

TITANIUM MINERAL CONCENTRATES TOTAL¹

U.S. GEOLOGICAL SURVEY

[All values in metric tons (t) titanium mineral concentrates unless otherwise noted²]

Last modification: November 27, 2007

Year	Production	Shipments	Imports	Exports	Stocks	Apparent consumption	World production
1910	513						
1911							
1912	408	159					
1913	504	227					
1914	166	81					
1915	499	272					
1916	186	186					
1917	1,400	1,400					
1918	1,730	1,730					
1919	189	189					
1920	492	492					
1921							
1922	825	4,440					
1923	668	5,520					
1924		4,330					
1925	42	5,050					14,800
1926	27	4,370					21,400
1927	475	3,180					36,100
1928	160	833	31,300				40,100
1929			22,700				48,200
1930			22,700				43,500
1931			30,300				43,700
1932			34,100				65,700
1933			39,300				79,000
1934			73,100				106,000
1935			122,000				174,000
1936			131,000				226,000
1937			157,000				284,000
1938			191,000				323,000
1939	13,200	15,300	233,000				89,600
1940	21,420	21,210	182,000				361,000
1941	23,940	22,610	161,000		322,000	255,770	248,000
1942	72,400	87,100	19,000	561	160,000	243,630	217,000
1943	188,620	195,580	83,800	523	119,000	291,000	379,000
1944	259,280	261,140	108,000	264	156,000	340,400	483,000
1945	286,510	286,200	201,000	552	253,000	354,880	532,000
1946	262,760	262,820	225,000	1,260	359,000	373,470	527,000
1947	312,770	309,700	285,000	1,150	423,000	441,980	704,000
1948	354,700	354,990	228,000	1,320	489,000	522,280	736,000
1949	375,900	362,580	297,000	1,370	634,000	473,800	844,000
1950	431,840	416,060	200,000	544	627,000	626,600	884,000
1951	492,520	472,930	185,000	586	621,000	662,600	160,000
1952	486,460	480,240	220,000	789	632,000	657,600	942,000
1953	472,190	470,880	402,000	1,240	640,000	708,300	860,000
1954	503,720	489,650	361,000	601	665,000	726,700	1,180,000
1955	536,720	528,330	490,000	1,040	668,000	821,100	1,340,000
1956	631,900	677,900	548,000	1,670	670,000	974,500	1,750,000
1957	696,710	719,660	693,000	1,830	884,000	916,400	1,930,000
1958	517,720	514,690	451,000	1,130	923,000	789,700	1,650,000
1959	584,590	585,850	501,000	4,220	857,000	984,500	1,830,000
1960	720,990	724,370	363,000	1,140	898,000	919,000	2,100,000
1961	718,210	716,950	328,000	1,300	831,000	987,800	2,230,000

TITANIUM MINERAL CONCENTRATES TOTAL¹

U.S. GEOLOGICAL SURVEY

[All values in metric tons (t) titanium mineral concentrates unless otherwise noted²]

Last modification: November 27, 2007

Year	Production	Shipments	Imports	Exports	Stocks	Apparent consumption	World production
1962	742,060	741,290	282,000	1,110	741,000	1,010,800	2,100,000
1963	816,800	817,300	368,000	1,100	773,000	963,900	2,190,000
1964	915,310	920,570	389,000	1,960	855,000	1,082,100	2,540,000
1965	879,000	861,000	395,000	1,090	939,000	1,078,000	2,680,000
1966	876,000	788,000	433,000	1,180	1,010,000	1,116,000	2,870,000
1967	848,000	801,000	475,000	2,750	1,060,000	1,084,000	3,020,000
1968	888,000	871,000	502,000	3,850	1,120,000	1,144,000	3,230,000
1969	845,000	810,000	548,000	1,290	1,040,000	1,208,000	3,610,000
1970	787,000	835,000	430,000	960	1,050,000	1,171,000	4,020,000
1971	620,000	647,000	371,000	1,600	898,000	1,151,000	3,750,000
1972	615,000	671,000	485,000	1,630	757,000	1,173,000	3,610,000
1973	712,460	738,170	484,000	1,360	750,000	1,240,000	3,920,000
1974	680,850	690,440	513,000	2,960	669,800	1,280,000	4,400,000
1975	651,000	637,000	508,000	2,850	785,000	1,020,000	4,030,000
1976	592,000	561,000	565,000	4,360	870,000	1,150,000	4,390,000
1977	579,000	492,000	553,000	20,600	920,000	1,090,000	4,350,000
1978	535,000	527,000	677,000		999,000	1,080,000	4,760,000
1979	580,000	586,000	525,000	8,980	845,000	1,130,000	4,660,000
1980	505,000	539,000	756,000	16,200	1,140,000	1,210,000	5,380,000
1981	492,000	475,000	642,000	6,620	1,110,000	1,270,000	5,140,000
1982	239,000	211,000	689,000	19,700	957,000	951,000	4,420,000
1983			462,000	3,980	551,000	1,060,000	4,040,000
1984			726,000	7,850	336,000	1,180,000	5,320,000
1985			888,000	25,200	416,000	1,190,000	5,110,000
1986			908,000	4,820	429,000	1,280,000	5,100,000
1987			915,000	4,020	426,000	1,320,000	5,950,000
1988			1,060,000	9,370	421,000	1,440,000	6,280,000
1989			1,060,000	19,800	488,000	1,440,000	6,570,000
1990			995,000	18,800	599,000	1,450,000	6,250,000
1991			862,000	26,900	547,000	1,450,000	5,330,000
1992			1,150,000	34,700	534,000	1,680,000	6,050,000
1993		1,000	1,150,000	15,200	500,000	1,710,000	6,040,000
1994		18,000	1,140,000	19,000	356,000	1,090,000	6,030,000
1995		17,000	1,180,000	32,300	356,000	1,890,000	6,240,000
1996			1,260,000	15,500	438,000	1,800,000	6,210,000
1997			1,290,000	23,800	395,000	2,000,000	6,450,000
1998			1,390,000	59,700	501,000	1,720,000	7,050,000
1999			1,410,000	9,380	595,000	1,770,000	6,550,000
2000	400,000		1,360,000	18,900	446,000	1,790,000	7,350,000
2001	500,000		1,380,000	7,800	413,000	1,660,000	7,570,000
2002	400,000		1,230,000	3,810	325,000	1,790,000	7,730,000
2003	500,000		1,230,000	10,300	324,000	1,790,000	8,030,000
2004	500,000		1,060,000	8,690	491,000	1,920,000	8,170,000
2005	500,000		1,190,000	20,900		1,720,000	8,340,000
2006	500,000		1,235,000	32,800		1,870,000	9,370,000

¹Compiled by D.A. Buckingham and J. Gambogi.

²Tonnages in table are expressed as gross weight of concentrate. Titanium content will vary depending on grade of concentrate.

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

ILMENITE AND TITANIUM SLAG¹

U.S. GEOLOGICAL SURVEY

[All values are in metric tons (t) ilmenite and titanium slag unless otherwise noted²]

Last modification: November 27, 2007

Year	Production	Shipments	Imports			Stocks			Apparent consumption		
			Ilmenite	Slag	Total	Ilmenite	Slag	Total	Ilmenite	Slag	Total
1912	159	159									
1913	227	227									
1914	80.7	80.7									
1915	272	272									
1916	86.2	86.2									
1917	1,210	1,210									
1918	1,490	1,490									
1919	96.2	96.2									
1920	243	243									
1921											
1922	544	4,160									
1923	423	5,270									
1924		4,330									
1925		5,050									
1926		4,370									
1927		3,180									
1928		833	31,300		31,300	31,300					
1929			22,700		22,700	22,700					
1930			22,700		22,700	22,700					
1931			30,300		30,300	30,300					
1932			34,000		34,000	34,000					
1933			39,200		39,200	39,200					
1934			72,900		72,900	72,900					
1935			122,000		122,000	122,000					
1936			130,000		130,000	130,000					
1937			156,000		156,000	156,000					
1938			190,000		190,000	190,000					
1939	13,200	15,300	232,000		232,000	232,000					
1940	18,800	18,800	180,000		180,000	180,000					
1941	21,100	19,500	155,000		155,000	319,000	319,000	250,000		250,000	
1942	70,000	84,700	9,440		9,440	157,000	157,000	234,000		234,000	
1943	185,000	192,000	70,800		70,800	116,000	116,000	275,000		275,000	
1944	253,000	255,000	98,800		98,800	152,000	152,000	327,000		327,000	
1945	280,000	280,000	191,000		191,000	247,000	247,000	346,000		346,000	
1946	256,000	256,000	220,000		220,000	346,000	346,000	367,000		367,000	
1947	305,000	305,000	273,000		273,000	411,000	411,000	435,000		435,000	
1948	348,000	346,000	220,000		220,000	481,000	481,000	513,000		513,000	
1949	365,000	353,000	294,000		294,000	626,000	626,000	463,000		463,000	
1950	425,000	410,000	196,000		196,000	619,000	619,000	616,000		616,000	
1951	486,000	463,000	172,000	3,430	175,000	615,000	615,000	647,000		647,000	
1952	480,000	474,000	167,000	34,900	202,000	604,000	15,100	619,000	619,000	22,000	641,000
1953	466,000	465,000	260,000	127,000	387,000	554,000	70,700	625,000	623,000	66,700	690,000
1954	497,000	483,000	249,000	97,500	347,000	576,000	74,000	650,000	617,000	91,500	708,000
1955	529,000	520,000	321,000	151,000	472,000	596,000	58,000	654,000	673,000	122,000	795,000
1956	621,000	667,000	326,000	178,000	504,000	544,000	102,000	646,000	785,000	147,000	932,000
1957	687,000	710,000	418,000	198,000	616,000	667,000	163,000	830,000	763,000	106,000	868,000
1958	511,000	513,000	316,000	102,000	418,000	721,000	139,000	860,000	663,000	107,000	770,000
1959	576,000	578,000	337,000	143,000	480,000	647,000	141,000	788,000	833,000	130,000	963,000
1960	713,000	716,000	241,000	94,600	336,000	707,000	120,000	827,000	788,000	109,000	897,000
1961	710,000	710,000	188,000	115,000	303,000	640,000	119,000	759,000	843,000	118,000	961,000

ILMENITE AND TITANIUM SLAG¹

U.S. GEOLOGICAL SURVEY

[All values are in metric tons (t) ilmenite and titanium slag unless otherwise noted²]

Last modification: November 27, 2007

Year	Production	Shipments	Imports			Stocks			Apparent consumption		
			Ilmenite	Slag	Total	Ilmenite	Slag	Total	Ilmenite	Slag	Total
1962	733,000	734,000	151,000	98,400	249,000	546,000	127,000	673,000	857,000	125,000	982,000
1963	806,000	807,000	182,000	121,000	303,000	593,000	96,000	689,000	794,000	138,000	932,000
1964	908,000	911,000	157,000	131,000	288,000	620,000	108,000	728,000	889,000	116,000	1,010,000
1965	879,000	861,000	151,000	106,000	257,000	692,000	99,000	791,000	838,000	134,000	972,000
1966	876,000	788,000	169,000	127,000	296,000	723,000	125,000	848,000	873,000	120,000	993,000
1967	848,000	801,000	189,000	134,000	323,000	776,000	118,000	894,000	834,000	112,000	945,000
1968	888,000	871,000	223,000	121,000	344,000	808,000	109,000	917,000	871,000	129,000	999,000
1969	845,000	810,000	287,000	74,700	362,000	769,000	93,800	863,000	910,000	126,000	1,040,000
1970	787,000	835,000	87,000	122,000	209,000	733,000	105,000	838,000	882,000	117,000	999,000
1971	620,000	647,000	25,500	138,000	164,000	585,000	98,200	683,000	815,000	130,000	946,000
1972	615,000	671,000	13,500	271,000	285,000	485,000	129,000	614,000	713,000	240,000	953,000
1973	704,000	730,000	63,200	215,000	278,000	515,000	101,000	616,000	733,000	256,000	988,000
1974	675,000	685,000	74,800	214,000	289,000	519,000	52,600	572,000	773,000	233,000	1,010,000
1975	651,000	637,000	111,000	193,000	304,000	578,000	79,500	658,000	678,000	134,000	813,000
1976	592,000	561,000	153,000	156,000	309,000	642,000	89,900	732,000	746,000	185,000	931,000
1977	579,000	492,000	304,000	137,000	441,000	730,000	56,800	787,000	786,000	136,000	922,000
1978	535,000	527,000	280,000	135,000	415,000	736,000	95,900	832,000	719,000	117,000	836,000
1979	580,000	586,000	167,000	101,000	268,000	661,000	68,100	729,000	718,000	131,000	849,000
1980	505,000	539,000	324,000	177,000	501,000	845,000	156,000	1,000,000	770,000	165,000	935,000
1981	492,000	475,000	214,000	244,000	458,000	775,000	185,000	960,000	777,000	229,000	1,010,000
1982	239,000	211,000	316,000	225,000	541,000	674,000	123,000	797,000	529,000	205,000	734,000
1983			235,000	126,000	361,000	362,000	71,100	433,000	663,000	151,000	814,000
1984			372,000	190,000	562,000	182,000	60,400	243,000	711,000	182,000	893,000
1985			460,000	265,000	725,000	215,000	96,200	311,000	686,000	229,000	915,000
1986			422,000	328,000	750,000	253,000	73,400	326,000	731,000	251,000	982,000
1987			308,000	409,000	717,000	198,000	120,000	318,000	744,000	251,000	996,000
1988			394,000	435,000	829,000	173,000	130,000	303,000	679,000	300,000	979,000
1989			412,000	386,000	798,000	237,000	96,100	333,000	660,000	415,000	1,070,000
1990			346,000	374,000	720,000	342,000	86,000	428,000	689,000	391,000	1,080,000
1991			214,000	408,000	622,000	251,000	88,000	339,000	738,000	341,000	1,080,000
1992			295,000	537,000	832,000	246,000	139,000	385,000	685,000	539,000	1,220,000
1993			301,000	476,000	777,000	173,000	137,000	310,000	694,000	546,000	1,240,000
1994			336,000	472,000	808,000	72,700	135,000	207,000		583,000	583,000
1995			473,000	388,000	861,000	98,900	102,000	201,000	828,000	582,000	1,410,000
1996			518,000	422,000	940,000			353,000			1,400,000
1997			522,000	430,000	952,000			330,000			1,520,000
1998			379,000	626,000	1,000,000			380,000			1,300,000
1999			391,000	678,000	1,070,000			489,000			1,280,000
2000			386,000	533,000	919,000			337,000			1,250,000
2001			467,000	594,000	1,060,000			286,000			1,180,000
2002			395,000	445,000	840,000			243,000			1,300,000
2003			395,000	409,000	804,000			244,000			1,300,000
2004			244,000	457,000	701,000			416,000			1,480,000
2005			154,000	667,000	821,000						
2006			187,000	693,000	880,000						

ILMENITE AND TITANIUM SLAG¹

U.S. GEOLOGICAL SURVEY

[All values are in metric tons (t) ilmenite and titanium slag unless otherwise noted²]

Last modification: November 27, 2007

Year	Unit values						World production		
	Ilmenite (\$/t)	Slag (\$/t)	Weighted average (\$/t)	Ilmenite (98\$/t)	Slag (98\$/t)	Weighted average (98\$/t)	Ilmenite	Slag	Total
1912									
1913									
1914									
1915									
1916									
1917									
1918									
1919									
1920									
1921									
1922									
1923									
1924									
1925							14,800		14,800
1926							21,300		21,300
1927							36,000		36,000
1928							40,000		40,000
1929							48,100		48,100
1930							43,500		43,500
1931							43,600		43,600
1932							65,600		65,600
1933							78,800		78,800
1934							106,000		106,000
1935							173,000		173,000
1936							225,000		225,000
1937							282,000		282,000
1938							322,000		322,000
1939							233,000		233,000
1940							355,000		355,000
1941	4.74		4.74				235,000		235,000
1942	19.80		19.80				200,000		200,000
1943	15.70		15.70				359,000		359,000
1944	22.50		22.50				461,000		461,000
1945	18.20		18.20				513,000		513,000
1946	13.30		13.30				510,000		510,000
1947	11.80		11.80				682,000		682,000
1948	13.40		13.40				713,000		713,000
1949	13.40		13.40				819,000		819,000
1950	11.20		11.20				856,000	3,180	859,000
1951	14.20		14.20				97,900	19,200	117,000
1952	16.40		16.40	101		101	857,000	38,900	896,000
1953	21.50		21.50	131		131	675,000	140,000	815,000
1954	21.30		21.30	130		130	1,000,000	115,000	1,220,000
1955	25.80		25.80	157		157	1,120,000	154,000	1,280,000
1956	27.70		27.70	166		166	1,430,000	209,000	1,630,000
1957	35.40		35.40	205		205	1,540,000	243,000	1,790,000
1958	29.10		29.10	164		164	1,410,000	150,000	1,560,000
1959	27.90		27.90	156		156	1,510,000	224,000	1,730,000
1960	24.30		24.30	134		134	1,650,000	352,000	2,000,000
1961	22.20		22.20	121		121	1,690,000	422,000	2,120,000

ILMENITE AND TITANIUM SLAG¹

U.S. GEOLOGICAL SURVEY

[All values are in metric tons (t) ilmenite and titanium slag unless otherwise noted²]

Last modification: November 27, 2007

Year	Unit values						World production		
	Ilmenite (\$/t)	Slag (\$/t)	Weighted average (\$/t)	Ilmenite (98\$/t)	Slag (98\$/t)	Weighted average (98\$/t)	Ilmenite	Slag	Total
1962	22.20		22.20	120		120	1,690,000	274,000	1,970,000
1963	23.30		23.30	124		124	1,640,000	345,000	1,990,000
1964	23.70		23.70	124		124	1,860,000	496,000	2,350,000
1965	23.60		23.60	122		122	1,960,000	498,000	2,450,000
1966	26.60	49.80	29.40	134	250	148	2,140,000	480,000	2,620,000
1967	25.30	34.60	26.40	124	169	129	2,190,000	552,000	2,740,000
1968	24.90	35.00	26.20	116	164	122	2,309,000	615,000	2,920,000
1969	25.50	74.30	31.40	113	330	139	2,530,000	685,000	3,220,000
1970	21.20	44.50	23.90	89.30	187	101	2,830,000	773,000	3,600,000
1971	24.20	47.40	27.40	97.50	191	110	2,580,000	779,000	3,360,000
1972	24.70	48.50	30.70	96.30	189	120	2,450,000	838,000	3,290,000
1973	26.50	51.00	32.80	97.30	187	121	2,710,000	859,000	3,570,000
1974	31.80	57.20	37.70	105	189	124	3,190,000	849,000	4,040,000
1975	38.80	71.80	44.30	118	217	134	2,900,000	754,000	3,650,000
1976	42.40	85.40	50.90	121	245	146	3,170,000	818,000	3,980,000
1977	38.80	98.90	47.70	104	266	128	3,320,000	694,000	4,000,000
1978	37.30	110	47.50	93.20	275	119	3,510,000	941,000	4,460,000
1979	47.50	110	57.10	107	247	129	3,550,000	764,000	4,310,000
1980	44.90	117	57.60	88.80	232	114	3,730,000	1,220,000	4,940,000
1981	62.20	124	76.30	112	223	137	3,650,000	1,130,000	4,780,000
1982	52.80	146	78.80	89.20	247	133	3,030,000	1,050,000	4,080,000
1983	39.40	160	61.80	64.40	262	101	2,670,000	1,050,000	3,730,000
1984	29.80	175	59.40	46.70	274	93	3,830,000	1,140,000	4,970,000
1985	31.70	197	73.10	48.10	299	111	3,460,000	1,280,000	4,740,000
1986	39.90	197	80.10	59.30	293	119	3,420,000	1,290,000	4,710,000
1987	39.00	203	80.40	55.90	291	115	3,940,000	1,580,000	5,510,000
1988	49.40	214	99.80	68.10	295	138	4,120,000	1,730,000	5,850,000
1989	61.90	220	123	81.40	290	162	4,350,000	1,770,000	6,120,000
1990	66.40	239	129	82.80	299	161	4,070,000	1,720,000	5,790,000
1991	113	259	159	135	310	190	3,360,000	1,510,000	4,870,000
1992	69.30	290	166	80.50	337	193	3,920,000	1,640,000	5,560,000
1993	61.10	315	173	69.00	355	195	3,990,000	1,550,000	5,540,000
1994	78.00	334	334	85.80	368		3,970,000	1,510,000	5,480,000
1995	71.90	340	183	76.90	364	195	4,010,000	1,810,000	5,820,000
1996	66.80	354		69.40	367		4,010,000	1,830,000	5,840,000
1997	71.30	391		72.40	397		4,070,000	1,950,000	6,020,000
1998	70.70	382		70.70	382		4,560,000	2,050,000	6,610,000
1999	83.90	301		82	382		4,150,000	2,050,000	6,200,000
2000	96.40	410		91.20	388		4,940,000	2,000,000	6,940,000
2001	80.10	402		73.70	371		5,110,000	2,040,000	7,150,000
2002	105	435		94.80	394		5,410,000	1,870,000	7,280,000
2003	100	399		88.60	353		5,780,000	1,880,000	7,660,000
2004	168	419		145	362		5,940,000	1,880,000	7,820,000
2005	132	391		110	326		6,090,000	1,880,000	7,970,000
2006	107	408		87	330		6,700,000	2,160,000	8,860,000

¹Compiled by D.A. Buckingham and J. Gambogi.

²Tonnages in table are expressed as gross weight of concentrate. Titanium content will vary depending on grade of concentrate.

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

NATURAL AND SYNTHETIC RUTILE STATISTICS¹
U.S. GEOLOGICAL SURVEY
 [All values are in metric tons (t) natural and synthetic rutile unless otherwise noted²]
 Last modification: November 27, 2007

Year	Production	Shipments	Imports			Stocks	Apparent consumption	Unit value (\$/t)	Unit value (98\$/t)	World production
			Natural	Synthetic	Total					
1910	513									
1911										
1912	249									
1913	277									
1914	85.3									
1915	227									
1916	100	100								
1917	187	187								
1918	237	237								
1919	92.5	92.5								
1920	249	249								
1921										
1922	281	281								
1923	245	245								
1924										
1925	41.7									
1926	27.2									77.1
1927	475									45.4
1928	160									59.0
1929			5.60		5.60					42.6
1930			2.72		2.72					46.3
1931			1.00		1.00					20.9
1932			88.2		88.2					65.3
1933			72.0		72.0					152
1934			155		155					352
1935			212		212					411
1936			463		463					1,020
1937			603		603					2,110
1938			463		463					967
1939			714		714					1,370
1940	2,620	2,410	1,960		1,960					6,250
1941	2,840	3,110	5,710		5,710	3,270	5,770	90.70	1,000	12,900
1942	2,400	2,400	9,550		9,550	3,390	9,630	86.60	866	17,300
1943	3,620	3,580	13,000		13,000	2,710	16,000	86.50	815	20,200
1944	6,280	6,140	9,090		9,090	4,090	13,400	89.30	827	21,800
1945	6,510	6,200	9,620		9,620	5,660	8,880	61.20	554	18,700
1946	6,760	6,820	5,320		5,320	13,400	6,470	99.70	834	16,700
1947	7,770	4,700	11,500		11,460	12,600	6,980	62.00	453	22,100
1948	6,700	8,990	7,960		7,960	8,360	9,280	72.90	493	22,700
1949	10,900	9,580	2,800		2,800	7,810	10,800	54.10	370	25,300
1950	6,840	6,060	4,140		4,140	7,560	10,600	49.60	335	24,900
1951	6,520	9,930	10,200		10,200	5,800	15,600	51.50	323	42,500
1952	6,460	6,240	17,700		17,700	12,500	16,600	102	627	45,600
1953	6,190	5,880	14,700		14,700	15,300	18,300	121	741	45,000
1954	6,720	6,650	13,700		13,700	15,300	18,700	108	654	52,300
1955	7,720	8,330	17,700		17,700	14,200	26,100	119	726	68,700
1956	10,900	10,900	44,400		44,400	24,300	42,500	161	965	111,000
1957	9,710	9,660	77,000		77,000	53,500	48,400	155	896	142,000
1958	6,720	1,690	33,200		33,200	62,900	19,700	135	764	93,600
1959	8,590	7,850	21,100		21,100	69,300	21,500	132	740	96,500
1960	7,990	8,370	26,500		26,500	70,600	22,000	132	724	104,000
1961	8,210	6,950	24,900		24,900	71,800	26,800	104	568	117,000

NATURAL AND SYNTHETIC RUTILE STATISTICS¹
U.S. GEOLOGICAL SURVEY
[All values are in metric tons (t) natural and synthetic rutile unless otherwise noted²]
Last modification: November 27, 2007

Year	Production	Shipments	Imports			Stocks	Apparent consumption	Unit value (\$/t)	Unit value (98\$/t)	World production
			Natural	Synthetic	Total					
1962	9,060	7,290	32,600		32,600	68,400	28,800	89.70	484	136,000
1963	10,800	10,300	65,300		65,300	84,200	31,900	81.80	436	201,000
1964	7,310	9,570	101,000		101,000	127,000	72,100	79.30	417	195,000
1965			138,000		138,000	148,000	106,000	73.50	380	222,000
1966			137,000		137,000	157,000	123,000	61.80	311	250,000
1967			152,000		152,000	169,000	139,000	78.80	385	282,000
1968			158,000		158,000	198,000	145,000	86.30	404	302,000
1969			186,000		186,000	176,000	168,000	87.20	387	396,000
1970			221,000		221,000	216,000	172,000	89.80	377	417,000
1971			207,000		207,000	215,000	205,000	117	472	384,000
1972			192,000	8,350	200,000	143,000	220,000	120	469	319,000
1973	8,460	8,170	156,000	49,600	206,000	134,000	251,000	139	509	350,000
1974	5,850	5,440	177,000	47,100	224,000	97,800	265,000	173	573	361,000
1975			151,000	52,700	204,000	127,000	210,000	228	690	382,000
1976			178,000	77,700	256,000	138,000	216,000	215	615	404,000
1977			88,200	24,100	112,000	133,000	168,000	218	586	345,000
1978			230,000	32,300	262,000	167,000	239,000	201	503	302,000
1979			150,000	107,000	257,000	116,000	285,000	193	433	354,000
1980			184,000	71,000	255,000	142,000	270,000	245	485	436,000
1981			146,000	37,500	184,000	148,000	259,000	322	577	362,000
1982			126,000	21,900	148,000	160,000	217,000	267	452	339,000
1983			82,500	18,700	101,000	118,000	241,000	232	381	310,000
1984			144,000	20,000	164,000	92,600	288,000	274	430	341,000
1985			133,000	30,000	163,000	105,000	277,000	270	409	376,000
1986			129,000	29,200	158,000	103,000	299,000	330	491	394,000
1987			146,000	52,100	198,000	108,000	321,000	364	523	439,000
1988			154,000	76,800	231,000	118,000	352,000	406	560	434,000
1989			189,000	76,300	265,000	155,000	366,000	453	595	454,000
1990			218,000	56,600	275,000	171,000	369,000	465	580	456,000
1991			175,000	65,300	240,000	208,000	369,000	507	606	460,000
1992			181,000	136,000	317,000	149,000	461,000	409	475	491,000
1993		1,000	275,000	96,600	372,000	190,000	465,000	363	410	501,000
1994		18,000	222,000	110,000	332,000	149,000	510,000	373	410	545,000
1995		17,000	192,000	127,000	319,000	54,700	480,000	409	438	416,000
1996			182,000	142,000	324,000	85,100	398,000	365	379	366,000
1997			183,000	153,000	336,000	64,600	489,000	430	437	425,000
1998			246,000	141,000	387,000	121,000	421,000	403	403	438,000
1999			225,000	119,000	344,000	106,000	494,000	406	397	348,000
2000			265,000	173,000	438,000	109,000	537,000	387	367	409,000
2001			197,000	127,000	324,000	127,000	483,000	394	362	421,000
2002			211,000	179,000	390,000	81,700	487,000	381	345	446,000
2003			255,000	172,000	427,000	79,700	489,000	380	336	361,000
2004			216,000	144,000	360,000	75,400	445,000	458	395	353,000
2005			184,000	182,000	366,000			432	361	373,000
2006			251,000	104,000	355,000			457	370	511,000

¹Compiled by D.A. Buckingham and J. Gambogi.

²Tonnages in table are expressed as gross weight of concentrate. Titanium content will vary depending on grade of concentrate.

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

Titanium Mineral Concentrates Total Worksheet Notes

Data Sources

Data sources for the titanium mineral concentrates; ilmenite, natural and synthetic rutile, and titanium slag, 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), and Mineral Commodity Summaries (MCS) and its predecessor, Commodity Data Summaries (CDS). 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 from publication because they are proprietary.

Production

Data represent the total gross weight of mine production for ilmenite and natural rutile. Data are not available for the years 1911, 1921, 1924, and 1929–38. Data are withheld for the years 1983–99. Data for the year 1910 and for 1925–28 are natural rutile production only. Data for the years 2000–06 are rounded to one significant digit. Data are from the MR and MYB.

Shipments

Data represent the total gross weight of domestically mined ilmenite and natural rutile shipments. Data for the years 1912–15 are ilmenite shipments only. Data are not available prior to 1910. Data are withheld from publication because they are proprietary, for the years 1911, 1921, 1929–38, and 1983–2006. Data are from the MR and MYB. Exports data for the years 1974–77, 1982–84 and 1986 are ilmenite data only. Data are from the MR and MYB.

Imports

Data represent the gross weight imports of all forms of titanium mineral concentrates (ilmenite, natural and synthetic rutile, and titanium slag). Data are not available prior to 1928. Data are from the MR and MYB.

Exports

Data represent the gross weight exports of titanium concentrates in all forms. Data are not available prior to 1942 and for 1978. Data are from the MR and MYB.

Ilmenite and titanium slag concentrate export data are available only for the years 1974–77, 1982–84, and 1986. Data are from the MR and MYB.

Exports data for natural and synthetic rutile are not available prior to 1954, 1967–71, 1978, and after 1987. Data for the years 1955–66 and 1972–75 are from the CDS and MCS. Data for the years 1976–77 and 1979–87 are from the MR and MYB.

Stocks

Data represent the gross weight industry stocks of all forms of titanium mineral concentrates. Data are from the MR and MYB. Data are not available prior to 1941 and after 2004.

Apparent Consumption

Data represent the cumulative gross weight consumption of all titanium mineral concentrates. Published consumption data was used to estimate apparent consumption data. Data are not available prior to 1941. For the years 1941–2006, published consumption data are used. For the years 1958–63, data exclude synthetic rutile used in the production of titanium pigments. Data for the year 1977 exclude consumption of synthetic rutile made from imported ilmenite. For the year 1994, ilmenite data are withheld. Data for the years 1995–97 include ilmenite used in the production of synthetic rutile. Data for the years 1998–2006, exclude ilmenite used in the production of synthetic rutile to avoid revealing proprietary data. Data are from the MR and MYB.

World Production

World production of titanium mineral concentrates includes ilmenite and natural rutile, and titanium slag, but does not include ilmenite used to produce titanium slag to avoid double counting. Data are not available prior to 1925. Titanium slag was not produced prior to 1950. Data are from the MR and MYB.

Ilmenite and Titanium Slag Concentrate Worksheet Notes

Production

Data represent gross weight of domestic mine production of ilmenite. Data were not available prior to 1912. Production and shipments data are equal for the years 1912–20. Data are withheld for the years 1921, 1924–38, and 1983–2006. Data are from the MR and MYB.

Shipments

Data represent ilmenite concentrate shipments. Data were not available prior to 1912. Shipments and production data are equal for the years 1912–20. Data are withheld for years for the years 1921, 1929–38, and 1983–2006. Data are from the MR and MYB.

Imports

Data represent ilmenite and titanium slag imports. Ilmenite data are not available prior to 1928. Slag data are not available prior to 1951. Data are from the MR and MYB.

Stocks

Data represent the gross weight of ilmenite and titanium slag industry stocks. Ilmenite data are not available prior to 1941 and after 2004. Slag data are not available prior to 1951. Data are from the MR and MYB.

Apparent Consumption

Published consumption data was used to estimate apparent consumption data. Data are not available prior to 1941 and after 2004. Apparent consumption data for the years 1941–2004 are published “Reported Consumption.” Data for the years 1941–51 are ilmenite “Reported Consumption.” For the years 1952–93 and 1995–2006 data are the total “Reported Consumption” of ilmenite plus titanium slag. For the year 1994 “Reported Consumption” data are titanium slag only, ilmenite data are withheld. Data for the years 1941–1993 and 1998–2004 exclude ilmenite used to produce synthetic rutile. Data for the years 1995–97 include ilmenite used to produce synthetic rutile. Data are from the MR and MYB.

Unit Value (\$/t)

Unit value is defined as the value of 1 metric ton (t) of gross weight apparent consumption of ilmenite and titanium slag concentrate. Unit value data were not available prior to 1941. Data are estimated using the following equation:

$$\text{UNIT VALUE} = (\text{SHIPMENTS VALUE} + \text{IMPORT VALUE}) / (\text{SHIPMENTS} + \text{IMPORTS}).$$

Data are from the MR and the MYB.

Weighted Average Unit Value (\$/t)

Weighted average unit value is defined as the weighted average of the calculated unit values of 1 metric ton (t) of gross weight of ilmenite and titanium slag concentrate. Unit value data were not available until 1941 for ilmenite, and were not available for titanium slag until 1966. A weighted average could not be calculated for the years 1941–65 because value data for titanium slag were not available. The calculated value of ilmenite concentrate was used for these years and likely underestimates the actual weighted value of the two materials. A weighted average could not be calculated for the year 1994 because apparent consumption data for ilmenite were not available. The calculated value of slag was used and likely overestimates the actual weighted value of the two materials. A weighted average for the years 1996–2006 could not be calculated because individual apparent consumption data for ilmenite and slag were not available. The general equation for the weighted average unit value is below.

$$\text{UNIT VALUE} = [(\text{ILMENITE SHIPMENTS VALUE} + \text{IMPORT VALUE}) + (\text{TITANIUM SLAG SHIPMENTS VALUE} + \text{IMPORTS VALUE})] / [(\text{ILMENITE SHIPMENTS TONNAGE} + \text{IMPORTS TONNAGE}) + (\text{TITANIUM SLAG SHIPMENTS TONNAGE} + \text{IMPORTS TONNAGE})].$$

Unit Value (98\$/t)

The Consumer Price Index conversion factor, with 1998 as the base year, is used to adjust unit value in current U.S. dollars to the unit value in constant 1998 U.S. dollars.

Weighted Average Unit Value (98\$/t)

The Consumer Price Index conversion factor, with 1998 as the base year, is used to adjust the weighted average unit value in current U.S. dollars to the unit value in constant 1998 U.S. dollars.

World Production

World production data are gross weight production of ilmenite and slag concentrates. Data are ilmenite world production for the years 1925–2006 and titanium slag world production for the years 1950–2006. Data are from the MR and the MYB.

Natural and Synthetic Rutile Concentrates Worksheet Notes

Production

Data represent the gross weight rutile mine production. Data are not available prior to 1910, and for the years 1911, 1921, 1924, 1929–39. Data are withheld for the years 1965–72, and 1975–2006. Production and shipments data are equal for the years 1916–20 and 1922–23. Data are from the MR and MYB.

Shipments

Data represent the gross weight of natural rutile concentrate shipments. Shipments data are not available prior to, 1916 and are equal to production for the years 1916–20 and 1922–23. Data are withheld for the years 1921, 1924–39, 1965–72, 1975–92, and 1996–2006. Data for the year 1993–95 are excess government stock shipments, in terms of TiO₂ content. Data are from the MR and MYB.

Imports

Data represent the gross weight of natural and synthetic rutile imports. Import data are not available prior to 1929 and include natural rutile only until 1954. Data are from the MR and MYB.

Stocks

Data represent the gross weight of total rutile industry stocks. Data are not available prior to 1941 and after 2004. Data are from the MR and MYB.

Apparent Consumption

Published consumption data was used to estimate apparent consumption data. Data are not available prior to 1941 and after 2004. Apparent consumption data for the years 1941–2004 are the published “Reported Consumption.” Data for the years 1958–63 exclude synthetic rutile used in the production of titanium pigments. Data for the year 1977 excludes synthetic rutile made from imported ilmenite. Data are from the MR and MYB.

Unit Value (\$/t)

Unit value is defined as the value of 1 metric ton (t) apparent consumption of total rutile concentrates. Data are not available prior to 1941. Unit value is estimated using the following equation:

$$\text{UNIT VALUE} = (\text{SHIPMENTS VALUE} + \text{IMPORT VALUE}) / (\text{SHIPMENTS} + \text{IMPORTS}).$$

Data are from the MR and the MYB.

Unit Value (98\$/t)

The Consumer Price Index conversion factor, with 1998 as the base year, is used to adjust unit value in current U.S. dollars to the unit value in constant 1998 U.S. dollars.

World Production

Data are the world production of natural rutile. Data are not available for world production of synthetic rutile. Production data are not available prior to 1925. Data are from the MR and the MYB.

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