TOTAL P.13

5

58033

# THE MERCK INDEX

AN ENCYCLOPEDIA OF
CHEMICALS, DRUGS, AND BIOLOGICALS

TWELFTH EDITION

Susan Budavari, *Editor*
Maryadele J. O'Neil, *Senior Associate Editor*
Ann Smith, *Associate Editor*
Patricia E. Heckelman, *Assistant Editor*
Joanne F. Kinneary, *Assistant Editor*

*Published by*
*Merck Research Laboratories*
*Division of*
**MERCK & CO., INC.**
Whitehouse Station, NJ

1996

10459

Received by
JUN 2 9 1998
SM

JUN-23-1998 11:21 FROM ERM/GOLDER PROJECT TEAM TO 6653285 P.13

f lysine. Formed through actio
meat, fish, albumin, etc. Found in
: Bocklisch, *Ber.* 18, 1922 (1885);
*Chem.* 54, 16 (1907). Prepn: L
(1885). GC determa in foods: W
Bond, *J. Assoc. Offic. Anal. Chem*
bolism study of $^{14}$C-cadaverine i
n, M. Stepita-Klauco, *J. Neurochem*
ynthetic study in *S. ruminantium*:
*l. Chem.* 257, 3326 (1982).
liquid; characteristic odor. Strong
$CO_2$ on exposure to air. pKa, 18
us/ $d_4^{20}$ 0.873. mp 9°. bp 178-180°.
alcohol; slightly sol in ether. *Keep*

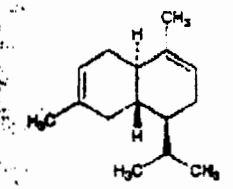
$C_5H_{14}N_2 \cdot 2HCl$. needles from water.
ter. Practically insol in abs alc.
tant and possible sensitizer.

**ter Iodine.** Iodosorb. A hydrop
ymer containing 0.9% (w/w) io
rix. Produced by the reaction of de
coupled with ion exchange groups
in venous ulcers: E. Skog *et al.*, *Bri*
1983); M. C. Ormiston *et al.*, *Brit.*
L. Hillström, *Acta Chir. Scand.*

erary.

**n.** Family of calcium-dependent
thought to be key regulators of morp
s. Transmembrane glycoprotein
Mediate tissue development by co
dentical cadherin types via homop
f cadherin function has been associ
sis. Two subfamilies have been ide
erins and the desmosomal cadherin
*ins* and *desmogleins*, which differ tra
primarily in the structure of the cy
number of classic cadherins have be
ture is based on the cell from wh
ified, *e.g.* E-, N- and P-cadherins tra
d placental cells, resp. Among
uno acids are conserved within a p
ic cadherins are complexed with c
own as *catenins* which anchor them
skeleton and are required for adh
of discovery and characterization
ichi, *Development* 102, 639-655 (19
*chem.* 99, 237-252 (1990); of propert
genesis: *idem, Science* 251, 1451-1
*ieta Anat.* 149, 165-169 (1994). Rev
catenins: R. Kemler, *Trends Gene*
Hinck *et al.*, *Trends Biochem. Sc*
view of role in tumor metastasis:
*Cell Biol.* 5, 806-811 (1993); W. Birc
*Biochim. Biophys. Acta* 1198, 11-
huk *et al.*, *Endocrine* 3, 83-89 (19
mal cadherins: P. J. Koch, W.
*Cell Biol.* 6, 682-687 (1994).

**n.** $C_{15}H_{24}$; mol wt 204.36. C 88.16%
nes occurring in essential oils from
ars (oil of cade). Nine possible isom
hemistry and position of the do
isomer being β-cadinene: Sykora *et*
(1958). Prepn and structure: C
*Chem. Soc.* 64, 417 (1942); Campbell
*et al.*, *Tetrahedron Letters* 1969,
*zech. Chem. Commun.* 31, 3012 (19
linay, *Tetrahedron Letters* 1968, 1
isomers, all able to yield (−)-cad
are known: Herout, Sykora, *Tet*
Kartha *et al.*, *ibid.* 19, 241 (1
uration of isomers: Sykora *et al.*, *C*
*un.* 23, 2181 (1958). Isoln of α-
op: Y. Naya, M. Kotake, *Bull. Che*
(1969). Synthesis: O. P. Vig, *Indian*
2). Brief review in *Rodd's Chemis*
vol. 2, pt. C, S. Coffey, Ed. (El
268-270.



β-form

oil. Slight pleasant odor. bp$_4$ 124°. $d_4^{20}$ 0.9059. $[\alpha]_D^{20}$ −251°.

**mium.** Cd; at. wt 112.411; at. no. 48; roup IIB(12) element. Abundance in earth's 0.2 ppm. Naturally occurring isotopes (mass 114 (28.73%); 112 (24.13%); 111 (12.80%); 110 (12.22%), $T_{1/2}$ 9.3 × 10$^{18}$ yrs, β-emitter; 116 (1.25%); 108 (0.89%); known artificial radioac- 97-105, 107, 109, 115, 117-122, 124, 126. ores; also as CdS, greenockite; $CdCO_3$, ota- d in vapor form when roasting zinc ores, as inc sulfate purification. Lab prepns from well, *Helv. Chim. Acta* 4, 551 (1921). Impli- ive agent in Itai-Itai ("ouch-ouch") disease in *et al.*, *Environ. Res.* 4, 71-85 (1971); Fassett, *rmacol.* 15, 425-435 (1975). *Review:* Aylett *Comprehensive Inorganic Chemistry*, vol. 3, *et al.*, Eds. (Pergamon Press, Oxford, 1973) J. S. Carr in Kirk-Othmer *Encyclopedia of ology* vol. 4 (John Wiley & Sons, New York, pp 748-760; N. Herron, *ibid* 760-776. Review ic risk: *IARC Monographs* 11, 39-74 (1976); *Cadmium in the Human Environment: Toxic- carcinogenicity*, G. F. Nordberg *et al.*, Eds., *IARC Publ.* no. 118 (1992) 469 pp.

blue-tinged, lustrous metal; distorted hexa- -packed structure; easily cut with a knife; availa- form of bars, sheets or wire or a gray, granular 321°. bp 765°. $d^{20}$ 8.65. Specific heat at ure (25°) 6.22 cal/mole deg. Slowly oxidized to form CdO. $E^\circ$ (aq) $Cd/Cd^{2+}$ 0.4025 V. Reacts readily with dil $HNO_3$; reacts slowly does not react with alkalies. Other reactions ose of zinc. Solns of cadmium salts and $H_2S$ or a yellow ppt insol in excess $Na_2S$.

Overexposure to cadmium and cadmium com- been associated with acute and chronic toxicity. ymptoms of acute poisoning from the inhalation ust or fumes include headache, chest pains, fume fever, weakness. Potential symptoms of from ingestion of cadmium salts are GI headache, muscular cramps, vertigo, convul- onic inhalation may cause pulmonary emphyse- tic bronchitis. *See Clinical Toxicology of Com- R. E. Gosselin et al.*, Eds. (Williams & Baltimore, 5th ed., 1984) Section II, p 99; Section Potential toxic effects due to chronic overex- inhalation or ingestion are anemia; kidney dam- malacia and osteoporosis. Itai-itai disease is a associated with a cadmium-induced renal is attributed to high oral intake of cadmium in characterized by progressive bone demineral- ith painful joints and bones. *See Patty's Indus- and Toxicology* vol. 2C, G. D. Clayton, F. E. Eds. (John Wiley & Sons, New York, 4th ed., 4-1967. *See also NIOSH Pocket Guide to Chemi- DHHS/NIOSH* 90-117, 1990) p 56. Cadmium compounds may reasonably be antici- ogens: *Seventh Annual Report on Carcino- 0978*1, 1994) p 111.

including Ni-Cd storage batteries; coating ating steel and cast iron, pigments; plastic sta- ructant of low melting or easily fusible alloys, berg's, Abel's, Lipowitz', Newton's, and electronics and optics; soft solder and solder reactor control rods; hardener for copper;

THERAPEUTICALLY: Many cadmium salts, especially the oxide and anthranilate, are used or have been suggested as anthelmintics in swine and poultry.

**1650. Cadmium Acetate.** $C_4H_6CdO_4$; mol wt 230.50. C 20.84%, H 2.62%, Cd 48.77%, O 27.76%. $Cd(CH_3COO)_2$. Prepd by treating cadmium nitrate with acetic anhydride: Späth, *Monatsh.* 33, 241 (1912); Wagenknecht, Juza, in *Handbook of Preparative Inorganic Chemistry*, vol. 2, G. Brauer, Ed. (Academic Press, New York, 2nd ed., 1965) p 1105.

Dihydrate, crystals. Slight acetic acid odor; becomes anhydr at about 130°. d 2.01. d (anhydr) 2.341. mp (anhydr) 255°. Freely sol in water; sol in alcohol. pH of 0.2 molar aq soln 7.1.

USE: Producing iridescent effects on porcelains and pottery; as a reagent for determination of S, Se, and Te; in cadmium electroplating.

**1651. Cadmium Bromide.** $Br_2Cd$; mol wt 272.22. Br 58.71%, Cd 41.29%. $CdBr_2$. Usually prepd from the elements: Honigschmid, Schiee, *Z. Anorg. Allgem. Chem.* 227, 184 (1936); Wagenknecht, Juza, in *Handbook of Inorganic Chemistry*, vol. 2, G. Brauer, Ed. (Academic Press, New York, 2nd ed., 1965) p 1096.

Hexagonal, pearly flakes; highly hygroscopic. mp 566°; bp 963°; d 5.192. Freely sol in water, alc; moderately sol in acetone; slightly sol in ether. Crystallizes as the monohydrate below 36°, as the tetrahydrate above 36°.

USE: In photography, process engraving, and lithography.

**1652. Cadmium Carbonate.** $CCdO_3$; mol wt 172.42. C 6.97%, Cd 65.20%, O 27.84%. $CdCO_3$. Occurs in nature as the mineral, *otavite*. Prepn: de Schulten, *Bull. Soc. Chim. France* [3] 19, 34 (1898); Biltz, *Z. Anorg. Allgem. Chem.* 220, 312 (1934).

Powder or rhombohedral leaflets. d 4.26. Practically insol in water. Sol in concd solns of ammonium salts, dil acids.

**1653. Cadmium Chloride.** Caddy; Vi-Cad. $CdCl_2$; mol wt 183.32. Cd 61.32%, Cl 38.68%. Prepn: *Gmelin's, Cadmium* (8th ed.) 33, pp 82-83 (1925); supplement, pp 464-465 (1959); Pray, *Inorg. Syn.* 5, 153 (1957).

Hygroscopic, rhombohedral crystals. mp 568°; bp 960°; d 4.05. Freely sol in water; sol in acetone; slightly sol in methanol, ethanol. Practically insol in ether. $LD_{50}$ orally in rats: 88 mg/kg. *Toxic Substances List*, H. E. Christensen *et al.*, Eds. (1974).

Hemipentahydrate, efflorescent granules or rhombohedral leaflets. $d^{25}$ 3.33. Freely sol in water.

USE: Photography; dyeing and calico printing; in the vacuum tube industry; manuf of cadmium yellow; galvanoplasty; manuf of special mirrors; as ice-nucleating agent; as lubricant; in analysis of sulfides to absorb the $H_2S$; in testing for pyridine bases; as fungicide.

**1654. Cadmium Cyanide.** $C_2CdN_2$; mol wt 164.45. C 14.61%, Cd 68.36%, N 17.04%. $Cd(CN)_2$. Prepn from $Cd(OH)_2$ and HCN: Biltz, *Z. Anorg. Allgem. Chem.* 170, 161 (1928); Wagenknecht, Juza in *Handbook of Preparative Inorganic Chemistry*, vol. 2, G. Brauer, Ed. (Academic Press, New York, 2nd ed., 1965) p 1105.

Crystals or white powder. Turns brown on heating in air. *Very poisonous!* d 2.226. Soly in water (15°) 1.71 g/100 ml. Slightly sol in alc; sol in solns of alkali cyanides or hydroxides; not appreciably attacked by organic acids, but readily dec by dil mineral acids with evolution of hydrogen cyanide. Readily forms complex cyanides.

USE: In copper bright electroplating.

**1655. Cadmium Fluoride.** $CdF_2$; mol wt 150.41. Cd 74.74%, F 25.26%. Prepn from $CdCl_2$ and $NH_4F$: Kurtenacker *et al.*, *Z. Anorg. Chem.* 211, 89 (1933); from $CdCO_3$ and HF: Kwasnik in *Handbook of Preparative Inorganic Chemistry*, vol. 1, G. Brauer, Ed. (Academic Press, New York, 2nd ed., 1963) p 243.

Cubic crystals. mp 1049°; bp 1748°; d 6.33. *Poisonous!* Soly in water (25°) 4.3 g/100 ml. Sol in HF and other mineral acids, practically insol in alcohol and liquid ammonia.

copals. *Habit.* Zanzibar, Mozambique, also S. America, Australia, Philippine Islands and West Indies. *Constit.* Zanzibar copal contains 80% trachylolic acid, 4% isotrachylolic acid, 6% resene and volatile oil. Kauri copal contains dammaric acid, dammaran and a resin.

Yellowish to yellowish-brown pieces of various sizes; conchoidal fracture; odorless and tasteless. Hard copals are almost insol in usual solvents; soft copals are partly sol in alcohol, chloroform or glacial acetic acid; both copals after having been fused are sol in oil turpentine and linseed oil.

USE: In varnishes and cements; as substitute for amber; manuf oil cloths and linoleum. In dentistry, for modeling compds and cavity varnishes.

**2582. Coparaffinate.** *Isopar.* A mixture of water-insol isoparaffinic acids partially neutralized with hydroxybenzyldialiphatic amines. The water-insol isoparaffinic acids are obtained by oxidation of petroleum hydrocarbons by the passage of a current of oxygen under pressure at an elevated temp in the presence of a metal catalyst. The water-insol mono- and dicarboxylic acids with from 6 to 16 carbon atoms are separated and purified by fractional distillation. The hydroxybenzyldialiphatic amines are combined directly with the isoparaffinic acids or in suitable solvent. The latter is then removed by distillation: C. E. Earle, U.S. pat. 2,262,720 (1941).

Dark-brown, viscous, oily liq. Odor of burnt petroleum. d 0.970-0.980. Immiscible with water. Freely sol in alc, volatile and fixed oils. Marketed as a 17% ointment, which also contains 4% titanium dioxide in an ointment base consisting of beeswax, cetyl alcohol, lanolin, and petrolatum.

THERAP CAT: Antifungal (topical).

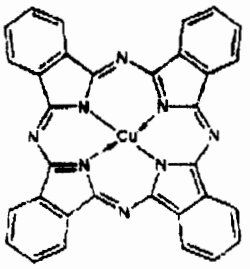
**2583. Copper.** Cu; at. wt 63.546; at. no. 29; valences 1, 2. Occurrence in the earth's crust: 70 ppm; also present in seawater: 0.001-0.02 ppm. Two naturally occurring isotopes: 63 (69.09%), 65 (30.91%); nine artificial isotopes: 58-62, 64, 66-68. One of the earliest known metals. Found in nature in its native state, also in combined form in several minerals including chalcopyrite, chalcocite, bornite, *q.q.v.*, *tennahedrite* ($Cu_{12}Sb_4S_{13}$), *enargite* ($Cu_3AsS_4$), antlerite. Extraction from ores: Clark-Hawley, *Encyclopedia of Chemistry* (Reinhold, New York, 2nd ed., 1966) p 288. Metallurgy of copper and its alloys: *Metals Reference Book*, vols. 1, 2, C. J. Smithells, Ed. (Butterworth's, London, 3rd ed., 1962). A trace element essential to many plants and animals. Occurs in biological complexes such as *pheophytin* (analog of chlorophyll), hemocyanin, tyrosinase and ceruloplasmin, *q.q.v.* Reviews of copper and copper compounds: *Copper*, A. Butts, Ed., A.C.S. Monograph Series, no. 122 (Reinhold, New York, 1954) 936 pp; Massey, "Copper" in *Comprehensive Inorganic Chemistry*, vol. 3, J. C. Bailar, Jr. *et al.*, Eds. (Pergamon Press, Oxford, 1973) pp 1-78; W. M. Tuddenham, P. A. Dougall, Kirk-Othmer, *Encyclopedia of Chemical Technology* vol. 6 (Wiley-Interscience, New York, 3rd ed., 1979) pp 819-869. Book: *Inflammatory Diseases and Copper*, J. R. J. Sorenson, Ed. (Humana Press, Clifton, N J, 1982) 622 pp.

Reddish, lustrous, ductile, malleable metal; face-centered cubic structure; commercially available in the form of ingots, sheets, wire or powder. Becomes dull when exposed to air. In moist air gradually becomes coated with green basic carbonate. d 8.94. mp 1083°. bp 2595°. Mohs' hardness 3.0. Resistivity 1.673 microohm-cm. Heat of fusion 48.9 cal/g; heat of vaporization 1150 cal/g. Heat capacity at constant pressure (solid) 0.092 cal/g/°C (20°), (liq) 0.112 cal/g/°C. $E^0$ (aq) $Cu^+/Cu$ +0.521 V; $E^0$ (aq) $Cu^{2+}/Cu$ +0.337 V. Very slowly attacked by cold hydrochloric or dil sulfuric acid; readily by dil nitric acid, and by both hot concd $H_2SO_4$ and HBr. It is also attacked by acetic and other organic acids. Slowly sol in ammonia water. Water-soluble cupric salts yield with sodium hydroxide a bluish-green precipitate of cupric hydroxide which is changed to black cupric oxide on warming. Potassium ferrocyanide produces a brownish-red precipitate of copper ferrocyanide. Hydrogen sulfide produces in acid solns a black precipitate of cupric sulfide which is sol in soln of sodium cyanide. Aluminum, iron or zinc precipitate metallic copper from its solns.

*Caution:* Copper itself probably has little or no [illegible] although there are conflicting reports in the literature. [illegible] uble salts, notably copper sulfate, are strong irr[illegible] skin, mucous membranes. Copper oxide fumes [illegible] metal fume fever. A relationship between copper [illegible] chromatosis has been reported. *See* E. Browning, [illegible] *of Industrial Metals* (Appleton-Century-Crofts, N[illegible] 2nd ed., 1969) pp 145-152.

USE: Manuf bronzes, brass, other copper alloys, [illegible] conductors, ammunition, copper salts, works of art, [illegible]

**2584. Copper Phthalocyanine.** *(SP-4-1)-[29H,31H-Phthalocyaninato(2-)-N29,N30,N31,N32]copper;* C.I. [illegible] Blue 15; C.I. 74160. $C_{32}H_{16}CuN_8$; mol wt 576.[illegible] 66.72%, H 2.80%, Cu 11.03%, N 19.45%. D[illegible] Dandridge *et al.*, Brit. pat. 322,169 (1928 to Scott[illegible] Prepn: Baumann *et al.*, *Angew. Chem.* 68, 133 (195[illegible] elevici *et al.*, *Rev. Chim. (Bucharest)* 12, 281 (1961); Hoerrle, Brit. pat. 930,150 (1963 to Bayer); Pat. Heinle, Mau, Ger. pat. 1,167,307 (1964 to G. Sm[illegible] elevici *et al.*, Belg. pat. 657,307 (1965 to Romania, M[illegible] of Petroleum and Chemical Industry); H. Tomod[illegible] *Chem. Letters* 1980, 1277. Properties: Dent, L[illegible] *Chem. Soc.* 1934, 1027; Easton, Smith, *J. Oil Colour Assoc.* 49, 614 (1966). *See also Colour Index*, vol. 4 (1971) p 4618.

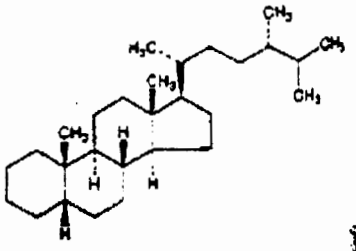


Bright blue microcrystals with purple lustre; sol in $H_2SO_4$ from which it can be almost quantitatively [illegible] dilution with water. Practically insol in water, alco[illegible] hydrocarbons. Stable toward heat (crystalline and [illegible] cally pure sublimate obtained at about 580° in low [illegible] atmosphere of nitrogen or carbon dioxide), alkali[illegible] acids. Dec by hot nitric acid, or dilute acid perm[illegible] to yield phthalimide.

Exists in two forms: the thermodynamically less [illegible] redder α-form is a better pigment than the more [illegible] greener β-form. In the presence of aromatic solvents, high shear, etc., α-form is converted to β-form.

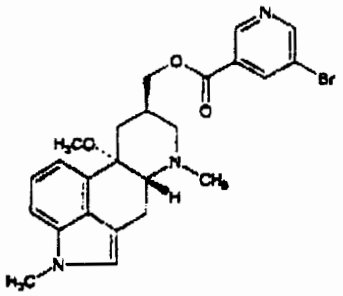
USE: In inks and paints. Approved by FDA for [illegible] polypropylene sutures.

**2585. Coprocergostane.** *5β-Ergostane;* pseudo[illegible] $C_{28}H_{48}$; mol wt 386.71. C 86.97%, H 13.03%. Prep[illegible] cholanic acid: Fernholz, *Ber.* 69, 1792 (1936).



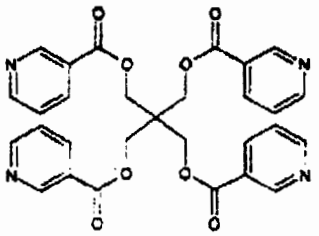
Needles from acetone. mp 64°. $[\alpha]_D^{19}$ +25.3° ([illegible] chloroform).

**2586. Coprogen.** $C_{35}H_{53}FeN_6O_{15}$; mol wt 82[illegible] 51.16%, H 6.50%, Fe 6.80%, N 10.23%, O 25.31%. [illegible] contg. growth-promoting complex. Isoln from [illegible] spp: Hesseltine *et al.*, *J. Am. Chem. Soc.* 74, 138[illegible] Pidacks *et al.*, *ibid.* 75, 6064 (1953); Gaumann, [illegible]



mp 136-138°. $LD_{50}$ in male mice, rats (mg/kg): 860, 2800 orally; 46, 43 i.v. (Neumann, Lauschner).
THERAP CAT: Vasodilator (cerebral, peripheral).

**6581. Niceritrol.** *3-Pyridinecarboxylic acid 2,2-bis[[(3-pyridinylcarbonyl)oxy]methyl]-1,3-propanediyl ester; nicotinic acid neopentaneteratyl ester;* pentaerythritol tetranicotinate; 8-AL; Peryeit; Bufor. $C_{29}H_{24}N_4O_8$; mol wt 556.53. C 62.59%, H 4.35%, N 10.07%, O 23.00%. Prepn: Fr. pat. M2046 (1963 to Société d'Etudes et de Recherches Pharmacotechniques). *C.A.* **60**, 10656e (1964); Brit. pats. 1,022,880; 1,053,689 (1966, 1967 to Aktiebolag Bofors). *C.A.* **64**, 19708d (1966), *C.A.* **66**, 104907e (1967); Kuriyama, Kudo, Japan. pat. 67 2399 (1967 to Yoshitomi), *C.A.* **66**, 115935p (1967). Acute toxicity data: T. Sugawara *et al.*, *Oyo Yakuri* **14**, 741 (1977), *C.A.* **88**, 131005v (1977).



Crystals, mp reported as 160-162° and as 163-164°. $LD_{50}$ in mice, rats (g/kg): > 20, > 20 orally; > 5, > 5 s.c.; > 5, > 5 i.p.; in rabbits (g/kg): > 10 orally; > 5 i.p. (Sugawara).
THERAP CAT: Antihyperlipoproteinemic.

**6582. Nickel.** Ni; at. wt 58.6934; at. no. 28; valence 2; seldom 1, 3, 4. Group VIII(10). Naturally occurring isotopes (mass numbers): 58 (68.27%), 60 (26.10%), 61 (1.13%), 62 (3.59%), 64 (0.91%); known artificial radioactive isotopes: 53, 55-57, 59 (longest-lived known isotope, $T_{1/2}$ 7.5 × $10^4$ years, decay by electron capture), 63, 65-67. Abundance in earth's crust 99 ppm. Discovered by Cronstedt in 1754: Cronstedt, *Mineralogie* (Stockholm, 1758) p 218. Isoln: Berthier, *Ann. Chim. Phys.* [2] **14**, 52 (1820); **25**, 94 (1824). Occurs free in meteorites. Found in many ores as sulfides, arsenides, antimonides and oxides or silicates; chief sources include chalcopyrite, *q.v.*, pyrrhotite, *pentlandite* [$(Fe,Ni)_9S_8$] and *garnierite* [$3(Mg,Ni)O.2SiO_2.2H_2O$]; other ores include *niccolite* (NiAs) and *millerite* (NiS). Methods of extraction and purification: Mackiw, *Can J. Chem. Eng.* **46**, 3 (1968); Houot, *Ann. Mines* **1969** (April), 9; Queneau, *J. Metals* **22**, 44-48 (1970). Prepn of high purity nickel: Wise, Schaefer, *Metals Alloys* **16**, 424 (1924); from NiO and $H_2$: Olemser in *Handbook of Preparative Inorganic Chemistry* vol. 2, G. Brauer, Ed. (Academic Press, New York, 2nd ed., 1965) pp 1543-1544; by electrolysis: Vu Quang Kinh, Nardin, *Compt. Rend. Ser. C* **266**, 307 (1968). Comprehensive reviews: *Gmelin's, Nickel* (8th ed.) **57**, 5 vols, about 3500 pp (1965-1967); Nicholls in *Comprehensive Inorganic Chemistry* vol. 3, J. C. Bailar, Jr. *et al.*, Eds. (Pergamon Press, Oxford, 1973) pp 1109-1161; J. K. Tien, T. E. Howson in Kirk-Othmer *Encyclopedia of Chemical Technology* vol. 15 (Wiley-Interscience, New York, 3rd ed., 1981) pp 787-801; *Chemistry of the Elements*, N. N. Greenwood, A. Earnshaw, Eds. (Pergamon Press, New 1328-1363. Book: *Nickel Toxicology*, S. Sunderman, Eds. (Academic Press, New pp. Review of carcinogenicity studies: 11, 75-112 (1976); of toxicology and human *cological Profile for Nickel* (PB-160378, 19

Lustrous white, hard, ferromagnetic m cubic crystals. mp 1453°, bp (calc) 2732°, bp (calc) 2837° (3110°K): D. R. Stull, G. *dynamic Properties of the Elements*, Adv Series 18 (A.C.S., Washington, 1956). d 8. ity (25°) 6.23 cal/g-atom/°C. Mohs' hard heat of fusion 73 cal/g. Electrical resist ohms-cm. E°(aq) Ni/$Ni^{2+}$ 0.250 V. Stable ry temp; burns in oxygen, forming NiO; water; decomposes steam at a red heat. dil hydrochloric or sulfuric acid; readily acid. Not attacked by fused alkali hydr

*Caution:* Potential symptoms of overex zation dermatitis, allergic asthma, pneumo *Pocket Guide to Chemical Hazards* (DHHS 1994) p 224. *See also Patty's Industrial Hy ogy* vol. 2C, G. D. Clayton, F. E. Clayton, & Sons, New York, 4th ed., 1994) 2157-2 stance and certain nickel compounds m anticipated to be carcinogens: *Seventh Carcinogens* (PB95-109781, 1994) p 262.

USE: Nickel-plating; for various alloys Chinese silver, German silver; for coins, age batteries; magnets, lightning-rod tips, and electrodes, spark plugs, machinery p hydrogenation of oils and other organic *also* Raney nickel. Manuf of Monel met heat resistant steels, heat and corrosion nickel-chrome resistance wire; in alloys space applications.

**6583. Nickel Acetate.** $C_4H_6NiO_4$; mol 27.18%, H 3.42%, Ni 33.20%, O 36.20%. N

Tetrahydrate, green, cryst mass or powder, 1.744. Sol in 6 parts water, in alcohol. *Keep*

USE: Catalyst; mordant for textiles.

**6584. Nickel Acetylacetonate.** *Bis(2,4-O,O')nickel;* bisacetylacetonatonickel(II); dicino)nickel(II); 2,4-pentanedione nickel $NiO_4$; mol wt 256.91. C 46.75%, H 5.49 24.91%. $Ni(CH_3COCHCOCH_3)_2$. Also N $(AA)_2$. Prepn from acetylacetone and N *Monatsh.* **21**, 103 (1900); from acetylaceto $6H_2O$: Charles, Pawlikowski, *J. Phys.* (1958); from 4-diethylamino-3-pentene-2- $6H_2O$: Gash, *Can. J. Chem.* **45**, 2109 (1 Fernelius, Bryant, *Inorg. Syn.* **5**, 105 (1957) trimer in the solid state: Bullen, *Nature* Bullen *et al.*, *Inorg. Chem.* **4**, 456 (1965); as the vapor phase: Fackler *et al.*, *J. Phys.* (1972). Structure of dihydrate: Montgom *Acta Cryst.* **17**, 1481 (1964).

Emerald-green orthorhombic crystals. mp 220-235°. $d^{17}$ 1.455. uv max ($10^{-4}M$ in CH nm (log ε 4.34, 4.44). Sol in water, alcohol benzene. Insol in ether, ligroin.

USE: Catalyst.

**6585. Nickel Bromide.** Nickel dibromide wt 218.50. Br 73.14%, Ni 26.86%. $NiBr_2$.

Trihydrate, yellowish-green, very deliquesc its water at about 200°, the anhydr salt is a color and sublimable in absence of air. So water, in alcohol. *Keep well closed.*

**6586. Nickel Carbonate Hydroxide.** wt 304.12. C 3.95%, H 1.33%, Ni 57. $NiCO_3.2Ni(OH)_2$. Tetrahydrate occurs mineral *zaratite.*

Tetrahydrate, green, odorless powder. Sol in ammonia and in dil acids with effer

USE: Nickel-plating; catalyst for harde ceramic colors and glazes.

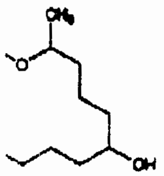
page 10261

page 10262



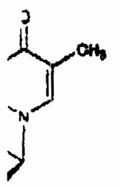
filters, adsorbents, catalysts, gens, dispersing agents, deter-

*7,8,9,10,11,12-Decahydro-7,14,- enzoxacyclotetradecin-1-one;* 6- orcylic acid μ-lactone; zearala- : Ralabol; Ralone. $C_{18}H_{26}O_5$; 8.13%, O 24.81%. Prepn from .. U.S. pat. 3,239,345 (1956 to oolism in steers: Sharp, Dyer,



uxtures yield two crystalline soluble has mp 146-148°; $[\alpha]_D^{25}$ soluble has mp 178-180°; $[\alpha]_D^{25}$ aethanol): 218, 265, 304 nm.

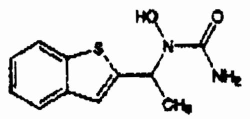
*zido-3'-deoxythymidine;* azido- : Azter; Retrovir. $C_{10}H_{13}N_5$- 4%, H 4.90%, N 26.21%, O e analog; reverse transcriptase witz *et al., J. Org. Chem.* 29, *et al., ibid.* 38, 4299 (1973). *et* *trahedron Letters* 29, ira metabolite and anti- ercq *et al., Biochem. Pharma-* activity against HIV-1 virus: *cad. Sci. USA* 82, 7096 (1985). DS: R. Yarchoan *et al., Lan-* armacokinetics: R. W. Kleck- *her.* 41, 407 (1987). Use in DS-related complex: J. L. ,608,606 (1986 to Wellcome ,724,232 (1988 to Burroughs K. M. Ayers, *Am. J. Med.* mposium on clinical experi- 101 (1989). Clinical trials of Fischl *et al., New Engl. J.* ollier *et al., ibid.* 1015. Com- Sethi in *Analytical Profiles of* lorey Ed. (Academic Press,



106-112° (Horwitz). Also re- mp 120-122° (Glinski). $[\alpha]_D^{25}$ in water (25°C): 25 mg/ml. 11650). $LD_{50}$ in male, female kg): 3568, 3062, 3084, 3683 (Ayers).

*enzo[b]thien-2-ylethyl)-N-hy-* -(1-benzo[*b*]thien-2-ylethyl)- : L $C_{11}H_{12}N_2O_2S$; mol 2% 1.86%, O 13.54%, S genase, the initial enzyme in ees from arachidonic acid. *al., Eur. pat. Appl.* 279,263;

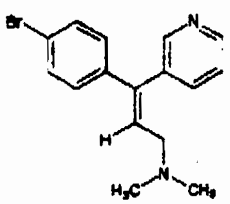
*eidem,* U.S. pat. 4,873,259 (1988, 1989 both to Chromatographic resolution of enantiomers: S. *et al., J. Chromatog.* 623, 390 (1992). Inhibition genase: G. W. Carter *et al., J. Pharmacol. Exp.* 929 (1991). Pharmacokinetics: P. Rubin *et al.,* *tions Suppl.* 35, 103 (1991). Clinical evaluation toid arthritis: M. E. Weinblatt *et al., J. Rh* 1537 (1992). Clinical trial in asthma: E. Israel *Intern. Med.* 119, 1059 (1993). Review of develop L. Bell *et al., Int. J. Immunopharmacol.* 14, 505-5



Crystals, mp 157-158°.

THERAP CAT: Antiasthmatic; anti-inflammatory.

**10254. Zimeldine.** *(Z)-3-(4-Bromophenyl)-N,N-* *3-(3-pyridinyl)-2-propen-1-amine; (Z)*-3-(4'-bromo (3''-pyridyl)dimethylallylamine; zimelidine; *cis*- $C_{16}H_{17}BrN_2$; mol wt 317.23. C 60.58%, H 5. 25.19%, N 8.83%. Antidepressant that inhibits 5-hydroxytryptamine uptake. Prepn: P. B. Berntss S. Afr. pat. 72 01,503; *eidem,* U.S. pat. 3,928, 1975 both to AB Hassle). X-ray crystallographic Abrahamsson *et al., Acta Chem. Scand.* A30, 609 vivo study in rats and humans: S. B. Ross *et al., L* 205 (1976). Pharmacokinetics: D. Brown, *Eu* *Pharmacol.* 17, 111 (1980). Mode of action: K. F *Neurosci. Letter* 13, 307 (1979). Metabolism: J. L *et al., Arzneimittel-Forsch.* 31, 486 (1981). Clinical A. Georgotas *et al., Am. J. Psychiatry* 139, 1057 ( Syvalahti *et al., J. Int. Med. Res.* 10, 250 (1982). antidepressant action: S. A. Montgomery *et al., Adv* *chem. Psychopharmacol.* 32, 35 (1982). Reversal of induced memory impairment in human subjects: H. gartner *et al., Science* 221, 472 (1983). Review of cology and therapeutic efficacy: R. C. Heel *et al. D* 169-206 (1982). Symposium on pharmacology, kinetics, metabolism, clinical studies: *Brit. J. Cli* 1982, Suppl. 19, 1-122.



Dihydrochloride monohydrate. $C_{16}H_{17}BrN_2.2HCl$ *Normud, Zelmid.* Crystals, mp 193°.

THERAP CAT: Antidepressant.

**10255. Zinc.** Zn; at. wt 65.38; at. no. 30; val Group 2b element. Abundance in earth's crust by wt. Natural isotopes: 64 (48.89%); 66 (27. (18.57%); 67 (4.11%); 70 (0.62%); eight radioactive and two isomers. Occurs in smithsonite or zinc sp erite or zinc blende, zincite, willemite, *franklinite* [(Zn Fe)O.(Fe.Mn$_2$)O$_3$] or *gahnite* ($ZnAl_2O_4$). Has been since very early times. Commercial forms: ingots sheets; wire; shot; strips; sticks; granules; mossy (dust). Prepn: Gowland, Bannister, *Metallurgy* *Ferrous Metals* (Griffin, London, 1930); *Zinc* *Properties and Uses* (Zinc Development Associat don, 1968). *Reviews: Zinc,* C. H. Mathewson, Ed. Monograph Series no. 142 (Reinhold, New York pp; Schlechter, Thompson, "Zinc and Zinc Alloys" Othmer, *Encyclopedia of Chemical Technology,* vol. terscience, New York, 2nd ed., 1970) pp 555-603; "Group IIB" in *Comprehensive Inorganic Chemistry* J. C. Bailar, Jr. *et al.,* Eds. (Pergamon Press, Oxford pp 187-328.





lustrous metal; distorted hexagonal close- ; stable in dry air; becomes covered with a basic carbonate on exposure to moist air. 908°. $d^{25}$ 7.14. Heat capacity at constant 6.07 cal/mole deg. Mohs' hardness 2.5. 100-150° becomes malleable, at 210° be- d pulverizable. Burns in air with a bluish- Loses electrons in aqueous systems to form n/$Zn^{2+}$ 0.763 V. Slowly attacked by $H_2SO_4$ ing agents or metal ions, e.g. $Cu^{2+}$, $Ni^{2+}$, the process. Reacts slowly with ammonia ic acid; rapidly with $HNO_3$. Reacts with s to form "*zincates*", $ZnO_2^{2-}$, which are ac- complexes such as $Zn(OH)_3^-$; $Zn(OH)_4^{2-}$, .

lation of fumes may result in sweet taste, cough, weakness, generalized aching, chills, vomiting. Zinc chloride fumes have caused ous membranes and skin irritation. Ingestion y cause nausea, vomiting, purging. *See* E. *y of Industrial Metals* (Appleton-Century- rk, 2nd ed., 1969) pp 348-355.

ing sheet iron; as ingredient of alloys such , Babbitt metal, German silver, and special ting; as a protective coating for other met- corrosion; for electrical apparatus, especially ies, household utensils, castings, printing materials, railroad car linings, automotive ducing agent in organic chemistry; for de- extracting gold by the cyanide process, soaps; bleaching bone glue; manuf sodium lin zinc salts; as reagent in analytical the Marsh and Gutzeit test for arsenic; as e determination of iron. It is a nutritional

e Acetate. $C_4H_6O_4Zn$; mol wt 183.48. C 3.30%, O 34.88%, Zn 35.64%. $Zn(C_2H_3O_2)_2$. ydr salt from zinc nitrate and acetic anhydride: 33, 235 (1912). Clinical evaluations in Wil- G. M. Hill *et al., Hepatology* 7, 522 (1987); G. *J. Lab. Clin. Med.* 109, 526 (1987). Toxic- Smyth *et al., Am. Ind. Hyg. Assoc. J.* 30, 470

crystallizes from dil acetic acid; faint, acetous t taste; slightly efflorescent. d 1.735; mp ram dissolves in 2.3 ml water, 1.6 ml boiling alcohol, about 1 ml boiling alcohol. The aq al or slightly acid to litmus; pH about 5-6. *closed containers. Incompat.* with zinc salts in acia, alkalies and their carbonates, oxalates, ulfides, lime water, vegetable astringent decoc- tions. $LD_{50}$ orally in rats: 2.46 g/kg (Smyth). ving wood; as mordant in dyeing; manuf glaz- g on porcelain. As a reagent in testing for al- urobilin, phosphate, blood.

: Styptic, astringent. Formerly used as an

(VET): Antiseptic, astringent, protective (topi- used as an emetic.

c Bacitracin. *Bacitracin zinc complex;* baci- ; Baciferm. Contains about 7% Zn. Prepd by zinc salts on bacitracin broth: Anker *et al., J.* 249 (1948); Hodge, Lafferty as cited in U.S. (1957 to CSC). The potency is usually be- 60 units/mg of bacitracin activity: Gross. *Ind.* 75, 612 (1954); Gross *et al., J. Am.* *Ed.* 46, 447 (1956).

contg 1-4% $H_2O$. Less bitter than baci- water at 25° = 0.23-0.45% (w/w). Solubili- by Weiss *et al., Antibiot. & Chemother.* 7, mg/ml at about 28°: water 5.1; methanol 2.0; isopropanol 0.16; ethyl acetate 1.3; chlo- ether 0.025. More stable than bacitracin elevated temps. Zinc bacitracin can be used in requiring heat processing.

ointments, tablets, implantation pellets, supposi- troches, either alone or in combination with other antibiotics or therapeu *loc. cit.*

THERAP CAT: Antibacterial.

THERAP CAT (VET): Antimicr

**10258. Zinc Bromide.** 70.96%, Zn 29.04%. $ZnBr_2$. $ZnBr_2$, the remainder being c

Very hygroscopic, granular d 4.22; mp 394°; bp 697° wit dissolves in 0.25 ml water, 0. solns of alkali hydroxides. Th about 4. *Keep tightly closed.*

USE: Making silver bromide tography; in the shielding of reactions.

**10259. Zinc Caprylate.** O$_4$Zn; mol wt 351.80. C 54. 18.59%. $Zn(C_8H_{15}O_2)_2$. Prep and zinc sulfate: van Renesse

Lustrous scales from alc. m ing water; moderately sol in *closed.* Dec in moist atm giv

USE: As fungicide like zinc

**10260. Zinc Carbonate.** 9.58%, O 38.28%, Zn 52.15%. the minerals *smithsonite, zinc* *Monatsh.* 72, 31 (1939).

Rhombohedral structure. S g/100 g; sol in dil acids, alkal

Basic carbonate. *zinc carb* *bonate.* Variable composition. $(OH)_2.2ZnCO_3$. Occurs as th gent specification: 70% ZnO

USE: As pigment; manuf of

THERAP CAT: Astringent, to

THERAP CAT (VET): Astringen cal). Also used in rations to p

**10261. Zinc Chloride.** 136.30. Cl 52.02%, Zn 47.98% least 95% $ZnCl_2$; remainder is Toxicity: Bruner, *Fed. Proc.*

White, odorless, very deliqu or rods. $d^{25}$ 2.907; mp ~290 432 g/100 g (25°); 614 g/100 in 0.25 ml of 2% HCl, in 1.3 m sol in acetone. With much w formed. The aq soln is acid *tightly closed.* LD i.v. in rats:

*Caution:* Potential sympto are conjunctivitis; irritation o copious sputum; dyspnea, che bronchopneumonia; pulmona fever; cyanosis; tachypnea; ski eyes. *See NIOSH Pocket* (DHHS/ NIOSH 90-117, 199

USE: Deodorant, disinfecti alone or with phenol and ot railway ties; fireproofing lumb as flux for soldering; etchin paper, artificial silk, dyes, a glues, vulcanized fiber; brow copper-plating iron; in magne fining; cement for metals and printing and dyeing textiles; ca ducing crepe and crimping fa ing and weighting fabrics; vu cellulose; preserving anatomic for separating silk, wool, and agent in chemical syntheses.

THERAP CAT: Astringent.

THERAP CAT (VET): Antiseptic in ulcers, fistulas, pododermati

**10262. Zinc Chromate(VI** buttercup yellow; C.I. Pigmen somewhat variable compositio

Hydrate, yellow, odorless. water; sol in dil acids, includin