red fuming

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.9.4 Standard Transportation Number



49 185 25; Nitrating acid, mixture (with more than 50% nitric acid)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 45; Nitrating acid, mixture (with not more than 50% nitric acid)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 54; Nitrating acid, spent

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 185 28; Nitric acid (over 40%)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 185 29; Nitric acid, fuming

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 302 42; Nitric acid, 40% or less

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.9.5 Shipment Methods and Regulations



No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

*49 CFR 171.2; U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 15, 2006: <https://www.ecfr.gov>*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.

*International Air Transport Association. Dangerous Goods Regulations. 47th Edition. Montreal, Quebec Canada. 2006., p. 224*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.

*International Maritime Organization. International Maritime Dangerous Goods Code. London, UK. 2004., p. 84,-5, 87, 89, 99*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.9.6 DOT Label



Corrosive Oxidizer Poison Inhalation Hazard

▶ [CAMEO Chemicals](#)

## 1.9.7 Packaging and Labelling



Unbreakable packaging. Put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.9.8 EC Classification



Symbol: O, C; R: 8-35; S: (1/2)-23-26-36-45; Note: B

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.9.9 UN Classification



UN Hazard Class: 8; UN Subsidiary Risks: 5.1; UN Pack Group: I

▶ [ILO International Chemical Safety Cards \(ICSC\)](#)

## 1.10 Regulatory Information



### 1.10.1 Clean Water Act Requirements



Nitric acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal [Water](#) Pollution Control Act and further regulated by the Clean [Water](#) Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and

mixtures containing this substance.

40 CFR 116.4 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.10.2 CERCLA Reportable Quantities



Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 1000 lb or 45.4 kg. The toll free number of the NRC is (800) 424-8802. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

40 CFR 302.4 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Releases of CERCLA hazardous substances are subject to the release reporting requirement of CERCLA section 103, codified at 40 CFR part 302, in addition to the requirements of 40 CFR part 355. Nitric acid is an extremely hazardous substance (EHS) subject to reporting requirements when stored in amounts in excess of its threshold planning quantity (TPQ) of 1,000 lbs.

40 CFR 355 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.10.3 FDA Requirements



Nitric acid is an indirect food additive for use only as a component of adhesives.

21 CFR 175.105 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: <https://www.ecfr.gov>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

## 1.11 Other Safety Information



### 1.11.1 Toxic Combustion Products



May give off poisonous oxides of nitrogen & acid fumes when heated in fires.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

### 1.11.2 Other Hazardous Reactions



... Will react with [water](#) or steam to produce heat and toxic and corrosive fumes.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 2644

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

### 1.11.3 Special Reports



USEPA: Review of new source performance standards for nitric acid plants p.1-70 (1984) EPA 450/3-84-011. Source performance standards for nitric acid plants were reviewed.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

NIOSH; Criteria Document: Nitric Acid (1976) DHEW Pub NIOSH 76-141

▶ [Hazardous Substances Data Bank \(HSDB\)](#)