

1. IDENTIFICATION

Product Name	Isobutyl Alcohol
Other Names	1-Hydroxymethylpropane; 1-PROPANOL, 2-METHYL-; 2-Methyl-1-Propanol; Isobutanol; Isopropylcarbinol
Uses	Organic synthesis; inert solvent of paint and lacquer; medium of amino resin paint; replacer of N-BUTANOL; paint remover; Fluorescence; high performance liquids chromatography (HPLC); liquids concentrate of fruit essence.
Chemical Family	No Data Available
Chemical Formula	(CH ₃) ₂ CHCH ₂ OH
Chemical Name	Isobutyl Alcohol
Product Description	No Data Available

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Pty Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200
Redox Chemicals Sdn Bhd	Level 2, No. 8, Jalan Sapir 33/7 Seksyen 33, Shah Alam Premier Industrial Park 40400 Shah Alam Sengalor, Malaysia	+60-3-5614-2111

Emergency Contact Details


For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
Poisons Information Centre	Westmead NSW	1800-251525 131126
Chemcall	Australia	1800-127406 +64-4-9179888
Chemcall	Malaysia	+64-4-9179888
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766
CHEMTREC	USA & Canada	1-800-424-9300 CN723420 +1-703-527-3887

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust) Not scheduled

Globally Harmonised System

Hazard Classification	Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)	
Hazard Categories	Flammable Liquids - Category 3 Specific Target Organ Toxicity (Single Exposure) - Category 3 Serious Eye Damage/Irritation - Category 1 Specific Target Organ Toxicity (Single Exposure) - Category 3 Acute Toxicity (Oral) - Category 5 Skin Corrosion/Irritation - Category 2 Aspiration Hazard - Category 2	
Pictograms		
Signal Word	Danger	
Hazard Statements	H226	Flammable liquid and vapour.
	H303	May be harmful if swallowed.
	H305	May be harmful if swallowed and enters airways.
	H315	Causes skin irritation.
	H318	Causes serious eye damage.
	H335	May cause respiratory irritation.
	H336	May cause drowsiness or dizziness.
Precautionary Statements	Prevention	P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P233 Keep container tightly closed. P240 Ground/bond container and receiving equipment. P241 Use explosion-proof electrical/ventilating/lighting/equipment. P242 Use only non-sparking tools. P243 Take precautionary measures against static discharge. P261 Avoid breathing fumes/mists/vapours/spray. P264 Wash hands and contaminated body thoroughly after handling. P271 Use only outdoors or in a well-ventilated area. P280 Wear protective gloves/protective clothing/eye protection/face protection.
	Response	P302 + P352 IF ON SKIN: Wash with plenty of soap and water. P303 + P361 + P353 IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. 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 CENTER or doctor/physician. P312 Call a POISON CENTER or doctor/physician if you feel unwell. P321 Specific treatment (see supplemental first aid instructions on this label). P332 + P313 If skin irritation occurs: Get medical advice/attention. P362 Take off contaminated clothing and wash before reuse. P370 + P378 In case of fire: Use carbon dioxide (CO ₂), dry chemical or sand for extinction. Do not use water.
	Storage	P403 + P233 Store in a well-ventilated place. Keep container tightly closed. P403 + P235 Store in a well-ventilated place. Keep cool. P405 Store locked up.

Disposal **P501**

Dispose of contents/container in accordance with local / regional / national / international regulations.

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification

Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

HSNO Classifications

Physical Hazards	3.1C	Flammable liquid - medium hazard
Health Hazards	6.1E	Substances that are acutely toxic –May be harmful, Aspiration hazard
	6.3B	Substances that are mildly irritating to the skin
	6.4A	Substances that are irritating to the eye

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Isobutyl Alcohol	No Data Available	78-83-1	100.0 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed

Rinse mouth thoroughly with water. Risk of aspiration! Do not induce vomiting; call for medical help immediately. Caution if victim vomits. Ensure that breathing passages are not obstructed. Pulmonary failure possible after aspiration of vomit.

Eye

Immediately lift eyelids, flushing eyes with plenty of water for at least 20 minutes. Do not allow water contaminate other sites. Get medical attention immediately

Skin

Wash skin with water for at least 5 minutes if irritation develops. Get medical attention if irritation develops or persists.

Inhaled

Remove to fresh air. Get medical attention immediately.

Advice to Doctor

If swallowed, consider gastric lavage and activated carbon.

Medical Conditions Aggravated by Exposure

The most Important Symptoms and Hazardous Effects: Central nervous system depression.
The Protection of First-Aiders: Use appropriate personal protective equipment such as class C clothing to take first aid in a safety area.

5. FIRE FIGHTING MEASURES

General Measures

Flame-proof equipment is necessary in all areas where this chemical is being used. Nearby equipment must be earthed.

Flammability Conditions

Flammable Liquid!

Extinguishing Media

Suitable extinguishing agents: CO2, sand, extinguishing powder. Do not use water.
For safety reasons unsuitable extinguishing agents: Water with full jet.

Fire and Explosion Hazard

Beware of vapours accumulating to form explosive concentrations. Vapours are heavier than air and may spread

along floors. Product is not explosive. However, formation of explosive air/ vapour mixtures are possible.

Hazardous Products of Combustion

Carbon monoxide (CO) and carbon dioxide (CO₂)

Special Fire Fighting Instructions

Clear fire area of all non-emergency personnel. Stay upwind. Keep out of low areas. Eliminate ignition sources. Move fire exposed containers from fire area if it can be done without risk. Do NOT allow fire fighting water to reach waterways, drains or sewers. Store fire fighting water for treatment.

Personal Protective Equipment

Fire fighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves) or chemical splash suit. Please note: Structural fire fighters uniform will provide limited protection.

Flash Point

28 °C Closed Cup

Lower Explosion Limit

1.7 %

Upper Explosion Limit

12 %

Auto Ignition Temperature

390 °C

Hazchem Code

•3Y

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure

Shut off all possible sources of ignition. Avoid accidents, clean up immediately. Increase ventilation. Avoid walking through spilled product as it is slippery when spilt. Water spray may be used to cool and disperse vapours, protect personnel, and dilute spills to form non-flammable mixtures. Water spray may reduce vapour but may not prevent ignition in closed spaces.

Clean Up Procedures

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Allow to solidify. Pick up mechanically. Do not flush with water or aqueous cleansing agents.

Containment

Stop leak if safe to do so.

Decontamination

Spray water on spilled areas. Use plenty of water to dilute small spill.

Environmental Precautionary Measures

Do NOT let product reach drains or waterways. If product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management. Use clean, non-sparking tools and equipment.

Evacuation Criteria

Evacuate all unnecessary personnel.

Personal Precautionary Measures

Personnel involved in the clean up should wear full protective clothing as listed in section 8.

7. HANDLING AND STORAGE

Handling

This material is flammable and toxic liquid. Engineering control should be applied and make the best use of use personal protective equipment when handling. Educate risk of this material and safety training of use. Remove all ignition sources away from heat and incompatible substances. There should be a "No smoking" sign in work space. The liquids will accumulate the electric charge. Consider extra design to increase electric conductance. All barrels, containers, and pipelines must have earth connection and contact with naked metal. While transporting and operating, reduce velocity flow, increase operating time to elevate the time that the liquids stays in pipeline, or operate at low temperature. When the operation of allocation is not in the airtight system, insure allocating containers, received-transporting apparatus and containers connected with same electric potential. Empty tanks, containers, and pipelines may have risk residuals. Do not weld, cut, drill or do other heat work before clearing up. Barrels or storage containers can be filled with the inert gas to reduce fire and explosion. Use spark-resistant ventilation system in workplace. Apparatus should be the explosion-proof type. Keep sidewalks and exports unimpeded. Storage and large operating areas are considered to install fire and spill detection system, and appropriate automatic fire-fighting system or enough and useful emergency apparatus. Avoid mist or vapors. Operate in well-ventilated assigned place and adopt the minimum consumption. Separate operation and storage areas. Wear appropriate personal protective equipment to avoid contacting with this chemical or contaminated apparatus if necessary. Don't use with incompatible substances to avoid increasing risk of fire and explosion. Use storage containers made of compatible substances. Package carefully to avoid spray out. Don't use air or inert gas to pressurize and transport liquids from containers. Unless allocating areas isolated with the fire-resistant structure, don't allocate and work in storage areas. Use approved storage containers of flammable liquids and allocating apparatus. Don't pour contaminated liquids back to original storage containers. Containers should be labeled, confined and prevented from damage while not using.

Storage

Store in a cool, dry, well-ventilated, fire-proof area. Keep containers tightly sealed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Ground and bond storage containers. Store away from incompatible materials as listed in section 10. Product from direct sunlight and keep away from heat, ignition sources, and incompatible substances. Storage apparatus should be constructed with the refractory materials. The floor should be constructed with the impermeable materials to avoid absorbing from the floor. Set

slope, door-sill or dig grooves in an entrance to discharge spill to safe places. Storage areas should be labeled clearly with no barriers. Permit assigned or trained personnel to enter. Keep storage areas away from work space, lifts, building, room exits, and main passages. Have appropriate fire extinguisher and leak cleaning apparatus near storage areas. Check containers regularly whether damage or leak. Check all new containers whether appropriately labeled and no damage. Limit storage. Store spill in containers made of compatible substances. Storage tanks have earth connection and connected with other apparatus by using same electric potential. Install depressurizing and vacuum releasing valves in all barrels stored flammable liquids. Store in accordance with the storage temperature suggested by chemical manufacturers or suppliers. Install warm-detecting sirens if necessary to alarm temperature is too high or too low. Avoid storing large amount in room. Store in fireproofing isolating building as possible. Install flame-extinguishing devices in storage exhaust pipes. Must be ground storage tanks. Seal whole area on the bottom to avoid seepage surrounded with liquids dikes, which can block the whole capacity. This product has a UN Classification of 1212 and a Dangerous Goods Class 3 (flammable) according to The Australian Code for the Transport of Dangerous Goods By Road and Rail.

Container

Container type/package must comply with all applicable local legislation. Store in original packaging as approved by manufacturer.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General

The following exposure standard has been established by The Australian Safety and Compensation Council (ASCC); Isobutyl Alcohol cas 78-83-1 TWA = 50ppm (152mg/m³)
 NOTE: The exposure value at the TWA is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week.
 These exposure standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Exposure Limits

No Data Available

Biological Limits

No information available on biological limit values for this product.

Engineering Measures

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Use a flame proof exhaust ventilation system. Use spark-resistant and earth-connection ventilation system separately. Direct outside exhaust vents. Supply adequate fresh air to replenish the exhausted air.

Personal Protection Equipment

RESPIRATOR: 1. Below 500ppm: Chemical type with organic vapor filters or air-feed type respiratory protective equipments. 2. Below 1,250ppm: Stable flow, air-feed type or dynamical type with organic vapor filters respiratory protective equipments. 3. Below 1,600ppm: Chemical type with organic vapor filters, full-mask type with organic vapor filters, full- type (portable), or full- and air-feed type respiratory protective equipments (AS1715/1716).
 EYES: Chemical safety goggles and masks (AS1336/1337).
 HANDS: Use seepage-proof gloves of butyl rubber, rubber-like, Viton, Responder, etc (AS2161).
 CLOTHING: Above rubber coveralls, work boots (AS3765/2210).

Work Hygienic Practices

1. Remove contaminated clothing quickly as possible after work. Clean clothing before reuse or abandon. Tell cleaning staffs the harmfulness.
2. Forbid smoking or eating in workplace.
3. After handling this material, wash hands thoroughly.
4. Keep workplace clean.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State

Liquid

Appearance

Liquid

Odour

Musty

Colour

Colourless

pH

No Data Available

Vapour Pressure

12 hPa (@ 20 °C)

Relative Vapour Density

2,6 g/cm³ Air = 1

Boiling Point

108 °C

Melting Point

-108 °C

Freezing Point

No Data Available

Solubility

9.8 g/100 mL water

Specific Gravity	No Data Available
Flash Point	28 °C Closed Cup
Auto Ignition Temp	390 °C
Evaporation Rate	0.82 N-butyl acetate = 1
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	0,8016 g/cm ³
Specific Heat	No Data Available
Molecular Weight	No Data Available
Net Propellant Weight	No Data Available
Octanol Water Coefficient	0.65
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	No Data Available
Volatile Percent	No Data Available
VOC Volume	>99.5 %
Additional Characteristics	No Data Available
Potential for Dust Explosion	Product is a liquid.
Fast or Intensely Burning Characteristics	No Data Available
Flame Propagation or Burning Rate of Solid Materials	No Data Available
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No Data Available
Properties That May Initiate or Contribute to Fire Intensity	No Data Available
Reactions That Release Gases or Vapours	No Data Available
Release of Invisible Flammable Vapours and Gases	No Data Available

10. STABILITY AND REACTIVITY

General Information	Flammable Liquid. Vapour may form explosive mixture with air.
Chemical Stability	Product is stable under directed conditions of use, storage and temperature.
Conditions to Avoid	Static, spark, heat, naked lights, and ignition sources.
Materials to Avoid	Exothermic reaction with : Acid chlorides. Risk of ignition or formation of inflammable gases or vapours with Chromium (VI) oxides, Aluminium and Strong oxidizing agents. Violent reaction possible with: Alkaline earth metals and Alkali metals. Incompatible materials: Strong oxidizing agents, various plastics.
Hazardous Decomposition Products	Carbon monoxide (CO) and carbon dioxide (CO ₂)
Hazardous Polymerisation	Has not been reported.

11. TOXICOLOGICAL INFORMATION

General Information	Oral LD50 2460 mg/kg (rat) Dermal LD50 3400 mg/kg (rabbit)
Eyelrritant	Strong irritant with the danger of severe eye injury.
Ingestion	May be harmful if swallowed and enters airways. Depress central nervous system, and cause nausea, vomiting, stomach ache, chest pain, headache, faintness, and dizziness. Exceeding dose may cause coma, even death. May damage liver and kidney. Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.
Inhalation	Irritating to respiratory system. Vapours may cause drowsiness and dizziness. The vapors will irritate the nose and throat. High concentrations can irritate nose, throat, and respiratory tracts seriously, induce cough and dyspepsia, depress central nervous system, cause nausea, vomiting, Headache, dizziness, even may lose consciousness.
SkinIrritant	May be harmful in contact with skin. Irritating to skin.
Carcinogen Category	No Data Available

12. ECOLOGICAL INFORMATION

Ecotoxicity	LC50 (96h, freshwater fish): >1430 mg/L (OECD N/A) EC50 (Daphnia Magna, 48hr): 1100 mg/L (OECD N/A) NOEL (Daphnia Magna, 21d)=20 mg/l (OECD N/A) ErC50 (alga, 72hr): 1799 mg/L (OECD 201)
Persistence/Degradability	Easily biodegradable Degradation : 70-80% (28d, OECD N/A)
Mobility	Partition coefficient, soil organic carbon/water (Koc) : 2,1 Henry's Law Constant (H) : 1,012 Pa m ³ /mol @ 25 °C .
Environmental Fate	Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
Bioaccumulation Potential	Bioconcentration Factor (BCF) : ~2 Partition coefficient, n-octanol/water (log Pow) : 0,76
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of in accordance with all local, state and federal regulations. All empty packaging should be disposed of in accordance with Local, State, and Federal Regulations or recycled/reconditioned at an approved facility.
Special Precautions for Land Fill	Contact a specialist disposal company or the local waste regulator for advice. Adopt particular incineration or sanitary burying.

14. TRANSPORT INFORMATION

Land Transport (Australia)

ADG Code

Proper Shipping Name	ISOBUTANOL (ISOBUTYL ALCOHOL)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	17 Liquids - Flammable, Toxic
UN Number	1212
Hazchem	•3Y
Pack Group	III
Special Provision	No Data Available

Land Transport (Malaysia)

ADR

Proper Shipping Name	ISOBUTANOL (ISOBUTYL ALCOHOL)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	17 Liquids - Flammable, Toxic
UN Number	1212
Hazchem	•3Y
Pack Group	III
Special Provision	No Data Available

Land Transport (New Zealand)

NZS5433

Proper Shipping Name	ISOBUTANOL (ISOBUTYL ALCOHOL)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	17 Liquids - Flammable, Toxic
UN Number	1212
Hazchem	•3Y
Pack Group	III
Special Provision	No Data Available

Land Transport (United States of America)

US DOT

Proper Shipping Name	ISOBUTANOL (ISOBUTYL ALCOHOL)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
ERG	129 Flammable Liquids (Polar / Water-Miscible / Noxious)
UN Number	1212
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

Sea Transport

IMDG Code

Proper Shipping Name	ISOBUTANOL (ISOBUTYL ALCOHOL)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	1212
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available
EMS	FE,SD
Marine Pollutant	No

Air Transport

IATA DGR

Proper Shipping Name	ISOBUTANOL (ISOBUTYL ALCOHOL)
Class	3 Flammable Liquids

Subsidiary Risk(s)	No Data Available
UN Number	1212
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
---------------------------------------	---

15. REGULATORY INFORMATION

General Information	No Data Available
Poisons Schedule (Aust)	Not scheduled

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

Approval Code	HSR001097
----------------------	-----------

National/Regional Inventories

Australia (AICS)	Listed
Canada (DSL)	Listed
Canada (NDSL)	Not Determined
Europe (EINECS)	Listed
Europe (REACH)	Not Determined
Japan (ENCS/METI)	Listed
Korea (KECI)	Listed
Malaysia (EHS Register)	Not Determined
Philippines (PICCS)	Listed
Switzerland (Giftliste 1)	Not Determined
Switzerland (Inventory of Notified Substances)	Not Determined
Taiwan (NCSR)	Listed
USA (TSCA)	Listed

16. OTHER INFORMATION

Related Product Codes	ISBUTA1000, ISBUTA1001, ISBUTA1002, ISBUTA1003, ISBUTA1004, ISBUTA1005, ISBUTA1006, ISBUTA1007, ISBUTA1008, ISBUTA1009, ISBUTA1010, ISBUTA1011, ISBUTA1012, ISBUTA1013, ISBUTA1014, ISBUTA1015, ISBUTA1020, ISBUTA1021, ISBUTA1100, ISBUTA1200, ISBUTA1500, ISBUTA1501, ISBUTA1600, ISBUTA2000, ISBUTA2001, ISBUTA2100, ISBUTA2105, ISBUTA2200, ISBUTA2201, ISBUTA2300, ISBUTA2301, ISBUTA2400, ISBUTA2500, ISBUTA3000, ISBUTA3010, ISBUTA3011, ISBUTA3020, ISBUTA3021, ISBUTA3022, ISBUTA3030, ISBUTA3500, ISBUTA4000, ISBUTA4500, ISBUTA4501, ISBUTA4502, ISBUTA5000, ISBUTA5001, ISBUTA5100, ISBUTA5200, ISBUTA6000, ISBUTA6500, ISBUTA6600, ISBUTA6900, ISBUTA7000, ISBUTA7100, ISBUTA8000, ISBUTA8008, ISBUTA8009
Revision	3
Revision Date	30 May 2016
Key/Legend	<p>< Less Than > Greater Than AICS Australian Inventory of Chemical Substances atm Atmosphere CAS Chemical Abstracts Service (Registry Number) cm² Square Centimetres CO₂ Carbon Dioxide COD Chemical Oxygen Demand deg C (°C) Degrees Celcius EPA (New Zealand) Environmental Protection Authority of New Zealand deg F (°F) Degrees Farenheit g Grams g/cm³ Grams per Cubic Centimetre g/l Grams per Litre HSNO Hazardous Substance and New Organism IDLH Immediately Dangerous to Life and Health immiscible Liquids are insoluable in each other. inHg Inch of Mercury inH₂O Inch of Water K Kelvin kg Kilogram kg/m³ Kilograms per Cubic Metre lb Pound LC₅₀ LC stands for lethal concentration. LC₅₀ is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours. LD₅₀ LD stands for Lethal Dose. LD₅₀ is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. ltr or L Litre m³ Cubic Metre mbar Millibar mg Milligram mg/24H Milligrams per 24 Hours mg/kg Milligrams per Kilogram mg/m³ Milligrams per Cubic Metre Misc or Miscible Liquids form one homogeneous liquid phase regardless of the amount of either component present. mm Millimetre mmH₂O Millimetres of Water mPa.s Millipascals per Second N/A Not Applicable NIOSH National Institute for Occupational Safety and Health NOHSC National Occupational Health and Safety Commission OECD Organisation for Economic Co-operation and Development Oz Ounce PEL Permissible Exposure Limit Pa Pascal ppb Parts per Billion ppm Parts per Million ppm/2h Parts per Million per 2 Hours ppm/6h Parts per Million per 6 Hours psi Pounds per Square Inch R Rankine RCP Reciprocal Calculation Procedure STEL Short Term Exposure Limit TLV Threshold Limit Value tne Tonne TWA Time Weighted Average ug/24H Micrograms per 24 Hours UN United Nations wt Weight</p>