

### **3. CHEMICAL AND PHYSICAL INFORMATION**

#### **3.1 CHEMICAL IDENTITY**

Table 3-1 lists the common synonyms, trade names, and other pertinent identification information for cadmium and its most important compounds

#### **3.2 PHYSICAL AND CHEMICAL PROPERTIES**

Table 3-2 lists important physical and chemical properties of cadmium and its most important compounds.

## 3. CHEMICAL AND PHYSICAL INFORMATION

**Table 3-1. Chemical Identity of Cadmium and Compounds<sup>a</sup>**

Characteristic	Cadmium	Cadmium carbonate	Cadmium chloride
Synonym(s)	Colloidal cadmium	Otavite <sup>b</sup> ; cadmium monocarbonate; carbonic acid; cadmium salt	Caddy <sup>b</sup> ; Vi-Cad <sup>b</sup> ; cadmium dichloride; dichlorocadmium
Registered trade name(s)	No data	No data	No data
Chemical formula	Cd <sup>b</sup>	CdCO <sub>3</sub> <sup>b</sup>	CdCl <sub>2</sub> <sup>b</sup>
Chemical structure	Cd <sup>b</sup>	CdCO <sub>3</sub> <sup>b</sup>	CdCl <sub>2</sub> <sup>b</sup>
Identification numbers:			
CAS registry	7440-43-9 <sup>b</sup>	513-78-0 <sup>b</sup>	10108-64-2
NIOSH RTECS	EU9800000	FF9320000	EV0175000
EPA hazardous waste	D006	D006	D006
OHM/TADS	7216622	No data	7217229
DOT/UN/NA/IMCO shipping	UN2570/IMCO 6.1	UN2570/IMCO 6.1	NA2570/IMCO 6.1
HSDB	282	1612	278
NCI	No data	No data	No data
Characteristic	Cadmium oxide	Cadmium sulfate	Cadmium sulfide
Synonym(s)	Cadmium fume; cadmium monoxide	Cadmium sulphate; Sulfuric acid; cadmium (2+) salt	Cadmium monosulfide; Cadmium yellow; Cadmium orange; Cadmopur yellow; Greenockite <sup>b</sup> ; Capsebon <sup>b</sup>
Registered trade name(s)	No data	No data	No data
Chemical formula	CdO <sup>b</sup>	CdSO <sub>4</sub> <sup>b</sup>	CdS <sup>b</sup>
Chemical structure	CdO <sup>b</sup>	CdSO <sub>4</sub> <sup>b</sup>	CdS <sup>b</sup>
Identification numbers:			
CAS registry	1306-19-0 <sup>b</sup>	10124-36-4 <sup>b</sup>	1306-23-6 <sup>b</sup>
NIOSH RTECS	EV1925000	EV2700000	EV3180000
EPA hazardous waste	D006	D006	D006
OHM/TADS	No data	7217231	No data
DOT/UN/NA/IMCO shipping	UN2570/IMCO 6.1	UN2570/IMCO 6.1	NA2570/IMCO 6.1
HSDB	1613	274	1614
NCI	CO2551	No data	CO2711

<sup>a</sup>All information obtained from HSDB 1996 except where noted<sup>b</sup>Merck 1989

CAS = Chemical Abstracts Service; DOT/UN/NA/IMCO = Department of Transportation/United Nations/North America/International Maritime Dangerous Goods Code; EPA = Environmental Protection Agency; HSDB = Hazardous Substances Data Bank; NCI = National Cancer Institute; NIOSH = National Institute for Occupational Safety and Health; OHM/TADS = Oil and Hazardous Materials/Technical Assistance Data System; RTECS = Registry of Toxic Effects of Chemical Substances

Table 3-2. Physical and Chemical Properties of Cadmium and Compounds<sup>a</sup>

Property	Cadmium	Cadmium carbonate	Cadmium chloride
Molecular weight	112.41 <sup>b</sup>	172.42 <sup>b</sup>	183.32
Valence	2 <sup>b</sup>	2	2
Color	Silver-white <sup>b</sup>	White <sup>c</sup>	Colorless
Physical state	Lustrous solid	Powder or rhombohedral leaflets <sup>b</sup>	Rhombohedral crystals <sup>b</sup>
Melting point	321 °C <sup>b</sup>	Decomposes at <500 °C <sup>g</sup>	568 °C <sup>b</sup>
Boiling point	765 °C <sup>b</sup>	No data	960 °C <sup>b</sup>
Density	8.65 g/cm <sup>3</sup> at 25 °C <sup>b</sup>	4.26 g/cm <sup>3</sup> at 4 °C <sup>g</sup>	3.33 g/cm <sup>3</sup> at 20 °C <sup>b</sup>
Odor	Odorless	No data	Odorless <sup>c</sup>
Odor threshold:			
Water	No data	No data	No data
Air	No data	No data	No data
Solubility:			
Water	Insoluble <sup>b</sup>	Insoluble <sup>g</sup>	Soluble <sup>b</sup>
Organic solvent(s)	Acids, NH <sub>4</sub> NO <sub>3</sub> , hot H <sub>2</sub> SO <sub>4</sub> <sup>g</sup>	Dilute acid, concentrated NH <sub>4</sub> solution <sup>c</sup>	Acetone, slightly soluble in MEOH and ETOH <sup>b</sup>
Partition coefficients:			
Log K <sub>ow</sub>	No data	No data	No data
Log K <sub>oc</sub>	No data	No data	No data
Vapor pressure	1 mmHg at 394 °C <sup>e</sup>	No data	10 mm Hg at 656 °C <sup>e</sup> ; 40 mm Hg at 736 °C <sup>d</sup> ; 760 mm Hg at 967 °C <sup>d</sup>
Henry's law constant	No data	No data	No data
Autoignition temperature	250 °C	No data	No data
Flashpoint	No data	No data	No data
Flammability limits	No data	No data	No data
Conversion factors:	No data	No data	No data
Explosive limits	No data	No data	No data

Table 3-2. Physical and Chemical Properties of Cadmium and Compounds (continued)

Property	Cadmium oxide	Cadmium sulfate	Cadmium sulfide
Molecular weight	128.41 <sup>b</sup>	208.47 <sup>b</sup>	144.47 <sup>b</sup>
Valence	2	2	2
Color	Dark brown <sup>b</sup>	Colorless <sup>c</sup>	Light yellow or orange <sup>b</sup>
Physical state	Infusible powder or cubic crystals <sup>b</sup>	Monoclinic crystals <sup>b</sup>	Cubic or hexagonal crystals <sup>b</sup>
Melting point	No data	1,000 °C <sup>g</sup>	1,750 °C <sup>g</sup>
Boiling point	Sublimes at 1,559 °C <sup>c</sup>	No data	Sublimes in N <sub>2</sub> at 980 °C <sup>c</sup>
Density	Crystals 8.15 g/cm <sup>2</sup> ; amorphous powder 6.95 g/cm <sup>3</sup> <sup>c</sup>	4.69 g/cm <sup>3</sup> <sup>b</sup>	4.82 g/cm <sup>3</sup> , hexagonal structure <sup>b</sup> ; 4.5 g/cm <sup>3</sup> , cubic structure <sup>b</sup>
Odor	Odorless	Odorless <sup>b</sup>	No data
Odor threshold:			
Air	No data	No data	No data
Water	No data	No data	No data
Solubility:			
Water	Insoluble <sup>b</sup>	Soluble <sup>c</sup>	Soluble at 1.3 mg/L at 18 °C <sup>b</sup>
Organic solvent(s)	Dilute acids, slowly soluble in NH <sub>4</sub> salts <sup>b</sup>	Insoluble in alcohol, acetone, ammonia <sup>g</sup>	Concentrated or warm dilute mineral acids <sup>b</sup>
Partition coefficients:			
Log K <sub>ow</sub>	No data	No data	No data
Log K <sub>oc</sub>	No data	No data	No data
Vapor pressure	1 mm Hg at 1,000 °C <sup>e</sup>	No data	No data
Henry's law constant	No data	No data	No data
Autoignition temperature	No data	No data	No data
Flashpoint	No data	No data	No data
Flammability limits	No data	No data	No data
Conversion factors	No data	No data	No data
Explosive limits	No data	No data	No data

<sup>a</sup> All information obtained from HSDB 1996 unless otherwise noted

<sup>b</sup> Merck 1989

<sup>c</sup> Lewis 1993

<sup>d</sup> Farnsworth 1980

<sup>e</sup> Sax and Lewis 1989

<sup>f</sup> Clayton and Clayton 1981

<sup>g</sup> Weast 1994