Appendix A

Waste Characterization Data Sheets

WASTE CHARACTERIZATION DATA SHEET (WCDS) INTRODUCTION

Chemical name, formula, and CAS number. The chemical name is the most common means of identification. Chemical names, however, are often ambiguous. The Chemical Abstracts Service (CAS) registration number and formula are provided as alternate means of identification.

Synonyms. These are alternate compound names. A complete list is included to allow identification by trade names or less known chemical names.

Contaminant Properties

Physical Description. The physical description aids in flow path and environment entry determination. The physical description is at room temperature for a pure compound. The compound color at room temperature is also included.

Atomic Weight. Weight to volume conversion, and density for calculating molar volume requires the atomic weight.

Boiling Point. The boiling point, or normal boiling point of a liquid, is the temperature at which its equilibrium vapor pressure equals to the standard atmospheric pressure (760 mm Hg). Solubility correlates linearly with aromatic compound boiling point. For health interests, high boiling point liquids commonly enter the body through direct contact, low boiling point liquids through inhalation.

Freezing Point (or melting point). The freezing point is the temperature at which a liquid changes to a solid at one atmospheric pressure. The freezing point provides an indication of the phase that a substance will be in under typical conditions.

Water Solubility. The solubility of a compound in water is the saturated concentration of the compound in water at a given temperature and pressure. Solubility varies with temperature, pressure, pH, and the presence of other dissolved constituents. The water solubility is useful in predicting contaminant migration in ground water. Qualitative solubility terms are generally definable as:

insoluble	< 10 grams per 100 milliliters (ml)
slightly soluble	10-24 grams per 100 ml
soluble	> 24 grams per 100 ml

Viscosity. The tendency of a fluid to resist flowing due to internal forces, such as the attraction of the molecules to each other (cohesion).

Odor. This is the compound odor at room temperature.

Specific Gravity/Density. Specific gravity at 68 °F (unless a different temperature is noted) referenced to water at 39.2 °F (4 °C).

Henry□s Law Constant (or air-water partition coefficient). Henry's law suggests the substance's volatility. This is the ratio of a compound's partial pressure in air to its concentration in water at a given temperature under equilibrium conditions. This constant, vapor pressure and solubility relate to the compound-to-atmosphere transfer efficiency, a major factor in air stripper design.

$K_H < 10^{-7}$ atm*m^3/mol	low volatility
$10^{-7} < K_H < 10^{-5}$ atm*m^3/mol	slow volatility
$10^{-5} < K_H < 10^{-3}$ atm*m^3/mol	medium volatility
$K_H > 10^{-3}$ atm*m^3/mol	highly volatile

Vapor Pressure. Vapor pressure is the pressure exerted by the vapor of a substance at equilibrium conditions. This value is used in the calculation of Henry's Law Constant. Vapor pressure provides a semi-quantitative rate at which the compound will volatilize from soils. Unless otherwise noted, vapor pressure is based on a temperature of 68 degrees F.

Hazard Classification

This section includes general information related to worker safety. Included are the National Fire Protection Association (NFPA) 704 diamond, Occupational Safety and Health Administration (OSHA) permissible exposure limits, and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV).

The NFPA 704 diamond identifies and numerically rates hazard severity of a material in terms of Health, Flammability, and Reactivity. A numerical rating of 0 indicates no hazard, while a 4 indicates extreme hazard. Additional hazard markings are included as necessary.

The Threshold Limit Value-Time Weighted Average (TLV-TWA) is the concentration of a substance in air that can be breathed for five consecutive eight-hour workdays by most people without adverse effect.

Contaminant Distribution/Information

This section discusses contaminant migration, segregation and fate. Primary considerations are terrestrial and aquatic releases, chemical behavior, and fate. Also included is useful information when dealing with fires or other hazards involving the specified contaminant.

$(CH_3)_2CO$ **ACETONE** CAS No.: 67-64-1

Synonyms: Dimethyl ketone, Ketone propane, 2-Propanone.

Contaminant Properties

Physical Description: Colorless liquid.	
Atomic Weight	58.09
Boiling Point	56.48 °C
Melting Point	-94.6°C
Water Solubility	miscible (>=100 mg/mL @ 22°C)
Viscosity	0 .32 mPa (20°C)
Odor	fragrant, mint-like
Specific Gravity/Density	0.79
Henry's Law Constant	2.8e01 (mol_{aq}/l_{aq})/atm
Vapor Pressure	180 mmHg

Hazard Classification

NFPA	Health	1
	Flammability	3
	Reactivity	0
	Special Symbols	none
ACGIH TLV-TWA		1188 mg/m^3
OSHA PEL TWA		2400 mg/m^3

Contaminant Distribution/Information

Acetone is a colorless, flammable liquid with a somewhat aromatic odor. It may enter the environment from industrial or municipal waste treatment plant discharges or spills. Acetone is highly soluble in water. Concentrations of 1,000 milligrams and more will mix with a liter of water. Acetone is slightly persistent in water, with a half-life of between 2 to 20 days. About 50% of acetone will eventually end up in air; the rest will end up in the water.

Acetone is a highly flammable liquid. There are dangerous disaster hazards due to fire and explosion. Acetone can react vigorously with oxidizing materials. It will also produce poisonous gases when involved with a fire.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 15pp.

2. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: **http://www.cdc.gov/niosh/npg/pgdstart.html**

3. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: **http://ntp-db.niehs.nih.gov/ Main_pages/Chem-HS.HTML**.

4. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: **http://mail.odsnet.com/TRIFacts/**.

5. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 22-23pp.

Ag **SILVER** CAS No.: 7440-22-4

Synonyms: Silver metal, Argentum.

Contaminant Properties

Physical Description: White, soft, lustrous, malleable metal.

Atomic Weight	107.87
Boiling Point	2212 °C
Melting Point	962 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	10.49
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA Health	not available
Flammability	not available
Reactivity	not available
Special Symbols	none
ACGIH TLV-TWA	0.1 mg/m^3 (metal)
OSHA PEL TWA	0.01 mg/m^3

Contaminant Distribution/Information

Some silver compounds are highly soluble in water and others less soluble. Silver is highly persistent in water, with a half-life greater than 200 days. In addition, the toxicity of silver to aquatic life is dependent on water hardness - the harder the water, the higher the concentration of silver needed to be toxic.

Solid silver is noncombustible, but the dust or powder form is flammable. Also flammable by chemical reaction with C_2H_2.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 35pp.

2. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: **http://hazard.com/msds/index.html**.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: **http://www.cdc.gov/niosh/npg/pgdstart.html**

4. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: **http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML**.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: **http://mail.odsnet.com/TRIFacts/**.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 3044pp.

Al **ALUMINUM** CAS No.: 7429-90-5

Synonyms: Aluminum, Aluminum metal, Aluminum powder, Elemental aluminum

Contaminant Properties

Physical Description: Silvery-white ductile metal.

Atomic Weight	26.98
Boiling Point	2450 °C
Melting Point	660 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	2.70
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	0
	Flammability	1
	Reactivity	1
	Special Symbols	none
ACGIH TLV-TWA		10 mg/m^3 (metal dust)
		2 mg/m^3 (soluble salts)
OSHA PEL TWA		15 mg/m^3 (total)

Contaminant Distribution/Information

Aluminum may enter the environment by binding to particles in the air. In addition, some plants are capable of taking up aluminum from the soil. Aluminum can also dissolve in water depending on water quality and acid rain may dissolve it from soil and rocks. Aluminum solubility in water is dependent upon pH - as pH increases or decreases from near neutrality, solubility increases.

Aluminum powder can be flammable and explosive. The hazard increases with the amount of Aluminum present, fineness of the powder, and high humidity.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 15pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: **http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html**.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 125pp.

As **ARSENIC** CAS No.: 7440-38-2

Synonyms: Arsenic, Grey arsenic, Metallic arsenic.

Contaminant Properties

Physical Description: Silvery to black, brittle, crystalline metalloid.

Atomic Weight	74.92
Boiling Point	sublimes
Melting Point	814 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	5.73 (metal)
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	0
	Reactivity	0
	Special Symbols	poison
ACGIH TLV-TWA		0.01 mg/m^3 (elemental and inorganic compounds, except Arsine)
OSHA PEL TWA		0.010 mg/m^3

Contaminant Distribution/Information

Arsenic enters the environment mainly from its use as a pesticide and from emissions from coal-fueled power plants. It doesn't evaporate into air, but becomes airborne when contaminated materials are burned. These particles, however, do not remain airborne and settle from the air to the ground. Although elemental arsenic is insoluble in water, most arsenic compounds can dissolve in water. Arsenic salts, however, have low solubility in water. In addition, arsenic doesn't break down in media, but it can change from one form to another.

Arsenic is slightly explosive in the form of dust when it is exposed to flame. Also, when heated or on contact with acid or acid fumes, it emits highly toxic fumes. Arsenic can also react vigorously on contact with oxidizing materials.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 16pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

5. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

6. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

7. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 291pp.

Ba **BARIUM** CAS No.: 7440-39-3

Synonyms: none

Contaminant Properties

Physical Description: Yellow-white lustrous malleable metal.

Atomic Weight	137.36
Boiling Point	1640 °C
Melting Point	725 °C
Water Solubility	reaction
Viscosity	not available
Odor	none
Specific Gravity/Density	3.51
Henry's Law Constant	not available
Vapor Pressure	10 mm Hg (1050oC)

Hazard Classification

NFPA	Health	0
	Flammability	3
	Reactivity	4
	Special Symbols	explosive, flammable

ACGIH TLV-TWA	0.5 mg/m^3
OSHA PEL TWA	0.5 mg/m^3

Contaminant Distribution/Information

Barium is a yellowish-white solid that exists in a variety of salt forms. Most of the barium salts are either highly or moderately soluble in water. Barium is also highly persistent in water, with a half-life greater than 200 days and accumulates rather than break down in fish and aquatic organisms.

Barium dust is dangerous and explosive when exposed to heat, flame, or chemical reaction. It also reacts with water, forming combustible gas and barium hydroxide.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 16pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

4. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 333pp.

Be **BERYLLIUM** CAS No.: 7440-41-7

Synonyms: Beryllium metal, Beryllium, Glucinium.

Contaminant Properties

Physical Description: Hard, brittle, light, gray-white metal.

Atomic Weight	9.01
Boiling Point	2970 °C
Melting Point	1278 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	1.85
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA Health	3
Flammability	1
Reactivity	0
Special Symbols	poison, flammable
ACGIH TLV-TWA	0.002 mg/m^3 (and compounds as Be)
OSHA PEL TWA	0.002 mg/m^3

Contaminant Distribution/Information

Beryllium dust found in air from burning coal and oil and other sources settles into the soil and water. Another source of water contamination is from industrial waste. While some beryllium compounds dissolve in water, most settle to the bottom. In addition, most beryllium in soil does not move to the surface or into the groundwater. Beryllium compounds that dissolve are highly persistent in water with a half-life of greater than 200 days.

Beryllium poses a moderate fire hazard if it is in powder or granular form, exposed to flame, or by spontaneous chemical reaction. It also reacts with strong acids and strong bases to form combustible gas.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 17pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 416pp.

$C_{24}H_{38}O_4$ **BIS(2-ETHYL HEXYL)PHTHALATE** CAS No.: 117-81-7

Synonyms: Di-sec octyl phthalate, De(2-ethylhexyl)phthalate, DEHP, Dioctyl phthalate.

Contaminant Properties

Physical Description: Colorless, oily liquid.

Atomic Weight	390.62
Boiling Point	385 °C
Melting Point	-50 °C
Water Solubility	slightly soluble (<0.1 mg/mL @ 22 °C)
Viscosity	80 cPs (20 °C)
Odor	mild odor
Specific Gravity/Density	0.99
Henry's Law Constant	not found
Vapor Pressure	<0.01 mmHg

Hazard Classification

NFPA	Health	0
	Flammability	1
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	5 mg/m^3
OSHA PEL TWA	5 mg/m^3

Contaminant Distribution/Information

Bis (2-Ethylhexyl) Phthalate is slightly persistent in water, with a half-life of between 2 to 20 days. About 42.8% of Bis (2-Ethylhexyl) Phthalate will eventually end up in terrestrial soil; about 40% will end up in aquatic sediments; and about 17% will end up in air.

Bis (2-Ehtylhexyl) Phthalate reacts with strong oxidants, acids, alkalis, and nitrates. When heated to decomposition, it emits products of carbon monoxide, irritating and toxic fumes and gases, and carbon dioxide.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 23pp.

2. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

5. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

6. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

7. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 1445-1446pp.

Cd **CADMIUM** CAS No.: 7440-43-9

Synonyms: Cadmium metal, Colloidal cadmium.

Contaminant Properties

Physical Description: Silver-white, blue-tinged, lustrous, malleable metal.

Atomic Weight	112.40
Boiling Point	767 °C
Melting Point	320.9 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	8.65
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	3
	Flammability	0
	Reactivity	0
	Special Symbols	poison

ACGIH TLV-TWA	0.01 mg/m^3 (inhalable fraction) 0.002 mg/m^3 (respirable fraction)
OSHA PEL TWA	0.005 mg/m^3 (applies to all Cadmium compounds (as Cd)

Contaminant Distribution/Information

Cadmium enters the environment primarily through industrial effluents and landfill leaching. It is relatively mobile in the aquatic environment relative to other heavy metals. It readily complexes with organic materials and subsequently adsorbs to sediment and may coprecipitate with manganese oxide. In contrast to other transition series metals, the adsorption of cadmium correlates with the cation exchange capacity of the soil. Competition between cations for adsorption sites strongly influences adsorption. The presence of calcium, magnesium, and trace metal cations reduces cadmium adsorption. The presence of organic fraction in soils does not enhance adsorption.

Cadmium dust ignites spontaneously in air and is flammable and explosive when exposed to heat, flame, or by chemical reaction with oxidizing agents. When heated to a high temperature it emits toxic fumes of Cd. Cadmium also reacts with acids giving off flammable hydrogen gas.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 17pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Battelle, 1984. Chemical Attenuation Rates, Coefficients and Constants in Leachate Migration, Vol. 1: A Critical Review. Consultants report tot he Electric Power Research Institute, EPRI EA-3356, Project 2198-1.

4. Clement Associates, Inc., 1985. Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites: Final Report. Consultants report to the USEPA, NTIS PB89-132203, 619pp.

5. Hem, John D., 1985. Study and Interpretation of the Chemical Characteristics of Natural Water, 3rd Ed. USGS Water-Supply Paper 2254, 263pp.

6. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

7. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

8. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

9. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

10. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 648pp

Synonyms: Cobalt metal dust, Cobalt metal fume.

Contaminant Properties

Physical Description: Silver-gray to black, hard, magnetic, ductile metal.

Atomic Weight	58.93
Boiling Point	3100 °C
Melting Point	1493 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	8.92
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	1
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.02 mg/m^3
OSHA PEL TWA	0.1 mg/m^3 (total)

Contaminant Distribution/Information

Cobalt normally exists in the form of various salts. Pure cobalt does not dissolve in water, but many of its compounds do. Cobalt and its salts are highly persistent in water, with a half- life greater than 200 days. In addition, Cobalt can move from the soil to underground water and can also be taken up by plants from the soil. Cobalt has several artificial radioactive isotopes, the most important being Cobalt 60. Cobalt 60 is a beta and gamma emitter

Solid cobalt is relatively stable, but becomes flammable when exposed to heat or flame. Powdered cobalt ignites spontaneously in air.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 20pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

4. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 931pp.

Cr **CHROMIUM** CAS No.: 7440-47-3

Synonyms: Chrome.

Contaminant Properties

Physical Description: Steel gray, lustrous metal.

Atomic Weight	52.00
Boiling Point	2642 °C
Melting Point	1900 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	7.14
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.5 mg/m^3 (metal and Cr III compounds)
	0.05 mg/m^3 (water-soluble Cr VI compounds)
	0.01 mg/m^3 (insoluble Cr VI compounds)
OSHA PEL TWA	0.1 mg/m^3 (total)

Contaminant Distribution/Information

Chromium is released into different environmental media by manufacturing, disposal of products or chemical containing chromium, or burning of fossil fuels. In soil, chromium will bind strongly to soil particles. Chromium is more toxic in soft water than in hard water. Chromium is highly persistent in water, with a half-life of greater than 200 days. Chromium mobility is dependent on the pH of the media, and the presence of organic matter and other metals.

Chromium is combustible if in powder form. Powder will explode spontaneously in air. It gives off irritating or toxic fumes or gases in a fire. Chromium will also react violently with strong oxidants such as hydrogen peroxide, causing fire and explosion hazards.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 19-20pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

6. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

7. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

8. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 899pp.

Cu **COPPER** CAS No.: 7440-50-8

Synonyms: Copper metal dusts, Copper metal fumes.

Contaminant Properties

Physical Description: Reddis, lustrous, malleable metal.

Atomic Weight	63.54
Boiling Point	2324 °C
Melting Point	1083 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	8.94
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	0
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.05 mg/m^3 (fume and respirable particulate) 1 mg/m^3 (inhalable particulate)
OSHA PEL TWA	1 mg/m^3 (applies to other copper compounds as Cu except copper fume)

Contaminant Distribution/Information

Copper is relatively mobile in the environment. Copper salts are highly soluble in water. Copper is highly persistent in water, with a half-life greater than 200 days. Factors such as water hardness, alkalinity and pH influence copper toxicity. Copper's environmental fate and transport are controlled by: the formation of complexes, especially with humic substances; sorption to hydrous metal oxide, clays, and organic materials; and bioaccumulation. The formation of complexes with organic ligands inhibits precipitation of copper. Clay more easily absorbs complexed copper than free copper cations.

Copper in powder form may ignite. In addition, liquid copper explodes on contact with water.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 41pp.

2. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

3. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

4. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 944pp.

5. USEPA, 1979. Water-Related Environmental Fate of 129 Priority Pollutants Vol. I, EPA-440/4-79-029a. chapter 11.

CN	**CYANIDE**	Cyanide ion CAS No: 57-12-5
HCN	**HYDROGEN CYANIDE**	CAS No.: 74-90-8
NaCN	**SODIUM CYANIDE**	CAS No.: 143-33-9

Synonyms CN^-: Carbon nitride ion, Cyanide anion.
Synonyms HCN: Hydrogen Cyanide, Hydrocyanic acid, Prussic acid, Formonitrile.
Synonyms NaCN: Sodium cyanide, Sodium salt.

Contaminant Properties

SODIUM CYANIDE
Physical Description: White or colorless solid.

Atomic Weight	49.01
Boiling Point	1496 °C
Melting Point	563.7°C
Water Solubility	soluble (48 gm/ml@10°C)
Viscosity	not available
Odor	none
Specific Gravity/Density	1.60 (25 °C)
Henry's Law Constant	not available
Vapor Pressure	not found

HYDROGEN CYANIDE
Physical Description: Colorless to bluish-white liquid.

Atomic Weight	27.03
Boiling Point	25.7 °C
Freezing Point	-13.3°C
Water Solubility	miscible
Viscosity	not available
Odor	characteristic sweetish, like almond
Specific Gravity/Density	0.689 (20 °C)
Henry's Law Constant	not available
Vapor Pressure	658.7 torr (21.9 °C)

Hazard Classification

SODIUM CYANIDE

NFPA	Health	3
	Flammability	0
	Reactivity	0
	Special Symbols	poison

HYDROGEN CYANIDE

NFPA	Health	4
	Flammability	4

Reactivity	2
Special Symbols	poison
ACGIH TLV-TWA	5 mg/m^3 (skin)
	not available for hydrogen cyanide and cyanide salts
OSHA PEL TWA	5 $mg(CN)/m^3$

Contaminant Distribution/Information

Cyanides are a diverse compound group whose environmental fate varies widely. Cyanides are organic or inorganic compounds that contain the CN^- group. The most common and most toxic of this group is hydrogen cyanide.

Hydrogen cyanide (HCN) is a volatile liquid. Hydrogen cyanide is a very reactive and soluble in water as is sodium cyanide. Hydrogen cyanide does not strongly partition into sediments or suspended adsorbents due to its high solubility. The low adsorption of hydrogen cyanide and sodium cyanide allows them to be fairly mobile in the environment. Mobility is least in low pH soils and where concentrations of free iron oxides and clays are present. Mobility is greatest at high pH, and in the presence of free calcium carbonate and a low clay content.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 26pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 974-975pp.

4. USEPA, 1979. Water-Related Environmental Fate of 129 Priority Pollutants Vol. I, EPA-440/4-79-029a. chapter 50.

$C_{12}H_8O$ **DIBENZOFURAN** CAS No.: 132-64-9

Synonyms: DBF; Diphenylene oxide.

Contaminant Properties

Physical Description: Colorless crystals.

Atomic Weight	168.19
Boiling Point	285 °C
Melting Point	86 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	not available
Henry's Law Constant	not available
Vapor Pressure	0.0175 mm Hg at 25 °C

Hazard Classification

NFPA	Health	1
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	not available
OSHA PEL TWA	not available

Contaminant Distribution/Information

Dibenzofuran is incompatible with strong oxidants and strong oxidizing agents. When heated to decomposition, it emits irritating and toxic fumes carbon monoxide and carbon dioxide.

References

1. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: **http://hazard.com/msds/index.html**.

2. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: **http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML**.

Hg **MERCURY** CAS No.: 7439-97-6

Synonyms: Mercury metal, Colloidal mercury, metallic mercury, Quicksilver.

Contaminant Properties

Physical Description: Silver-white, heavy, mobile liquid.

Atomic Weight	200.59
Boiling Point	356.9°C
Melting Point	-38.8°C
Water Solubility	insoluble
Viscosity	1.554 cP (20 °C)
Odor	none
Specific Gravity/Density	13.6
Henry's Law Constant	not available
Vapor Pressure	0.0012 mmHg

Hazard Classification

NFPA	Health	3
	Flammability	none
	Reactivity	none
	Special Symbols	none

ACGIH TLV-TWA	0.01 mg/m^3 (alkyl compounds)
	0.1 mg/m3 (aryl compounds)
	0.025 mg/m^3 (inorganic forms including metallic mercury)
OSHA PEL TWA	not available

Contaminant Distribution/Information

Elemental mercury is a heavy and relatively inert liquid which is oxidized to inorganic mercury (II) under natural conditions. Mercury (II) may combine with an organic fraction to from methylmercury.

The concentration of mercury (II) in bodies of water may be elevated with acid rain due to the scouring of mercury from the air and increased partitioning from the sediment into the water. Mercury is highly persistent in water, with a half-life greater than 200 days. On soil, mercury is expected to volatilize rapidly. In water, it tends to bind to particulate matter and collect in the sediment.

Mercury may burn, but does not readily ignite. When burning, it will produce poisonous gas.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 28pp.

2. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

4. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

5. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 2192-2193pp.

$C_9H_{14}O$ **ISOPHORONE** CAS No.: 78-59-1

Synonyms: Isoacetophorone, 3,5,5-Trimethyl-2-cyclohexenone, 3,5,5-Trimethyl-2-cyclo-hexen-1-one.

Contaminant Properties

Physical Description: Colorless to white (white-water) liquid.

Atomic Weight	138.23
Boiling Point	215.2°C
Freezing Point	-8°C
Water Solubility	soluble (0.1-1 mg/mL @ 18 °C)
Viscosity	2.62 cP (20 °C)
Odor	sharp, peppermint or camphor-like odor
Specific Gravity/Density	0.92
Henry's Law Constant	not available
Vapor Pressure	0.3 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	2
	Reactivity	0
	Special Symbols	none
ACGIH TLV-TWA		not available
OSHA PEL TWA		140mg/m^3

Contaminant Distribution/Information

Isophorone is flammable and explosive when exposed to heat or flame and can react with oxidizing materials.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 27pp.

2. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

5. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 2034pp.

CH_2Cl_2 **METHYLENE CHLORIDE** CAS No.: 75-09-2

Synonyms: Dichloromethane, Methylene dichloride.

Contaminant Properties

Physical Description: Colorless liquid.	
Atomic Weight	84.93
Boiling Point	39.8 °C
Freezing Point	-96.7°C
Water Solubility	soluble (10-50 mg/mL @ 21 °C)
Viscosity	not available
Odor	chloroform-like
Specific Gravity/Density	1.33
Henry's Law Constant	3.3e-01 (mol_{aq}/l_{aq})/atm
Vapor Pressure	350 mmHg)

Hazard Classification

NFPA	Health	2
	Flammability	1
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	174 mg/m^3
OSHA PEL TWA	25 ppm (1 ppm = 3.47 mg/m^3)

Contaminant Distribution/Information

Methylene chloride is found mostly in air because of its evaporation rate. Furthermore, methylene chloride does not adhere to particles in soil or dissolve in water, so it moves from these media to air. Organisms break down the methylene chloride found in soil and water into simpler compounds.

Poisonous gases, including Hydrogen Chloride and Phosgene Gas, are produced in fire when methylene chloride is heated to decomposition. It also reacts violently with metals to create fire and explosion hazards.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 29pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

6. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

7. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

8. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 1. Van Nostrand Reinhold, NY. 2311-2312pp.

Mg **MAGNESIUM** CAS No.: 7439-95-4

Synonyms: Magnesium metal, Magnesium powder.

Contaminant Properties

Physical Description: Hexagonal, silvery-white crystals.

Atomic Weight	24.31
Boiling Point	1100 °C
Melting Point	651 °C
Water Solubility	insoluble/reactive
Viscosity	not available
Odor	none
Specific Gravity/Density	1.74
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	0
	Flammability	1
	Reactivity	1
	Special Symbols	water reactive
ACGIH TLV-TWA		not available
OSHA PEL TWA		not available

Contaminant Distribution/Information

Magnesium represents an explosion hazard if in powder or granular form and mixed with air. It may spontaneously ignite on contact with air or moisture producing irritating or poisonous gases including magnesium oxide. It reacts violently with strong oxidants. Magnesium also reacts with acids or water forming flammable hydrogen gas.

References

1. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

2. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

3. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 2147pp.

Mn **MANGANESE** CAS No.: 7439-96-5

Synonyms: Colloidal manganese, Magnacat, Tronamang.

Contaminant Properties

Physical Description: Reddish-grey or silvery, brittle, metallic solid.

Atomic Weight	54.94
Boiling Point	1900 °C
Melting Point	1260 °C
Water Solubility	insoluble/reactive
Viscosity	not available
Odor	none
Specific Gravity/Density	7.20
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	2
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.2 mg/m^3
OSHA PEL TWA	5 mg/m^3

Contaminant Distribution/Information

Manganese and its compounds vary in their solubility in water from being very soluble to insoluble. In addition, manganese and its compounds are highly persistent in water, with half-lives greater than 200 days.

Manganese is flammable and moderately explosive in the form of dust or powder when exposed to flame. It will also react with water or steam to produce hydrogen. Finely dispersed particles of manganese can form explosive mixtures in air.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 28pp.

2. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 1. Van Nostrand Reinhold, NY. 2159-2160pp.

Ni **NICKEL** CAS No.: 7440-02-0

Synonyms: Nickel metal, Elemental nickel, Raney alloy, Raney nickel.

Contaminant Properties

Physical Description: Silvery-white metallic solid.

Atomic Weight	58.71
Boiling Point	2730 °C
Melting Point	1455 °C
Water Solubility	insoluble
Viscosity	not available
Odor	none
Specific Gravity/Density	8.90
Henry's Law Constant	not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA Health	2
Flammability	1
Reactivity	0
Special Symbols	none
ACGIH TLV-TWA	1.5 mg/m^3
OSHA PEL TWA	1 mg/m^3

Contaminant Distribution/Information

Sources of nickel and compounds to the environment include the burning of coal and other fossil fuels and discharges from such industries as electroplating and smelting. Most of the nickel found in the environment is found in soil and sediments because nickel attaches to particles that contain iron or manganese. Nickel and its compounds have water solubilities ranging from low to high. Nickel and its compounds are highly persistent in water when dissolved, with half- lives greater than 200 days.

Nickel may cause a dust explosion if in powder or granular form, mixed with air. Dry Nickel catalyst may spontaneously ignite and a fire may restart after it has been extinguished. In addition, toxic gases and vapors (nickel carbonyl) may be released in a fire involving nickel.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 42pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

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5. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

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7. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

8. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 2489pp.

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)

$C_{14}H_{10}$	Anthrance	CAS No.:120-12-7
$C_{18}H_{12}$	Benz(a)anthracene	CAS No.: 56-55-3
$C_{20}H_{12}$	Benzo(a)pyrene	CAS No.: 50-32-8
$C_{22}H_{12}$	Benzo(g,h,i)perylene	CAS No.: 191-24-2
$C_{20}H_{12}$	Benz(k)fluoranthene	CAS No.: 207-08-9
$C_{18}H_{12}$	Chrysene	CAS No.: 218-01-9
$C_{16}H_{10}$	Fluoranthene	CAS No.: 206-44-0
$C_{13}H_{10}$	Fluorene	CAS No.: 86-73-7
$C_{22}H_{12}$	Indeno(1,2,3-cd)pyrene	CAS No.: 206-44-0
$C_{11}H_{10}$	2-Methylnaphthalene	CAS No.: 91-57-6
$C_{10}H_{8}$	Naphthalene	CAS No.: 91-20-3
$C_{14}H_{10}$	Phenanthrene	CAS No.: 85-01-8
$C_{16}H_{10}$	Pyrene	CAS No.: 129-00-0

Synonyms:

Anthracene:	Anthracin, green oil, paranaphthalene, tetra olive U2G.
Benz(a)anthracene:	BH, benzanthracene, 1,2-benzanthracene, 1,2-benz(a)anthracene, benzanthrene, benzoanthracene, 1,2-benzoanthracene, benzo(a)anthracene, benzo(a)phenanthrene, benzo(b)phenanthrene, 2,3-benzophenanthrene, 2,3-benzphenanthrene, naphthanthracene, tetraphene, and RCRA Waste #U018.
Benzo(a)pyrene:	3,4-Benzpyrene, 1,2-benzpyrene, benzo(d,e,f)chrysene, 3,4-benzopyrene, 6,7-benzopyrene, benz(a)pyrene, B(a)P, RCRA Waste # U022.
Benzo(g,h,i)perylene:	1,12-Benzperylene, 1,12-benzoperylene.
Benz(k)fluoranthene:	8,9-Benzofluoranthene, 11,12-benzofluoranthene, 11,12-benzo(k)fluoranthene, 2,3,1',8'-binaphthylene, dibenzo(b,j,k)fluoranthrene.
Chrysene:	1,2-Benzphenanthrene, 1,2-benzophenanthrene, benzo(a)phenanthrene, benz(a)phenanthrene, 1,2,5,6-dibenzonaphthalene, RCRA Waste # U050.

Fluoranthene:	1,2-Benzacenaphthene, benzo(j,k)fluorene, IDRYL, 1,2-(1,8-naphthalenediyl) benzene, 1,2-(1,8-napthtylene) benzene, RCRA Waste # U120.
Fluorene:	Diphenylenemethane, 2,3-benzindene, o-biphenylenemethane, 2,2'-methylenebiphenyl, 9H-fluorene.
Indeno(1,2,3-cd)pyrene:	2,3-Phenylenepyrene, 2,3-o-phenylenepyrene, 1,10-(o-phenylene)pyrene, 1,10-(1,2-phenylene)pyrene, RCRA Waste # U137.
2-Methylnaphthalene:	β-Methylnaphthalene.
Naphthalene:	Naphthalin, naphthene, tar camphor, camphor tar, mighty 150, moth balls, moth flakes, naphthaline, NCI-C52904, white tar, RCRA Waste # U165.
Phenanthrene:	Phenantrin.
Pyrene:	Benzo(d,e,f)phenanthrene, β-pyrine.

Contaminant Properties/Hazard Classification:

Anthracene

Physical State	Solid
Color	colorless if pure, yellow if unpure
Atomic Weight	178.2
Boiling Point	342 °C @ 760 torr
Melting Point	218°C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	4.45
Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	0
Flammability	1
Reactivity	0
Special Symbols	information pending

Benz(a)anthracene

Physical State	solid
Color	under ultraviolet light, yellow-green
Atomic Weight	228.3
Boiling Point	400 °C
Melting Point	160°C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	information pending
Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

Benzo(a)pyrene

Physical State	solid
Color	pale yellow
Atomic Weight	252.3
Boiling Point	310 - 312°C
Melting Point	179°C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	information pending
Henry's Law Constant	information pending
Vapor Pressure	information pending

NFPA	Health	information pending
	Flammability	information pending
	Reactivity	information pending
	Special Symbols	information pending

Benzo(g,h,i)perylene

Physical State	solid
Color	yellow under ultraviolet light
Atomic Weight	276.3
Boiling Point	information pending
Melting Point	272 - 273 °C
Water Solubility	information pending
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	information pending
Henry's Law Constant	information pending
Vapor Pressure	information pending

NFPA	Health	information pending
	Flammability	information pending
	Reactivity	information pending
	Special Symbols	information pending

Benz(k)fluoranthene

Physical State	solid
Color	yellow
Atomic Weight	252.3
Boiling Point	480 °C
Melting Point	217 °C
Water Solubility	information pending
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	information pending
Henry's Law Constant	information pending
Vapor Pressure	information pending

NFPA	Health	information pending
	Flammability	information pending
	Reactivity	information pending
	Special Symbols	information pending

Chrysene

Physical State	solid
Color	reddish-violet under ultraviolet light
Atomic Weight	228.3
Boiling Point	448 °C
Melting Point	254 °C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.274

Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

Fluoranthene

Physical State	solid
Color	colorless
Atomic Weight	202.3
Boiling Point	367 °C
Melting Point	120°C
Water Solubility	information pending
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.274
Henry's Law Constant	information pending
Vapor Pressure	0.01 mm @ 20°C
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

Fluorene

Physical State	solid
Color	white
Atomic Weight	116.2
Boiling Point	295 °C
Melting Point	116 - 117 °C
Water Solubility	0.69 - 1.98 mg/L
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.202
Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

Indeno(1,2,3-cd)pyrene

Physical State	solid
Color	yellow
Atomic Weight	276.3
Boiling Point	information pending
Melting Point	161 - 163.5°C

Water Solubility	information pending
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	information pending
Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

2-Methylnaphthalene

Physical State	solid
Color	information pending
Atomic Weight	228.3
Boiling Point	241.1 °C
Melting Point	34.58 °C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.006
Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

Naphthalene

Physical State	solid
Color	white
Atomic Weight	128.2
Boiling Point	217 °C at 760torr
Melting Point	80.2 °C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.162
Henry's Law Constant	information pending
Vapor Pressure	1 mm @ 52.6°C
NFPA Health	2
Flammability	2
Reactivity	0
Special Symbols	information pending

Phenanthrene

Physical State	solid
Color	reddish-violet under ultraviolet light

Atomic Weight	228.3
Boiling Point	448 °C
Melting Point	254°C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.274
Henry's Law Constant	information pending
Vapor Pressure	1 mm @ 52.6°C
NFPA Health	0
Flammability	1
Reactivity	0
Special Symbols	information pending

Pyrene	
Physical State	solid
Color	colorless if pure, yellow if impure
Atomic Weight	202.2
Boiling Point	404 °C
Melting Point	156°C
Water Solubility	insoluble
Viscosity	information pending
Odor	information pending
Specific Gravity/Density	1.271
Henry's Law Constant	information pending
Vapor Pressure	information pending
NFPA Health	information pending
Flammability	information pending
Reactivity	information pending
Special Symbols	information pending

Contamination Distribution/Information:

Polynuclear Aromatic Hydrocarbons (PAHs) are a constituent of diesel fuels and motor oils. The group PAHs are a USEPA designation for an analytical test.

References:

1. Sax's Dangerous Propertias of Industrial Materials, Eighth Edition, Richard J. Lewis, Editor, Van Nostrand Reinhold, New York, New York, 1992.

2. Merck Index

Pb **LEAD** CAS No.: 7439-92-1

Synonyms: Lead metal, Plumbum.

Contaminant Properties

Physical Description: Bluish-gray, heavy, ductile soft metal.

Atomic Weight	207.19
Boiling Point	1740 °C
Melting Point	327.43 °C
Water Solubility	insoluble
Viscosity	information not available
Odor	none
Specific Gravity/Density	11.34
Henry's Law Constant	information not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	3
	Flammability	1
	Reactivity	0
	Special Symbols	poison

ACGIH TLV-TWA	0.05 mg/m^3
OSHA PEL TWA	0.05 mg/m^3 (applies to other lead compounds as Pb)

Contaminant Distribution/Information

When released to the air from industry or burning of fossil fuels or waste, lead particles stay in the air around 10 days. Most of the lead in soil comes from these particles settling out of the air. Once in the soil, the lead binds to soil particles. It does not move from soil to groundwater unless the water is acidic. Lead compounds are not usually mobile in surface or ground water due to adsorption by ferric hydroxide or reaction with carbonate or sulfate ions to form insoluble compounds. In the aquatic environment, lead exists chiefly as the divalent cation. It is readily adsorbed to inorganic solids, organic materials, and hydrous iron and manganese oxides in the sediment. Lead and its compounds are highly persistent in water, with a half-life greater than 200 days.

Lead is flammable and moderately explosive in the form of dust when exposed to heat or flame. When it is heated to decomposition, it emits highly toxic fumes. Lead can also react vigorously with oxidizing materials.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 27pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Clement Associates, Inc., 1985. Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites: Final Report. Consultants report to the USEPA, NTIS PB89-132203, 619pp.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

6. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

7. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 2093-2094pp.

Sb **ANTIMONY** CAS No.: 7440-36-0

Synonyms: Antimony metal, Antimony powder, Stibium.

Contaminant Properties

Physical Description: Silver or gray, lustrous metal.

Atomic Weight	121.75
Boiling Point	1635 °C
Melting Point	630 °C
Water Solubility	insoluble
Viscosity	information not available
Odor	none
Specific Gravity	6.684
Henry's Law Constant	not applicable
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	1
	Reactivity	1
	Special Symbols	flammable
ACGIH TLV-TWA		0.5 mg/m^3
OSHA PEL TWA		0.5 mg/m^3

Contaminant Distribution/Information

Most antimony waste is found in soil, where it attaches firmly to particles that contain iron, manganese, or aluminum. It can also attach to very small airborne particles and remain in the air for many days. In addition, antimony found in water is highly persistent with a half-life of longer than 200 days.

Fire and explosion hazards from antimony are moderate in the forms of dust and vapor, when exposed to heat or flame. Toxic hazards are also present when heated or on contact with acid because of the emission of toxic fumes (SbH_3).

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 16pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

6. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

7. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 2. Van Nostrand Reinhold, NY. 269pp.

Se **SELENIUM** CAS No.: 7782-49-2

Synonyms: Elemental selenium, Selenium alloy.

Contaminant Properties

Physical Description: Amorphous or crystalline black, gray or red odorless solid.

Atomic Weight	78-96
Boiling Point	690 °C
Melting Point	170-217°C
Water Solubility	insoluble
Viscosity	information not available
Odor	none
Specific Gravity/Density	4.28
Henry's Law Constant	information not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.2 mg/m^3 (metal and compounds as Se
OSHA PEL TWA	0.2 mg/m^3

Contaminant Distribution/Information

Selenium is present in coal and fuel oil, and is emitted in flue gas and fly ash during combustion. Airborne selenium particles settle to the ground or are taken out of the air in rain. Selenium compounds are common air contaminants. Selenium and its compounds have water solubilities ranging from low to moderate.

Selenium reacts violently with oxidants and strong acids. In addition, selenium reacts violently with water at 50 °C to form flammable hydrogen and selenious acids. When selenium compounds are heated to decomposition, they emit toxic fumes of Se.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 35pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

6. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

7. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 3027-3028pp.

Tl **THALLIUM** CAS No.: 7440-28-0

Synonyms: RAMOR.

Contaminant Properties

Physical Description: Bluish-white, soft, malleable metal.

Atomic Weight	204.37
Boiling Point	1457 °C
Melting Point	303.5°C
Water Solubility	insoluble
Viscosity	information not available
Odor	none
Specific Gravity/Density	11.85
Henry's Law Constant	information not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.1 mg/m^3 (skin)
OSHA PEL TWA	0.1 mg/m^3 (skin)

Contaminant Distribution/Information

Thallium and compounds may enter the environment during mining and smelting operations, industrial discharges, or spills. It stays in the air, water, and soil for a long time and is not broken down. Thallium itself is likely to be highly persistent in water, as it has only slight water solubility. Other compounds of thallium will vary in persistence, as water solubility varies from compound to compound.

Thallium reacts violently with fluorine. When heated to decomposition, it emits toxic fumes of Tl. Thallium is also flammable in the form of dust when exposed to heat or flame.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 37pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

4. pen Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

5. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 3258pp.

$C_6H_5CH_3$ **TOLUENE** CAS No.: 108-88-3

Synonyms: Methyl benzene, Methyl benzol, Phenyl methane, Toluol.

Contaminant Properties

Physical Description: Colorless liquid.

Atomic Weight	92.15
Boiling Point	110.4 °C
Melting Point	-95 °C
Water Solubility	slightly soluble (1 mg/mL @ 18 C)
Viscosity	information not available
Odor	sweet, pungent, benzene-like
Specific Gravity/Density	0.87
Henry's Law Constant	1.5e-01 (mol_{aq}/l_{aq})/atm
Vapor Pressure	21 mmHg (approx)

Hazard Classification

NFPA	Health	2
	Flammability	3
	Reactivity	0
	Special Symbols	flammable

ACGIH TLV-TWA	188 mg/m^3 (skin)
OSHA PEL TWA	200 ppm (1 ppm = 3.77 mg/m^3)

Contaminant Distribution/Information

Toluene does not stay long in the environment and is readily broken down by microorganisms in the soil. It evaporates quickly from the soil and surface water into the air. In the air it combines with oxygen to form benzaldehyde and cresol. Toluene is non-persistent in water, with a half-life less than 2 days. About 99.5% of toluene will eventually end up in air; the rest will end up in the water.

Toluene is a very dangerous fire hazard when exposed to heat, flame, or oxidizers. I reacts violently with strong oxidants causing fire and explosion hazards.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 38pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. National Institute for Occupational Safety and Health (NIOSH), 1998. International Chemical Safety Cards. HTML version: http://www.cdc.gov/niosh/ipcs/icstart.html.

6. National Institute of Environmental Health Sciences National Toxicology Program, 1998. NTP Chemical Health & Safety Data. HTML version: http://ntp-db.niehs.nih.gov/Main_pages/Chem-HS.HTML.

7. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

8. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 3309-3310pp.

V **VANADIUM** CAS No.: 7440-62-2

Synonyms: Commonly in form of Vanadium dust (Vanadium pentoxide).

Contaminant Properties

Physical Description: Gray or white shiny powder or solid metal.

Atomic Weight	50.94
Boiling Point	3380 °C
Melting Point	1890 °C
Water Solubility	insoluble
Viscosity	information not available
Odor	none
Specific Gravity/Density	5.8 g/cm^3
Henry's Law Constant	information not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	1
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	0.05 mg/m^3 (vanadium pentoxide/dust - CAS 1314-62-1)
OSHA PEL TWA	information not available

Contaminant Distribution/Information

Vanadium usually combines with other elements such as oxygen, sodium, sulfur, or chloride rather than persisting in it pure elemental form. It stays in the air, water, and soil for a long time, although, elemental vanadium is not likely to dissolve in surface water. Vanadium and its compounds tend to adhere to soil sediments. It is ordinarily recovered from its raw materials in the form of pentoxide, and sometimes as sodium and ammonium vanadate salts.

Large pieces of vanadium are not soluble, but fine powder can burn. Do not use water to extinguish burning vanadium.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 39pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

4. National Institute for Occupational Safety and Health (NIOSH), 1998. Pocket Guide to Chemical Hazards. HTML version: http://www.cdc.gov/niosh/npg/pgdstart.html.

5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

Zn **ZINC** CAS No.: 7440-66-6

Synonyms: Blue powder, Zinc powder, Merrillite.

Contaminant Properties

Physical Description: Bluish-white, lustrous, soft metal.

Atomic Weight	65.37
Boiling Point	908 °C
Melting Point	419.8 °C
Water Solubility	insoluble/reaction
Viscosity	information not available
Odor	none
Specific Gravity/Density	7.14
Henry's Law Constant	information not available
Vapor Pressure	0 mmHg (approx)

Hazard Classification

NFPA	Health	0
	Flammability	0
	Reactivity	0
	Special Symbols	none

ACGIH TLV-TWA	5 mg/m^3 (zinc oxide fume)
10 mg/m^3 (zinc oxide dust)	
OSHA PEL TWA	information not available

Contaminant Distribution/Information

Zinc may enter the environment in the discharge from galvanizing plants, as a leachate from galvanized structures and natural ores, and from municipal waste treatment plant discharges. It combines with other elements to form zinc compounds such as zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc attaches to soil, sediments, and dust particles in the air. Most of the zinc in soil stays bound to soil particles. It builds up in fish and other organisms, but it doesn't build up in plants.

Zinc is a combustible solid. It is flammable in the form of dust when exposed to heat or flame and may ignite spontaneously in air when dry. When heated to decomposition, it gives off irritating or toxic fumes. There is also a risk of fire and explosion on contact with acids, water, and bases.

References

1. ACGIH, 1997. Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposures Indices. 6th ed. ACGIH, Cincinnati, OH. 40pp.

2. Agency for Toxic Substances and Disease Registry, 1998. ToxFAQS. HTML version: http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html.

3. Dan Woodard, MD and Ralph Stuart, CIH, 1998 (maintained by). Vermont SIRI Safety Information on the Internet: Vermont SIRI MSDS Archive. HTML version: http://hazard.com/msds/index.html.

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5. Open Data Solutions, Inc., 1998. EPA Factsheets for Regulated Chemicals. Alexandria, VA. HTML version: http://mail.odsnet.com/TRIFacts/.

6. R. J. Lewis (revised by), 1992. Sax's Dangerous Properties of Industrial Materials. 8th ed. Volume 3. Van Nostrand Reinhold, NY. 3536pp.