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CRC Handbook of Chemistry and Physics

69TH Edition

1988—1989

ANNIVERSARY EDITION
75
YEARS
1913 · 1988

Editor-in-Chief

Robert C. Weast, Ph.D.

Associate Editors

Melvin J. Astle, Ph.D.
William H. Beyer, Ph.D.

A Ready-Reference Book of Chemical and Physical Data

CRC Press, Inc.
Boca Raton, Florida

ZN-0242
75801

Small amounts of yttrium (0.1 to 0.2%) can be used to reduce the grain size in chromium, molybdenum, zirconium, and titanium, and to increase strength of aluminum and magnesium alloys. Alloys with other useful properties can be obtained by using yttrium as an additive. The metal can be used as a deoxidizer for vanadium and other nonferrous metals. The metal has a low cross section for nuclear capture. ^{90}Y, one of the isotopes of yttrium, exists in equilibrium with its parent ^{90}Sr, a product of atomic explosions. Yttrium has been considered for use as a nodulizer for producing nodular cast iron, in which the graphite forms compact nodules instead of the usual flakes. Such iron has increased ductility. Yttrium is also finding application in laser systems and as a catalyst for ethylene polymerization. It has also potential use in ceramic and glass formulas as the oxide has a high melting point and imparts shock resistance and low expansion characteristics to glass. Natural yttrium contains but one isotope, ^{89}Y. Twenty other unstable nuclides and isomers have been characterized. Yttrium metal of 99+% purity is commercially available at a cost of about $510/kg.

Zinc — (Ger. *Zink*, of obscure origin), Zn; at. wt. 65.38; at. no. 30; m.p. 419.58°C; b.p. 907°C; sp. gr. 7.133 (25°C); valence 2. Centuries before zinc was recognized as a distinct element, zinc ores were used for making brass. Tubal-Cain, seven generations from Adam, is mentioned as being an "instructor in every artificer in brass and iron." An alloy containing 87% zinc has been found in prehistoric ruins in Transylvania. Metallic zinc was produced in the 13th century A.D. in India by reducing calamine with organic substances such as wool. The metal was rediscovered in Europe by Marggraf in 1746, who showed that it could be obtained by reducing *calamine* with charcoal. The principal ores of zinc are *sphalerite* or *blende* (sulfide), *smithsonite* (carbonate), *calamine* (silicate), and *franklinite* (zinc, manganese, iron oxide). Zinc can be obtained by roasting its ores to form the oxide and by reduction of the oxide with coal or carbon, with subsequent distillation of the metal. Other methods of extraction are possible. Naturally occurring zinc contains five stable isotopes. Ten other unstable nuclides and isomers are recognized. Zinc is a bluish-white, lustrous metal. It is brittle at ordinary temperatures but malleable at 100 to 150°C. It is a fair conductor of electricity, and burns in air at high red heat with evolution of white clouds of the oxide. The metal is employed to form numerous alloys with other metals. Brass, nickel silver, typewriter metal, commercial bronze, spring brass, German silver, soft solder, and aluminum solder are some of the more important alloys. Large quantities of zinc are used to produce die castings, used extensively by the automotive, electrical, and hardware industries. An alloy called *Prestal®*, consisting of 78% zinc and 22% aluminum is reported to be almost as strong as steel but as easy to mold as plastic. It is said to be so plastic that it can be molded into form by relatively inexpensive die casts made of ceramics and cement. It exhibits superplasticity. Zinc is also extensively used to galvanize other metals such as iron to prevent corrosion. Neither zinc nor zirconium is ferromagnetic, but $ZrZn_2$ exhibits ferromagnetism at temperatures below 35 K. Zinc oxide is a unique and very useful material to modern civilization. It is widely used in the manufacture of paints, rubber products, cosmetics, pharmaceuticals, floor coverings, plastics, printing inks, soap, storage batteries, textiles, electrical equipment, and other products. It has unusual electrical, thermal, optical, and solid-state properties that have not yet been fully investigated. Lithopone, a mixture of zinc sulfide and barium sulfate, is an important pigment. Zinc sulfide is used in making luminous dials, X-ray and TV screens, and fluorescent lights. The chloride and chromate are also important compounds. Zinc is an essential element in the growth of human beings and animals. Tests show that zinc-deficient animals require 50% more food to gain the same weight of an animal supplied with sufficient zinc. Zinc is not considered to be toxic, but where freshly formed ZnO is inhaled a disorder known as the *oxide shakes* or *zinc chills* sometimes occurs. It is recommended that where zinc oxide is encountered good ventilation be provided to avoid concentrations exceeding 5 mg/m^3, (time-weighted over an 8-h exposure, 40-h work week). The price of zinc was roughly 45c/lb in December 1984.

Zirconium — (Persian *zargun*, gold like), Zr; at. wt. 91.22; at. no. 40; m.p. 1852 ± 2°C; b.p. 4377°C; sp. gr. 6.506 (20°C); valence +2, +3, and +4. The name *zircon* probably originated from the Persian word *zargun*, which describes the color of the gemstone now known as *zircon, jargon, hyacinth, jacinth*, or *ligure*. This mineral, or its variations, is mentioned in biblical writings. The mineral was not known to contain a new element until Klaproth, in 1789, analyzed a jargon from Ceylon and found a new earth, which Werner named zircon (*silex circonius*), and Klaproth called *Zirkonerde (zirconia)*. The impure metal was first isolated by Berzelius in 1824 by heating a mixture of potassium and potassium zirconium fluoride in a small iron tube. Pure zirconium was first prepared in 1914. Very pure zirconium was first produced in 1925 by van Arkel and de Boer by an iodide decomposition process they developed. Zirconium is found in abundance in S-type stars, and has been identified in the sun and meteorites. Analyses of lunar rock samples obtained during the various Apollo missions to the moon show a surprisingly high zirconium oxide content, compared with terrestial rocks. Naturally occurring zirconium contains five isotopes, one of which, ^{90}Zr (abundant to the extent of 2.80%), is unstable with a very long half-life of $>3.6 \times 10^{17}$ is found in deposits in Florida, South Carolina, Australia, and Brazil. *Baddeleyite*, found in Brazil, is an important zirconium mineral. It is principally pure ZrO_2 in crystalline form having a hafnium content of about 1%. Zirconium also occurs in some 30 other recognized mineral species. Zirconium is produced commercially by reduction of the chloride with magnesium (the Kroll Process), and by other methods. It is a grayish-white lustrous metal. When finely divided, the metal may ignite spontaneously in air, especially at elevated temperatures. The solid metal is much more difficult to ignite. The inherent toxicity of zirconium compounds is low. Hafnium is invariably found in zirconium ores, and the separation is difficult. Commercial-grade zirconium contains from 1 to 3% hafnium. Zirconium has a low absorption cross section for neutrons, and is therefore used for nuclear energy applications, such as for cladding fuel elements. Zirconium has been found to be extremely resistant material without appreciable absorption or energy. Commercial nuclear power generation now takes more than 90% of zirconium metal production. Reactors of the size now being made may use as much as a half-million lineal feet of zirconium alloy tubing. Reactor-grade zirconium is essentially free of hafnium. *Zircaloy®* is an important alloy developed specifically for nuclear applications. Zirconium is exceptionally resistant to corrosion by many common acids and alkalis, by sea water, and by other agents. It is used extensively by the chemical industry where corrosive agents are employed. Zirconium is used as a getter in vacuum tubes, as an alloying agent in steel, making surgical applicances, photoflash bulbs, explosive primers, rayon spinnerets, lamp filaments, etc. It is used in poison ivy lotions in the form of the carbonate as it combines with *urushiol*. With niobium, zirconium is superconductive

PHYSICAL CONSTANTS OF INORGANIC COMPOUNDS (continued)

No.	Name	Synonyms and Formulae	Mol. wt.	Crystalline form, properties and index of refraction	Density or spec. gravity	Melting point, °C	Boiling point, °C	Solubility, in grams per 100 cc: Cold water	Hot water	Other solvents
v22	oxytribromide	$VOBr_3$	306.65	red liq	$2.933^{14.5}$	d 180	130^{100}	s		
v23	oxychloride	VOCl	102.39	yel brn powd	$2.824, 3.64^{20}$		127	i		v s HNO_3
v24	oxydichloride	$VOCl_2$	137.85	grn, deliq	2.88^{13}			d		s dil HNO_3
v25	oxytrichloride	$VOCl_3$	173.30	yel liq	1.829	−77 ± 2	126.7	s d		s al, eth, ac a
v26	oxydifluoride	VOF_2	104.94	yel	3.396^{19}	d				sl s acet
v27	oxytrifluoride	VOF_3	123.94	yel-wh, hygr	2.459^{19}	300	480			
v28	silicide, di-	VSi_2	107.11	met pr	4.42			i	i	s HF; i al, eth, a
v29	(di-)silicide	V_2Si	129.97	silv wh pr	5.48^{17}			i	i	s HF, i al, eth, a
v30	sulfate (hypovanadous)	$VSO_4 \cdot 7H_2O$	273.11	vit, monocl			d in air			
v31	sulfide, mono- or (di-)	VS (or V_2S_2)	83.00	blk pl (exist ?)	4.20		d			s hot H_2SO_4, HNO_3; sl s KSH, i HCl, alk
v32	sulfide, penta-	V_2S_5	262.18	blk-grn powd	3.0		d			s HNO_3, alk sulf, alk
v33	sulfide, sesqui- or (tri-)	V_2S_3	198.06	grn-blk pl, or powd	4.72^{21}	d>600		i		s alk sulf; sl s, alk, HCl, HNO_3, H_2SO_4
v34	**Vanadyl sulfate**	$VOSO_4$	163.00	bl				v s		
w1	**Water**	H_2O	18.01528	col liq, or col hex cr	liq 1.000, sld 0.9168^0	0.00	100.00			s al
w2	**Water heavy**	Deuterium oxide, D_2O	20.0312	col liq or hex cr, 1.33844^{20}	1.1052^{20}	3.82	101.42	∝	∝	∝ al, sl s eth
w3	**Wolfram**	See tungsten								
x1	**Xenon**	Xe	131.29 ± 3	col inert gas	gas 5.887 g/l ± 0.009 liq 3.52^{-100} solid 2.7^{-140}	−111.9	−107.1 ± 3	$24.1°$ cm³, 8.4^{50}, 11.9^{25} cm³ 7.12^{00}		
y1	**Ytterbium**	Yb	173.04 ± 3	cub	6.960	819	1196	i		s a
y2	(III) acetate	$Yb(C_2H_3O_2)_3 \cdot 4H_2O$	422.23	hex pl	2.09	$-4H_2O$, 100		v s	v s	
y3	(III) bromide	$YbBr_3$	332.85		5.91_4^{25}	677	1800	s	s	s dil a
y4	(III) bormide	$YbBr_3$	412.75	col cr		956	d	s	s	
y5	(II) chloride	$YbCl_2$	243.95	grn-yel cr	5.08	702	1900	s	s	s dil a
y6	(III) chloride	$YbCl_3 \cdot 6H_2O$	387.49	grn, rhomb cr, deliq	2.575	865 $-6H_2O$, 180		v s	v s	s abs al
y7	(II) fluoride	YbF_2	211.04			1052	2380	i	i	
y8	fluoride	YbF_3	230.04			1157	2200	i	i	i dil a
y9	(II) iodide	YbI_2	426.85	li yel, hex cr	5.40_4^{25}	780 ± 4	1300 d(700) vac	s	s	s dil a
y10	(III) iodide	YbI_3	553.75	gold yel cr		d 700	d	s	s	s dil a
y11	(III) oxalate	$Yb_2(C_2O_4)_3 \cdot 10H_2O$	790.29	col cr	2.644			0.00033^{25}		sl s dil a
y12	(III) oxide	Ytterbia Yb_2O_3	394.08	col	9.17			i	i	s h dil a
y13	(III) selenate	$Yb_2(SeO_4)_3 \cdot 8H_2O$	919.08	hex pl	3.30			s d	s	
y14	(III) selenite	$Yb_2(SeO_3)_3$	726.95					i		
y15	(III) sulfate	$Yb_2(SO_4)_3$	634.25	col cr	3.793	d 900		44.2^{20}	4.7^{100}	
y16	(III) sulfate, octohydrate	$Yb_2(SO_4)_3 \cdot 8H_2O$	778.38	prism	3.286			35.9^{25}	21.1^{60}	
y17	**Yttrium**	Y	88.9059	gray met, hex	4.469	1522	3338	i	i	v s dil a, s h KOH
y18	acetate	$Y(C_2H_3O_2)_3 \cdot 4H_2O$	338.10	col, tricl					9.03^{25}	
y19	bromate	$Y(BrO_3)_3 \cdot 9H_2O$	634.75	hex pr		74	$-6H_2O$, 100	168^{25}		sl s al, i eth
y20	bromide	YBr_3	328.62	deliq		904		v s		s al; i eth
y21	bromide hydrate	$YBr_3 \cdot 9H_2O$	490.76	col tabl, deliq				v s		sl s al; i eth
y22	carbide	YC_2	112.93	yel, microcr	4.13^{18}			d		
y23	carbonate	$Y_2(CO_3)_3 \cdot 3H_2O$	411.89	wh-redsh powd						s dil min a, $(NH_4)_2CO_3$; sl s aq CO_2, i al, eth
y24	chloride	YCl_3	195.26	shiny wh leaf	2.67	721	1507	78^{10}	82^{50}	60.1^{15} al, 60.6^{15} pyr
y25	chloride, hexahydrate	$YCl_3 \cdot 6H_2O$	303.36	redsh-wh, rhomb, deliq	2.18^{18}	$-5H_2O$, 100		217^{20}	235^{50}	s al; i eth
y26	chloride, monohydrate	$YCl_3 \cdot H_2O$	213.28	col cr		$-H_2O$, 160		v s		
y27	fluoride	YF_3	145.90	gelat	4.01	1387		i		v sl s dil a
y28	hydroxide	$Y(OH)_3$	139.93	wh-yel gelat or powd		d		i	i	s a, NH_4Cl, i alk
y29	iodide	YI_3	469.62	wh, cr, deliq		1004	$650-700^{0.02}$	v s		s al, acet, sl s eth
y30	molybdate	$Y_2(MoO_4)_3 \cdot 4H_2O$	729.69	grayish or yelsh, tetr pl, 2.03	4.79_8^{18}	1347				
y31	nitrate, hexahydrate	$Y(NO_3)_3 \cdot 6H_2O$	383.01	col, redsh cr, deliq	2.68	$-3H_2O$, 100		$134.7^{22.5}$		v s al, eth, HNO_3
y32	nitrate, tetrahydrate	$Y(NO_3)_3 \cdot 4H_2O$	346.98	redsh-wh pr	2.682			s		s al, HNO_3
y33	oxalate	$Y_2(C_2O_4)_3 \cdot 9H_2O$	604.01	wh cr powd		d		0.0001		sl s HCl
y34	oxide	Yttria Y_2O_3	225.81	col-yelsh, cub or powd	5.01	2410		0.00018^{29}		s a, i alk
y35	sulfate	$Y_2(SO_4)_3$	465.98	wh powd	2.52	d 1000		5.38^{25}	s	s sat K_2SO_4 sol
y36	sulfate, octahydrate	$Y_2(SO_4)_3 \cdot 8H_2O$	610.11	col-redsh, monocl, 1.543–1.549, 1.576	2.558	$-8H_2O$, 120	d 700	7.47^{16} (anhydr)	1.99^{95} (anhydr)	i al, alk; s conc H_2SO_4
y37	sulfide	Y_2S_3	273.99	yel-gr powd						d a
y38	**Yttrium hexaantipyrine** perchlorate	$[Y(C_{11}H_{12}N_2O)_6](ClO_4)_3$	1516.63	col, nex cr		d 293-296		0.55^{20}		
y39	hexaantipyrine iodide	$[Y(C_{11}H_{12}N_2O)_6]I_3$	1598.99	col cr		280-282		4.65^{20}		
z1	**Zinc**	Zn	65.38	bluish-wh met, hex	7.14	419.58	907	i	i	s a, alk, ac a
z2	acetate	$Zn(C_2H_3O_2)_2$	183.47	col, monocl	1.84	d 200	subl vac	30^{20}	44.6^{100}	2.8^{25} al, 166.79^{79}
z3	acetate, dihydrate	$Zn(C_2H_3O_2)_2 \cdot 2H_2O$	219.50	col, monocl, β 1.494	1.735	237	$-2H_2O$, 100	31.1^{20}	66.6^{100}	2 al

No.	Name	Synonyms and Formulae	Mol. wt.	Crystalline form, properties and index of refraction	Density or spec. gravity	Melting point, °C	Boiling point, °C	Solubility, in grams per 100 cc		
								Cold water	Hot water	Other solvents
z4	acetylacetonate	$Zn(C_5H_7O_2)_2$	263.60	need		138	subl	v s d		v s bz, acet; s al
z5	aluminate	Nat. gahnite $ZnAl_2O_4$	183.34	cub, grn 1.78	4.58			i	i	i a, sl s alk
z6	amide	$Zn(NH_2)_2$	97.43	wh powd, amorph	2.13^{25}	d 200 vac		d	d	i al, eth
z7	antimonide	Zn_3Sb_2	439.64	silv wh, rhomb pr	6.33	570		d		
z8	*ortho*arsenate	Nat. koettigite. $Zn_3(AsO_4)_2 \cdot 8H_2O$	618.10	monocl, 1.662, 1.683, 1.717	3.309^{15}	$-1H_2O$, 100		i	i	s HNO_3, H_3PO_4, alk
z9	*ortho*arsenate, basic	Nat. adamite. $Zn_3(AsO_4)_2 \cdot Zn(OH)_2$	573.37	col, rhomb	4.475^{15}	d 250				
z10	*ortho*arsenate, hydrogen	$ZnHAsO_4 \cdot H_2O$	277.37	wh, rhomb		$-H_2O$, 327		d	d	
z11	arsenide	Zn_3As_2	345.98	met-gray, tetr	5.528	1015		i		d a
z12	benzoate	$Zn(C_7H_5O_2)_2$	307.61	wh powd				2.46^{20}	1.44^{20}	
z13	borate	$3ZnO \cdot 2B_2O_3$	383.37	wh tricl cr, or amorph powd	cr 4.22 powd 3.64	980		s		cr i HCl; amorph, s HCl
z14	bromate	$Zn(BrO_3)_2 \cdot 6H_2O$	429.28	wh, cub, 1.5452	2.566	100	$-6H_2O$, 200	v s	x	
z15	bromide	$ZnBr_2$	225.19	col, rhomb, hygr n_D^8 1.5452	4.201_4^{25}	394	650	447^{20}	675^{100}	v s al, eth, acet; s NH_4OH
z16	butyrate	$Zn(C_4H_7O_2)_2 \cdot 2H_2O$	275.61	wh pr				10.7^{16}	d	
z17	caproate	$Zn(C_6H_{11}O_2)_2$	295.68					$1.03^{24.5}$		
z18	carbonate	Nat. smithsonite. $ZnCO_3$	125.39	col, trig, 1.818, 1.618	4.398	$-CO_2$, 300		0.001^{15}		s a, alk, NH_4 salts, NH_3, acet, pyr
z19	chlorate	$Zn(ClO_3)_2 \cdot 4H_2O$	304.34	col yelsh, cub, deliq	2.15	d 60	d	262^{20}	v s	167 al, s acet, eth, glyc
z20	chlorate, per-	$Zn(ClO_4)_2 \cdot 6H_2O$	372.37	wh, rhomb, deliq, 1.508, 1.480	2.252 ± 0.01	105-107	d 200	s		s al
z21	chloride	$ZnCl_2$	136.29	wh, hex, deliq, 1.681, 1.713	2.91^{25}	283	732	432^{25}	615^{100}	$100^{12.5}$ al, v s eth, NH_3
z22	chloroplatinate	$ZnPtCl_6 \cdot 6H_2O$	581.27	yel, trig, hygr	2.717^{12}	d 160		v s	v s	v s al, d H_2SO_4
z23	chromate	$ZnCrO_4$	181.37	lem-yel pr	3.40			i	d	s a, liq NH_3, i acet
z24	chromate	$ZnCr_2O_4$	233.37	dk grn to black, cub	5.30^{15}					
z25	*di*chromate	$ZnCr_2O_7 \cdot 3H_2O$	335.41	redsh-brn cr, or or-yel powd, hygr				v s	d	i al, eth; s a
z26	citrate	$Zn_3(C_6H_5O_7)_2 \cdot 2H_2O$	610.37					sl s		
z27	cyanide	$Zn(CN)_2$	117.42	col, rhomb	1.852	d 800		0.0005^{20}		s alk, KCN, NH_4, al
z28	ferrate (III)	Ferrite. $ZnFe_2O_4$	241.07	blk, oct	5.33^{20}	1590				s conc HCl, i dil a, alk
z29	ferrocyanide	$Zn_2Fe(CN)_6$	342.71	wh powd	1.85_4^{25}			i		s excess alk, i dil
z30	ferrocyanide, trihydrate	$Zn_2Fe(CN)_6 \cdot 3H_2O$	396.76	wh powd		d		i	i	i al HCl, d NaOH NH_4OH, v sl s N
z31	fluoride	ZnF_2	103.38	col, monocl or tricl	4.95_4^{25}	872	ca 1500	1.62^{20}	s	s hot a, NH_4OH, i NH_3
z32	fluoride, tetrahydrate	$ZnF_2 \cdot 4H_2O$	175.44	col, rhomb	2.255	$-4H_2O$, 100	tr to ZNO, 3000	1.6^{18}	s	s a, alk, NH_4OH
z33	fluosilicate	$ZnSiF_6 \cdot 6H_2O$	315.55	col, hex pr, 1.3824, 1.3956	2.104	d 100		v s		
z34	formaldehydesulfoxylate	$Zn(HSO_2 \cdot CH_2O)_2$	255.57	rhomb pr		d		v s	v s	d a, i al
z35	formaldehydesulfoxylate, basic	$Zn(OH)HSO_2 \cdot CH_2O$	177.48	rhomb pr		d		i	i	d a, i al
z36	formate	$Zn(CHO_2)_2$	155.42	col, cr	2.368	d		3.80	62^{100}	
z37	formate	$Zn(CHO_2)_2 \cdot 2H_2O$	191.45	wh, monocl, 1.513, 1.526, 1.566	2.207^{20}	$-2H_2O$, 140	d	5.2^{20}	38^{100}	i al
z38	gallate	$ZnGa_2O_4$	268.82	wh fine cr, 1.74	6.15 calc	<800		i	i	i org solv; s dil a, NH_4OH
z39	glycerophosphate	$ZnC_3H_7O_6P$	235.44	wh amorph powd				s		i al, eth
z40	hydroxide(α)	$Zn(OH)_2$	99.39	col, rhomb	3.053	d 125		v sl s		s a, alk
z41	iodate	$Zn(IO_3)_2$	415.19	wh, need	5.0632^{25}	d		0.87	1.31	s alk, HNO_3
z42	iodate, dihydrate	$Zn(IO_3)_2 \cdot 2H_2O$	451.22	wh, cr powd	4.223_4^{25}	$-H_2O$, 200		0.877	1.32	s HNO_3, NH_4OH
z43	iodide	ZnI_2	319.19	col, hexag	4.7364_4^{25}	446	d 624	432^{18}	511^{100}	s a, al, eth, NH_3, $(NH_4)_2CO_3$
z44	*d*-lactate	$Zn(C_3H_5O_3)_2 \cdot 2H_2O$	279.55					5.7^{15}	9^{33}	0.104 h 98% al
z45	*di*-lactate	$Zn(C_3H_5O_3)_2 \cdot 3H_2O$	297.57	wh, rhomb cr				1.67^{106}	16.7^{100}	v sl s al
z46	laurate	$Zn(C_{12}H_{23}O_2)_2$	464.01	wh powd		128		0.01^{15}	0.019^{100}	0.010^{15} al
z47	*permanganate*	$Zn(MnO_4)_2 \cdot 6H_2O$	411.34	vlt-br or bl, deliq	2.47	$-5H_2O$, 100		33.3	v s	d al, a
z48	nitrate, trihydrate	$Zn(NO_3)_2 \cdot 3H_2O$	243.44	col, need		45.5		327.3^{40}		
z49	nitrate, hexahydrate	$Zn(NO_3)_2 \cdot 6H_2O$	297.48	col, tetrag	2.065^{14}	36.4	$-6H_2O$, 105-131	184.3^{20}	x	v s al
z50	nitride	Zn_3N_2	224.15	gray	6.22_4^{25}			d		s HCl
z51	oleate	$Zn(C_{17}H_{33})_2)_2$	628.30	wax-like solid		70		i		s al, eth, bz, CS_2, s acet
z52	oxalate	$ZnC_2O_4 \cdot 2H_2O$	189.43	wh powd	3.28_4^{25}	d 100		0.00079^{18}		s a, alk
z53	oxide	Nat. zincite. ZnO	81.38	wh, hex, 2.008, 2.029	5.606	1975		0.00016^{29}		s a, alk, NH_4Cl, NH_3
z54	oxide, per-	$ZnO_2 \cdot {}^1/_2H_2O$	106.39	yelsh, powd	3.00 ± 0.08	$-O_2$, vac		sl d	d	d al, eth, acet
z55	1-phenol-4-sulfonate(p)	$Zn(C_6H_5SO_4)_2 \cdot 8H_2O$	555.83	col cr or fine wh powd, efll		$-8H_2O$, 125		62.5	250^{100}	55.6^{25} al
z56	*ortho*phosphate	$Zn_3(PO_4)_2$	386.08	col, rhomb	3.998^{15}	900		i	i	s a, NH_4OH; i al
z57	*ortho*phosphate, dihydrogen	$Zn(H_2PO_4)_2 \cdot 2H_2O$	295.39	tricl		d 100		d		
z58	*ortho*phosphate, octahydrate	$Zn_3(PO_4)_2 \cdot 8H_2O$	530.20	rhomb pl	3.109^{15}			i		s alk

PHYSICAL CONSTANTS OF INORGANIC COMPOUNDS (continued)

No.	Name	Synonyms and Formulae	Mol. wt.	Crystalline form, properties and index of refraction	Density or spec. gravity	Melting point, °C	Boiling point, °C	Solubility, in grams per 100 cc: Cold water	Hot water	Other solvents
z59	*orthophosphate*, tetrahydrate	α-Hopeite $Zn_3(PO_4)_2 \cdot 4H_2O$	458.14	col, rhomb, 1.572, 1.591, 1.59	3.04	tr > 105		i	i	v s a, NH_4OH, HN_4 salts
z60	*orthophosphate* tetrahydrate	β-Hopeite, $Zn_3(PO_4)_2 \cdot 4H_2O$	458.14	col, rhomb, 1.574, 1.582, 1.582	3.03	tr > 140		i	i	v s a, NH_4OH, NH_4 salts
z61	*orthophosphate* tetrahydrate	Parahopeite, $Zn_3(PO_4)_2 \cdot 4H_2O$	458.14	col, tricl, 1.614, 1.625, 1.665	3.75	tr > 163		i	i	v s a, NH_4OH, NH_4 salts
z62	*pyrophosphate*	$Zn_2P_2O_7$	304.70	wh powd	3.75^{23}			i	i	s a, alk, NH_4OH
z63	phosphide	Zn_3P_2	258.09	dk gray, tetrag, pois	4.55^{13}	>420	1100, subl in H_2	d		d H_2SO_4 ev H_3P s HNO_3, s (viol) dil a, i al
z64	hypophosphite	$Zn(H_2PO_2)_2 \cdot H_2O$	213.37	col, cr powd, hygr				s		s alk
z65	picrate	$Zn(C_6H_2N_3O_7)_2 \cdot 8H_2O$	665.70	yel cr powd, expl		expl		s		
z66	salicylate	$Zn(C_7H_4O_3)_2 \cdot 3H_2O$	393.66	need				5^{20}		s al
z67	selenate	$ZnSeO_4 \cdot 5H_2O$	298.41	wh, tricl	2.591_4^{20}	d > 50		s		
z68	selenide	ZnSe	144.34	yelsh to redsh, cub, 2.89	5.42_4^{5}	>1100		i		s a, d NHO_3
z69	silicate	Nat hemimorphite $2ZnO \cdot SiO_2 \cdot H_2O$	240.86	rhomb, or trigon 1.614, 1.617, 1.636	3.45			i	i	
z70	*metasilicate*	$ZnSiO_3$	141.46	col, rhomb	3.42	1437		i		i a
z71	*orthosilicate*	Nat willemite Zn_2SiO_4	222.84	trig, 1.694, 1.723	4.103	1509		i	i	s acet a
z72	stearate	$Zn(C_{18}H_{35}O_2)_2$	632.33	light powd		130		i		i al, eth
z73	sulfate	Nat zinkosite $ZnSO_4$	161.44	sol, rhomb, 1.658, 1.669, 1.670	3.54_4^{5}	d 600		s	s	sl s al, s MeOH, glyc
z74	sulfate, heptahydrate	Nat goslarite $ZnSO_4 \cdot 7H_2O$	287.54	col, rhomb, effl, 1.457, 1.480, 1.484	1.957_4^{25}	100	$-7H_2O$, 280	96.5^{20}	663.6^{100}	sl s al, glyc
z75	sulfate, hexahydrate	$ZnSO_4 \cdot 6H_2O$	269.53	col, monocl or tetrag	2.072^{15}	$-5H_2O$, 70		s	117.5^{80}	
z76	sulfide(α)	Nat wurtzite ZnS	97.44	col, hex, 2.356, 2.378	3.98	1700 ± 20^{50}	atm 1185	0.000069^{18}		v s a, i ac a
z77	sulfide(β)	Nat sphalerite, ZnS	97.44	col, cub, 2.368	4.102^{25}	tr 1020		0.000065^{18}		v s a
z78	sulfide, monohydrate	$ZnS \cdot H_2O$	115.46	yelsh-wh powd	3.98	1049		i		s a
z79	sulfite	$ZnSO_3 \cdot 2H_2O$	181.47	wh, cr powd		$-2H_2O$, 100	d 200	0.16	d	i al, s H_2SO_3
z80	tartrate	$ZnC_4H_4O_6 \cdot H_2O$ (or $2H_2O$)	231.47	wh powd				0.055^{30}		s KOH, NaOH
z81	tellurate	Zn_3TeO_6	419.74	wh, gran ppt				i	i	s a
z82	telluride	ZnTe	192.98	red, cub, 3.56	6.34^{15}	1238.5		d		s d a
z83	thiocyanate	$Zn(SCN)_2$	181.54	wh powd, deliq				s		s al, NH_4OH
z84	valerate	$Zn(C_5H_9O_2)_2 \cdot 2H_2O$	303.66	wh glist sc or powd				$2.6^{24.25}$	s	*ca* 2.5 al, s sl s eth
	Zinc Complexes									
z85	*diamminezinc chloride*	$[Zn(NH_3)_2]Cl$	170.35	col, rhomb, 1.625, 1.590	2.10	210.8	d 271	d		
z86	tetrammine perrhenate	$[Zn(NH_3)_4](ReO_4)_2$	633.91	wh, cub cr	3.608_4^{25}					0.1852 conc NH_4OH
z87	tetrapyridine fluosilicate	$[Zn(C_5H_5N)_4]SiF_6$	523.86	wh, rhomb	2.197					
z88	**Zirconium**	Zr	91.22	silver gray, met	6.49	1852 ± 2	4377	i	i	s HF, aq reg, sl s a
z89	boride, di	ZrB_2	112.84	hex	6.085	*ca*3200				
z90	bromide, di	$ZrBr_2$	251.03	blk powd, ign in air		d 350		d ev H_2		
z93	bromide, tetra-	$ZrBr_4$	410.84	wh cr powd, deliq		450 ± 1^{15atm}	357 subl	i d		s liq NH_3, acetone, i bz, CCl_4
z94	bromide, tri-	$ZrBr_3$	330.93	bl-blk powd		d 350		d ev H_2		
z95	carbide	ZrC	103.23	gray met, cub	6.73	3540	5100	i		sl s conc H_2SO_4
z96	carbonate, basic	$3ZrO_2 \cdot CO_2 \cdot H_2O$	431.68	wh, amorph powd				i		s a
z97	chloride, di-	$ZrCl_2$	162.13	blk	3.6^{18}	d 350		d ev H_2		
z98	chloride, tetra-	$ZrCl_4$	233.03	wh cr	2.803^{15}	437^{25atm}	subl 331	s	d	s al, eth, conc HCl
z99	chloride, tri-	$ZrCl_3$	197.58	br cr	3.00^{18}	d 350		d ev H_2		s $-H_2$ conc al, i org cpd
z100	fluoride	ZrF_4	167.21	wh hex, 1.59	4.43	subl ~ 600		1.388^{25}	d	sl s HF
z101	hydride	ZrH_2	93.24	gray-blk powd						s di HF, conc a
z102	hydroxide	$Zr(OH)_4$	159.25	wh amorp powd	3.25	$-2H_2O$, 500		0.02	i	s min a
z103	iodide	ZrI_4	598.84	wh need, hygr		499 ± 2 6.3^{atm}	d ~ 600	s d	s	d al, s eth, s sl s CS_2, bz, i liq NH_3
z104	*nitrate*	$Zr(NO_3)_4 \cdot 5H_2O$	429.32	col cr, deliq, 1.60, 1.61				s s		s al
z105	nitride	ZrN	105.23	yel-brn cr	7.09	2980 ± 50		i	i	sl s inorg ac, s conc H_2SO_4 HF, aq reg
z106	oxide	Nat baddeleyite ZrO_2	123.22	col-yel-brn, monocl, 2.13, 2.19, 2.20	5.89	*ca* 2700	*ca* 5000	i	i	s H_2SO_4, HF
z107	oxide	Zirconia ZrO_2 HfO_2 < 2%	123.22	wh, monocl below 1000°, cub, above	5.6	2715		i	i	s H_2SO_4, HF
z108	oxide	Zirconium hydroxide, zirconic acid $ZrO_2 \cdot xH_2O$		gel or wh amorph powd	3.25	$-2H_2O$, 550		0.02		s acids, i al, alk
z109	phosphide	ZrP_2	153.17	gray, brittle	4.77_4^{25}			i		s s conc hot H_2SO_4
z110	selenate	$Zr(SeO_4)_2 \cdot 4H_2O$	449.20	hex trsp cr				s		sl s al, conc a
z111	selenite	$Zr(SeO_3)_2$	345.14	wh sm cr	4.3	d ~ 400		i	i	sl s H_2SO_4
z112	*orthosilicate*	Zircon, hyacinth $ZrSiO_4$	183.30	tetr, var colors, 1.92-96, 1.97-2.02	4.56	2550		i	i	i a, aq reg, alk