

# ZIRCONIUM MINERAL CONCENTRATES STATISTICS<sup>1</sup>

## U.S. GEOLOGICAL SURVEY

[All values in metric tons (t) zirconium mineral concentrates unless otherwise noted]

Last modification: November 21, 2007

Year	Production	Imports	Exports	Government stocks	Government shipments	Stocks	Apparent consumption	Unit value (\$/t)	Unit value (98\$/t)	World production
1900										
1901										
1902	0.907		0				0.91			
1903	1.36		0				1.4			
1904	0.454		0				0.45			
1905	3.63		0				3.6			
1906	0.454		0				0.45			
1907	0.0925	0	0				0.093			
1908		0	0				0.50			
1909	0.907		0				0.91			
1910	0		0				1.2			
1911	1.46		0				1.5			
1912	0		0							
1913	0		0							
1914	0		0							
1915	0		0							
1916	0		0							
1917	0		0							
1918	0	1,460	0				1,500	43.5	470	
1919	0	5	0				5	59.9	565	
1920	0		0				32	59	480	
1921	0	59	0				59	58	530	
1922	9.07	30	0				39	57	550	
1923	139		0				140	56	530	
1924	255	280	0				540	55	520	
1925	566		0				570	54	500	
1926	1,170		0				1,200	53	490	
1927	3,310	2	0				3,300	52	490	
1928		392	0				390	51	490	
1929	0	1,220	0				1,200	50	480	
1930	0	1,380	0				1,400	49	480	
1931	0	510	0				510	48	510	
1932	0	12	0				12	46.8	557	
1933	0	258	0				260	46.8	586	
1934	0	774	0				770	60.6	737	
1935	0	2,610	0				2,600	46.8	557	
1936	0	5,250	0				5,300	46.8	549	
1937	0	8,100	0				8,100	50.7	574	
1938	0	1,900	0				1,900	60.6	701	
1939	0	3,110	0				3,100	60.6	710	
1940		15,300	0				15,000	77.2	899	
1941		25,100	0				25,000	71.6	794	
1942		30,800	27	4,500		6,080	31,000	71.6	716	
1943	1,940	25,800	85	5,040		7,440	25,800	77.2	728	
1944		21,800	73	4,840		4,420	25,000	77.2	715	17,300
1945		24,000	98	2,580		5,730	25,000	74.4	676	19,700
1946		15,300	235	2,250		4,590	17,000	56.8	473	24,700
1947		27,800	299			8,700	23,000	47.4	346	25,900
1948		16,500	283			5,900	22,700	50.7	343	26,600
1949		18,900	277			7,890	18,100	51.3	351	24,100
1950		15,300				7,350	26,000	51.5	348	25,200
1951		24,800	336			6,820	25,000	57.9	362	46,200

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1952		21,700	549			8,160	22,700	47.7	293	33,900
1953	14,800	22,400	1,010			9,980	36,300	41.8	255	53,300
1954	14,800	16,800	628			8,710	40,800	50.4	305	63,200
1955	25,500	26,400	707			7,980	38,100	54.3	331	78,200
1956	39,900	28,300	951			14,000	61,000	54.3	325	118,000
1957	51,500	37,800	2,870			17,000	77,100	60.6	352	146,000
1958	27,600	17,400	1,810			10,200	49,000	45.2	255	105,000
1959		49,800	1,370			45,600	73,900	52.1	291	103,000
1960		31,100	1,250			18,200	80,700	52.1	286	129,000
1961		30,700	1,160			16,100	83,600	52.1	285	159,000
1962		28,000	1,510		6,360	21,500	80,700	52.1	282	149,000
1963		47,700	1,290		4,470	19,700	34,000	52.1	277	195,000
1964		40,300	2,270		210	35,800	26,800	52.1	274	191,000
1965		53,400	1,600		181	38,900	32,200	52.1	270	235,000
1966		52,600	2,100			34,500	120,000	52.1	262	244,000
1967		53,800	2,480			43,500	122,000	52.1	254	293,000
1968		54,300	1,840			41,700	130,000	62.3	292	309,000
1969		86,600	4,890			48,100	145,000	62.3	277	386,000
1970		86,000	3,930			47,200	132,000	62.3	262	399,000
1971		87,400	8,550			38,600	151,000	60.1	242	432,000
1972		61,300	15,700			40,400	152,000	60.1	234	369,000
1973		88,900	26,200			46,700	159,000	66.1	243	379,000
1974		56,700	19,500			38,000	152,000	276	912	397,000
1975		36,500	17,000			33,600	111,000	173	524	418,000
1976		58,600	8,550			35,000	141,000	165	473	448,000
1977		59,200	13,000			23,600	147,000	165	444	505,000
1978		82,600	6,960			34,800	149,000	165	413	525,000
1979		101,000	8,030			34,000	152,000	165	370	629,000
1980		103,000	7,010			63,000	127,000	182	360	680,000
1981		82,700	10,600			30,300	136,000	182	326	645,000
1982		62,100	9,990			44,100	84,400	182	307	710,000
1983		40,400	12,000			33,100	90,700	182	298	666,000
1984		60,300	8,640			29,800	118,000	182	286	736,000
1985		39,700	15,300			26,600	118,000	193	292	815,000
1986		68,800	15,900			28,100	143,000	209	311	741,000
1987		67,900	20,100			39,200	133,000	223	320	753,000
1988	118,000	76,300	21,800			34,400	177,000	267	368	929,000
1989	118,000	73,100	48,100			32,100	146,000	353	464	979,000
1990	102,000	26,800	30,200			28,100	103,000	406	506	852,000
1991	103,000	35,700	31,300			24,400	111,000	365	437	795,000
1992	108,000	37,400	27,900			21,600	121,000	292	339	856,000
1993		70,000	35,900			26,000	150,000	292	329	796,000
1994		82,000	32,000			30,100	150,000	306	337	897,000
1995		93,600	40,300			33,400	160,000	352	376	918,000
1996		92,500	35,000		1,480	34,300	160,000	462	480	894,000
1997		62,400	44,300			29,300	160,000	462	469	830,000
1998		89,500	41,000			32,000	160,000	353	353	732,000
1999		57,600	69,500			24,700	160,000	331	324	673,000
2000		65,200	72,900			25,100	170,000	375	355	731,000
2001		60,600	66,900			37,700	170,000	356	328	750,000
2002		36,000	47,100			21,600	170,000	397	360	973,000
2003		38,100	74,300				170,000	408	361	1,030,000

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2004		36,200	71,400				170,000	408	361	1,080,000
2005		38,200	100,900				170,000	570	476	1,090,000
2006		36,200	76,300				170,000	728	648	1,180,000

<sup>1</sup>Compiled by C.A. DiFrancesco (retired), J.B. Hedrick, and J. Gambogi.

Data are calculated, estimated, or reported. See notes for more information.

## Zirconium Mineral Concentrates Worksheet Notes

### Data Sources

The sources of data for the zirconium worksheet are the mineral statistics publications of the U.S. Bureau of Mines and the U.S. Geological Survey—Minerals Yearbook (MYB) and its predecessor, Mineral Resources of the United States (MR). Data are for zirconium ores and concentrates, which contain zircon ( $\text{ZrSiO}_4$ ) as the main source for zirconium (Zr). The years of publication and corresponding years of data coverage are listed in the References section below. Blank cells in the worksheet indicate that data either were not available or were withheld because they were proprietary.

### Production

U.S. production data report the amount of zircon concentrates. Data were from the MR and the MYB. Data were withheld for the years 1959–87 and 1993–2006 in order to avoid disclosing proprietary data. The remaining blanks indicate that data were not available for the years 1900–01, 1908, 1928, 1940–42, and 1944–52.

### Imports

Import data report the amount of zirconium ores and concentrates imported into the United States. Data were from the MR and the MYB. Datum for 1918 was for ½ year of production as zirconium ores and concentrates were not classified separately before this time. Ores and concentrates from Brazil contained some baddeleyite (an oxide of zirconium), as do some present day concentrates. Australian zirconium ores contained some rutile and ilmenite. Blank cells in the worksheet indicate that data were not available for the years 1900–06, 1909–17, 1920, 1923, and 1925–26.

### Exports

Export data report the amount of zirconium ores and concentrates exported from the United States. Data were from the MR and the MYB. Blank cells in the worksheet indicate that data were not available for the years 1900–01 and 1950.

### Government Stocks

Government stock data were for zirconium ores and concentrates and were from the MYB. Blank cells in the worksheet indicate that data were not available for the years 1900–41 and 1947–2006.

### Government Shipments

Government shipment data were for shipments from the government stockpile of zirconium ores and concentrates. Data were from the MYB. Blank cells in the worksheet indicate that data were not available for the years 1900–61, 1966–95, and 1997–2006.

### Stocks

Stock data were for zirconium ores and concentrates. Data were from the MR and the MYB. Blank cells in the worksheet indicate that data were not available for the years 1900–41.

### Apparent Consumption

Apparent consumption values were developed based on the following considerations:

- Apparent consumption was left blank because data were unavailable for the years 1901–01 and 1912–17.
- Apparent consumption values were limited to two significant figures based on broad assumptions that had to be made throughout the period covered for the years 1902–11, 1918–47, 1950, 1956, and 1993–2006.
- Apparent consumption was estimated for the years 1902–07, 1909, 1911, 1918–19, 1921–47, and 1956 by using the formula:

$$\text{APPARENT CONSUMPTION} = \text{PRODUCTION} + \text{IMPORTS} - \text{EXPORTS} \pm \text{GOVERNMENT SHIPMENTS} \pm \text{STOCK CHANGES.}$$

- Values for the components of apparent consumption were not available and were assumed to equal zero for the following years:
  - Production: 1928, 1940–42, and 1944–47.
  - Imports: 1902–06, 1909, 1911, 1923, and 1925–26.
  - Government stocks: 1902–07, 1909, 1911, 1918–19, 1921–41, 1947, and 1956.
  - Government shipments: 1902–07, 1909, 1911, 1918–19, 1921–47, and 1956.
  - Stocks: 1902–07, 1909, 1911, 1918–19, and 1921–41.
- Apparent consumption was interpolated for the years 1908, 1910, 1920, and 1950.
- No changes of the amount of government and industry stocks (since government and industry stock data for 1941 were not available) data were available for the year 1942 and were assumed equal to zero.
- Apparent consumption was taken from the MYB for the years, 1948–49, 1951–55, and 1957–92.
- Apparent consumption was estimated by regression analysis for the years 1993–2004.

**Unit Value (\$/t)**

Unit value is the value in dollars of 1 metric ton (t) of zirconium ores and concentrates apparent consumption. Data were from the MYB. Blank cells in the worksheet indicate that data were not available for the years 1900–17. Unit value was interpolated to two significant figures for the years 1920–31.

**Unit Value (98\$/t)**

The Consumer Price Index conversion factor, with 1998 as the base year, is used to adjust current U.S. dollars to the unit value in constant 1998 U.S. dollars. Blank cells in the worksheet indicate that data were not available for the years 1900–17.

**World Production**

World production data were for zirconium mineral concentrates. Data were from the MYB and the MR. Blank cells in the worksheet indicate that data were not available for the years 1900–43. Production data for the United States were not included for the years 1944–52, 1959–87, and 1993–2006.

**References**

- U.S. Bureau of Mines, 1927–34, Mineral Resources of the United States, 1924–31.
- U.S. Bureau of Mines, 1933–96, Minerals Yearbook, 1932–94.
- U.S. Geological Survey, 1901–27, Mineral Resources of the United States, 1900–23.
- U.S. Geological Survey, 1997–2007, Minerals Yearbook, v. I, 1995–2006.

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