

GEOLOGICAL SURVEY CIRCULAR 87



BIBLIOGRAPHY ON TITANIUM

(To January 1, 1950)

INCLUDING SUPPLEMENTARY LIST OF REPORTS 1949-53

By Jean Richards Carpenter and Gwendolyn Werth Luttrell

UNITED STATES DEPARTMENT OF THE INTERIOR
Douglas McKay, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

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Washington, D. C., 1953

Free on application to the Geological Survey, Washington 25, D. C.

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BIBLIOGRAPHY ON TITANIUM

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By

Jean Richards Carpenter and Gwendolyn Werth Luttrell

This bibliography includes, in general, the more significant publications on titanium issued to January 1, 1950, although one or two important papers issued since that date have been added. The papers are listed by issuing organizations--Federal and State Bureaus--and by various groups of publications--books and scientific and industrial journals. Persons seeking information issued by specific organizations or in particular types of publications will find such groups of listings in the Table of Contents; those seeking publications on a specific subject or by a certain author should consult the subject index, pp. 16, 17, or the author index, pp. 18, 19.

PUBLICATIONS OF THE U. S. GEOLOGICAL SURVEY

Except as indicated, publications for which prices are given can be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Those preceded by an asterisk (*) are out of print, but copies can be consulted in the larger public and university libraries.

BULLETINS

Index No.	Bull. No.	
(1)	*285c	Investigation of black sands from placer mines, by D. T. Day and R. H. Richards, in Contributions to Economic Geology, 1905, pp. 150-163, 1906.
(2)	*315d	Titaniferous iron ore of Iron Mountain, Wyo., by S. H. Ball, in Contributions to Economic Geology, 1906, pp. 206-212, 1907.
(3)	*340d	Minerals of the rare-earth metals at Baringer Hill, Llano County, Tex., by F. H. Hess, in Contributions to Economic Geology, 1907, pp. 286-294, 1908.
(4)	*430d	The Virginia rutile deposits, by T. L. Watson and Stephen Taber, in Contributions to Economic Geology, 1909, pp. 200-215, 1910.
(5)	*529	The enrichment of sulphide ores, by W. H. Emmons, 260 pp., 1913.
(6)	*540h	Titaniferous magnetite beds on the Blackfeet Indian Reservation, Mont., by Eugene Stebinger, in Contributions to Economic Geology, 1912, pp. 329-337, 1914.
(7)	*580o	The rutile deposits of the eastern United States, by T. L. Watson, in Contributions to Economic Geology, 1913, pp. 385-412, 1915.
(8)	*624	Useful minerals of the United States, compiled by F. C. Schrader, R. W. Stone, and Samuel Sanford, 412 pp., 1916.
(9)	*625	The enrichment of ore deposits, by W. H. Emmons, 530 pp., 1917.
(10)	*735g	General features of the magnetite ores of western North Carolina and eastern Tennessee, by W. S. Bayley, in Contributions to Economic Geology, 1922, pp. 209-270, 1923.
(11)	940d	Vanadium-bearing magnetite-ilmenite deposits near Lake Sanford, Essex County, N. Y., by J. R. Balsley, Jr., in Strategic Minerals Investigations, 1943, pp. 99-123, 1944, 60 cents.

Prof. Paper
No.

PROFESSIONAL PAPERS

(12)	198	Occurrence and origin of the titanium deposits of Nelson and Amherst Counties, Va., by C. S. Ross, 59 pp., 1941, 25 cents.
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MINERAL RESOURCES

The annual volumes of Mineral Resources of the United States were issued by the U. S. Geological Survey for the years 1882-1923, inclusive. They contain statistics of production by calendar years and matter relating to technology and resources. Only such chapters relating to titanium as contain information of special or permanent interest are noted below; those containing material that is mainly statistical are not listed here.

Index
No.

- (13) *Titanium ores (in Virginia), by W. O. Snelling, in Mineral Resources of the United States, 1901, pp. 271-278, 1902.
- (14) *Useful minerals in the black sands of the Pacific slope, by D. T. Day and R. H. Richards, in Mineral Resources of the United States, 1905, pp. 1175-1248, 1906.
- (15) Tests for titanium minerals, by F. L. Hess, in Mineral Resources of the United States, 1915, Part I, p. 821, 1917, 5 cents.

ANNUAL REPORTS

- (16) *The titaniferous iron ores of the Adirondacks, by J. F. Kemp, in Nineteenth Annual Report of the United States Geological Survey, 1897-98, Part III, pp. 377-422.

Circular

CIRCULARS

- (17) No. *8 Beach placers of the Oregon Coast, by J. T. Pardee, 1934, 41 leaves.

OPEN-FILE REPORTS

- (18) Magnet Cove Rutile Company Mine, Hot Springs, Ark., by D. M. Kinney, geologic map with explanatory text, February 1949. Available for inspection in the following offices: Room 1033 (Library), General Services Building, Washington 25, D. C.; Room 13, Post Office Building, Knoxville 1, Tenn., Office of Mr. Harold B. Foxhall, Director, Division of Geology, Arkansas Resources and Development Commission, Little Rock, Ark.

MAPS

Maps of areas east of the Mississippi River may be ordered from the Chief of Distribution, Geological Survey, Washington 25, D. C. Maps of areas west of the Mississippi River may be ordered from the Distribution Section Geological Survey, Denver Federal Center, Denver, Colo.

Missouri Basin Studies

- (19) Map No. 1 Mineral resources of the Missouri Valley region, by D. H. Dow, D. M. Larrabee, and S. E. Clabaugh, part 1, Metallic mineral resources, 1945. 40 cents.
- (20) 8 Map showing mineral deposits of Colorado, by R. P. Fischer and others, 1946. 30 cents.

MISCELLANEOUS GEOLOGICAL SURVEY REPORTS

- (21) Annotated bibliography of literature on titaniferous magnetite deposits of the United States, October 1944, 19 leaves mimeographed. Free upon application to the U. S. Geological Survey, Washington 25, D. C.

PUBLICATIONS OF THE U. S. BUREAU OF MINES

Publications for which prices are quoted can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Free publications (Reports of Investigations and Information Circulars) are obtainable from Publications Distribution Section, U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa. Those publications preceded by an asterisk (*) are out of print, but copies can be consulted in the larger public and university libraries.

BULLETINS

- (22) Bull. No. *64 The titaniferous iron ores in the United States, their composition and economic value, by J. T. Singewald, Jr., 145 pp., 1913.
- (23) 425 Magnetic separation of ores, by R. S. Dean and C. W. Davis, 417 pp., 1941, \$1.00.

TECHNICAL PAPERS

- (24) Tech. Paper No. *196 Notes on the black sand deposits of southern Oregon and northern California, by R. R. Hornor, 42 pp., 1918.

REPORTS OF INVESTIGATIONS

Index No.	Rept. Inv. No.	
(25)	*2406	Titanium, by R. J. Anderson, 12 pp., 1922.
(26)	3668	Mineral dressing of Oregon beach sands. Concentration of chromite, zircon, garnet, and ilmenite, by John Dasher, Foster Fraas, and Alton Gabriel, 19 pp., 1942.
(27)	3679	Smelting of vanadium-bearing titaniferous sinter in an experimental blast furnace, by C. E. Wood, T. L. Joseph, and S. S. Cole, 24 pp., 1943.
(28)	3814	Magnetometer surveys of black sands of the Oregon coast, by E. L. Stephenson, 18 pp., 1945.
(29)	3864	Thermodynamic properties of ilmenite and selective reduction of iron in ilmenite, by C. E. Shomate, B. F. Naylor, and F. S. Boericke, 19 pp., 1946.
(30)	3886	Small-scale tests of selective reduction of iron in titaniferous iron ores, by R. J. O'Dea, 19 pp., 1947.
(31)	3895	Exploration of the Blue Metal corundum property, Douglas County, Nev., by E. O. Binyon, 7 pp., 1946.
(32)	3900	Exploration of the Magnet Cove Rutile Company property, Magnet Cove area, Hot Spring County, Ark., by Robert V. Spencer, 23 pp., 1946.
(33)	3968	Exploration of Iron Mountain titaniferous magnetite deposits, Albany County, Wyo., by E. Frey, 37 pp., 1946.
(34)	3981	Exploration of Choteau titaniferous magnetite deposit, Teton County, Mont., by N. L. Wimmeler, 12 pp., 1946.
(35)	4112	Bush-Hutchins ilmenite, Roanoke County, Va., by R. C. Hickman, 5 pp., 1947.
(36)	4208	Titanium minerals in Trail Ridge, Fla., by R. V. Spencer, 21 pp., 1948.
(37)	4407	Thermochemical study of the stability relation of geikielite and ilmenite in rocks, by T. G. Sahama and D. R. Torgeson, 14 pp., 1949.
(38)	4463	A tentative titanium-nickel diagram, by J. R. Long, D. C. Root, C. E. Armstrong, and E. T. Hayes, 13 pp., 1949.
(39)	4464	Sheath working of metal powders, by J. R. Long and E. T. Hayes, 13 pp., 1949.
(40)	4515	Titanium minerals in central and northeastern Florida, by J. R. Thoenen and J. D. Warne, 62 pp., 1949.
(41)	4519	Production of ductile titanium at Boulder City, Nev., by F. S. Wartman, J. P. Walker, H. C. Fuller, M. A. Cook, and E. L. Anderson, 37 pp., 1949.
(42)	4592	Investigation of Christy titanium deposits, Hot Spring County, Ark., by D. F. Reed, 1949.
(43)	4593	Investigation of Magnet Cove rutile deposit, Hot Spring County, Ark., by D. F. Reed, 1949.

INFORMATION CIRCULARS

	Inf. Circ. No.	
(44)	*6365	Titanium, by E. P. Youngman, 39 pp., 1930.
(45)	*6386	Deposits of titanium-bearing ores, by E. P. Youngman, 41 pp., 1930.
(46)	*6881	Trends in white pigment consumption, by P. M. Tyler, 15 pp., 1936.
(47)	7293	Mining and milling operations of rutile mine of the Titanium Alloy Co. of Arkansas, by F. A. Vogel, 7 pp., 1944.
(48)	7381	Metallic titanium and its alloys, by R. S. Dean and B. Silkes, 38 pp., 1946.

MINERAL RESOURCES

The annual volumes of Mineral Resources of the United States for the years 1924-1931, inclusive, were issued by the U. S. Bureau of Mines. They contain statistics of production by calendar years and matter relating to technology and resources. For the years 1924-1930, data pertaining to titanium are contained in the chapters entitled Rare Metals; for 1931, in a chapter entitled Titanium. Most of these chapters are available at 10 cents each.

MINERALS YEARBOOKS

- (50) The annual volumes of Minerals Yearbooks have been issued by the U. S. Bureau of Mines beginning with the years 1932-33. They also contain statistics of production by calendar years and matter relating to technology and resources. The chapters containing data on titanium, most of which are available at 10 cents each, are listed below, with their page numbers:

1932-33, Minor Metals, pp. 347-367.	1941, Minor Metals, pp. 793-810.
1934 " " pp. 517-541.	1942, Titanium pp. 811-818.
1935 " " pp. 581-608.	1943, " pp. 807-815.
1936 " " pp. 525-541.	1944, " pp. 798-806.
1937 " " pp. 759-785.	1945, " pp. 803-810.
1938 " " pp. 671-685.	1946, " pp. 1183-1191.
1939 " " pp. 747-761.	1947, " pp. 1175-1184.
1940 " " pp. 759-772.	1948, " (preprint, 13 pp.
	1949, " pp. 1234-1248.

STATE REPORTS

The State publications listed below can be consulted in many public and university libraries, or information concerning their availability can be obtained from the State official indicated. Below are also listed the officials of the states for which no publications are given.

- ALABAMA State Geologist, Geological Survey of Alabama, University, Ala.
- ARIZONA Director, Arizona Bureau of Mines, University of Arizona, Tucson, Ariz.
- ARKANSAS Director, and State Geologist, Division of Geology, Arkansas, Resources and Development Commission, Little Rock, Ark.
- (51) A brookite deposit in Hot Spring County, Ark., by D. F. Holbrook, Arkansas Res. and Dev. Commission, Div. of Geology Bull. 11, 21 pp., 1947.
- (52) Titanium in southern Howard County, Ark., by D. F. Holbrook, Arkansas Res. and Devel. Commission, Div. of Geology Bull. 13, 16 pp., 1948.
- CALIFORNIA Chief, Division of Mines, State Department of Natural Resources, Ferry Building, San Francisco 11, Calif.
- (53) The utilization and metallurgy of titanium mining in California, by Will Baughman, California State Min. Bur., Mining in California, vol. 23, no. 1, 1927.
- (54) Titaniferous iron deposits, by W. B. Tucker, California State Min. Bur., Mining in California, vol. 23, no. 2, 1927.
- (55) Minerals of California, by Adolf Pabst, California Dept. Nat. Res. Bull. 113, pp. 111-112, 309-310, 1938.
- (56) Titanium, by G. L. Gary, Commercial Minerals of California (Series 1942), California Dept. Nat. Res., Div. Mines, 3 pp., Jan. 1942.
- (57) Minor metals, Economic mineral resources and production of California, California Dept. Nat. Res., Div. Mines Bull. 130, pp. 182, A53, 1944.
- (58) Titaniferous iron-ore deposits of the western San Gabriel Mountains, Los Angeles County, Calif., by G. B. Oakeshott, in Iron Resources of California, California Dept. Nat. Res., Div. Mines, Bull. 129, part P, pp. 243-266, 1948.
- (59) The counties of California, Mineral resources and mineral production during 1947, California Dept. Nat. Res., Div. Mines Bull. 142, pp. 24, 65, 190, 1949.
- COLORADO Chairman, Geological Survey Board of the State of Colorado, 220 Museum Building, Denver, 2, Colo.

<u>CONNECTICUT</u>	Director, Connecticut Geological and Natural History Survey, Trinity College, Hartford 6, Conn.
<u>DELAWARE</u>	Chief Engineer, State Highway Department, Dover, Del.
<u>FLORIDA</u>	Director, Florida Geological Survey, P. O. Box 631, Tallahassee, Fla.
(60)	Beach deposits of ilmenite, zircon, and rutile in Florida, by J. H. Martens, Florida State Geol. Survey, 19th Ann. Rept., pp. 124-154, 1928.
(61)	Florida mineral industry, with summaries of production for 1940 and 1941, by R. O. Vernon, Florida Geol. Survey Bull. 24, 207 pp., Aug. 1943.
<u>GEORGIA</u>	Director, Department of Mines, Mining and Geology, State Division of Conservation, 425 State Capitol, Atlanta 3, Ga.
(62)	Preliminary report on the sand and gravel deposits of Georgia, by L. P. Teas, Georgia Geol. Survey Bull. 37, p. 376, 1921.
<u>IDAHO</u>	Director, Idaho Bureau of Mines and Geology, University of Idaho, Moscow, Idaho.
<u>ILLINOIS</u>	Chief, Illinois Geological Survey Division, 100 Natural Resources Building Urbana, Ill.
<u>INDIANA</u>	State Geologist, Division of Geology, Indiana Department of Conservation, Owen Hall, Indiana University, Bloomington, Ind.
<u>IOWA</u>	Director and State Geologist, Iowa Geological Survey, Geology Annex, Iowa City, Iowa.
<u>KANSAS</u>	Director of Research and State Geologist, State Geological Survey of Kansas, University of Kansas, Lawrence, Kans.
<u>KENTUCKY</u>	State Geologist, Kentucky Geological Survey, Miller Hall, University of Kentucky, Lexington 29, Ky.
<u>LOUISIANA</u>	State Geologist, Louisiana Geological Survey, P. O. Box 8847, University Station, Baton Rouge 3, La.
<u>MAINE</u>	State Geologist, Maine Geological Survey, University of Maine, Orono, Maine.
<u>MARYLAND</u>	Director, Department of Geology, Mines and Water Resources, The Johns Hopkins University, Baltimore 18, Md.
<u>MICHIGAN</u>	State Geologist and Head, Geological Survey Division, State Department of Conservation, Lansing 13, Mich.
<u>MINNESOTA</u>	Director, Minnesota Geological Survey, University of Minnesota, Minneapolis 14, Minn.
(63)	Notes on titanium and vanadium, Minnesota Geol. Survey, 4 leaves mimeographed, 1942.
<u>MISSISSIPPI</u>	Director and State Geologist, Mississippi Geological Survey, University of Mississippi, University, Miss.
<u>MISSOURI</u>	Director and State Geologist, Missouri Geological Survey and Water Resources, Box 250, Rolla, Mo.
<u>MONTANA</u>	Director, Montana Bureau of Mines and Geology, Butte, Mont.
<u>NEBRASKA</u>	Director, Nebraska Geological Survey, University of Nebraska, Lincoln 8, Nebr.
<u>NEVADA</u>	Director, Nevada Bureau of Mines, Reno, Nev.
<u>NEW HAMPSHIRE</u>	Geologist, Mineral Resources Committee, New Hampshire State Planning and Development Commission, Durham N. H.
<u>NEW JERSEY</u>	State Geologist, Division of Geology and Topography, State Department of Conservation and Economic Development, Trenton 8, N. J.
(64)	Iron mines and mining in New Jersey, by W. S. Bayley, New Jersey Geol. Survey, Final Rept. 7, 512 pp., 1910.
<u>NEW MEXICO</u>	Director, New Mexico Bureau of Mines and Mineral Resources, Socorro, N. Mex.

- NEW YORK Asst. Director, New York State Museum, Albany 1, N. Y.
- (65) Geology of the Adirondack magnetic iron ores (with a report on the Mineville-Port Henry mine group, by J. F. Kemp), by D. H. Newland, New York State Mus. Bull. 119, pp. 146-170, 1908.
- (66) Titaniferous magnetite deposits of the Lake Sanford area, New York, by R. C. Stephenson, New York State Mus. Bull. 340, 95 pp., Nov. 1945.
- NORTH CAROLINA State Geologist, Division of Mineral Resources, State Department of Conservation and Development, Box 2719, Raleigh, N. C.
- NORTH DAKOTA State Geologist, North Dakota Geological Survey, University of North Dakota, Grand Forks, N. Dak.
- OHIO State Geologist, State Department of Natural Resources, Geological Survey, Ohio State University, Columbus 10, Ohio.
- OKLAHOMA Director, Oklahoma Geological Survey, Norman, Okla.
- OREGON Director, State Department of Geology and Mineral Industries, 702 Woodlark Building, Portland 5, Oreg.
- PENNSYLVANIA Director, Bureau of Topographic and Geologic Survey, State Department of Internal Affairs, Harrisburg, Pa.
- RHODE ISLAND Chairman, Mineral Resources Committee, Rhode Island Industrial Development Commission, Providence 3, R. I.
- SOUTH CAROLINA State Geologist, South Carolina Geological Survey, University of South Carolina, Columbia 19, S. C.
- SOUTH DAKOTA State Geologist, State Geological Survey, Vermillion, S. Dak.
- TENNESSEE State Geologist and Director, Division of Geology, Tennessee Department of Conservation, State Office Building, 5 G, Nashville 3, Tenn.
- TEXAS Director, Bureau of Economic Geology, University of Texas, Austin 12, Tex.
- (67) Preliminary report on the rutile and kaolin deposits of the Medley district in Jeff Davis County, Tex., by F. A. Vogel, Jr., Texas Univ. Bur. Econ. Geol. Min. Res. Survey Cir. 53, 8 pp., Aug. 1942.
- UTAH State Geologist, School of Mineral Industries, University of Utah, Salt Lake City, Utah.
- VERMONT State Geologist, State Department of Natural Resources, University of Vermont, Burlington, Vt.
- VIRGINIA State Geologist, Virginia Geological Survey, Conservation Commission, Box 1425, University Station, Charlottesville, Va.
- (68) Mineral resources of Virginia, by T. L. Watson, The Virginia Jamestown Exposition Commission, 618 pp., Lynchburg, 1907.
- (69) Geology of the titanium and apatite deposits of Virginia, by T. L. Watson and Stephen Taber, Virginia Geol. Survey Bull. 3-A, 308 pp., 1913.
- (70) Outline of the mineral resources of Virginia, by W. M. McGill, Virginia Geol. Survey Bull. 47, Educational Ser. no. 3, p. 49, 1936.
- (71) Outline of the geology and mineral resources of Goochland County, Va., by C. B. Brown, Virginia Geol. Survey Bull. 48, County ser. 1. vii, 68 pp., 1937.
- (72) Virginia's war mineral resources, by A. C. Bevan, Virginia Geol. Survey. Reprint ser. 4, 1942; also printed in the Commonwealth, vol. 9, no. 1, pp. 9-12, 19, Jan. 1942; no. 2, pp. 11-15, 48, Feb. 1942.
- WASHINGTON Supervisor, Division of Mines and Geology, State Dept. of Conservation and Development, P. O. Box 207, Olympia, Wash.
- (73) Inventory of mineral properties in Chelan County, Washington, by M. T. Hunting, Washington Dept. Conserv. and Devel. Div. of Geol. Rept. of Inv. 9, p. 26, 1943.

WEST VIRGINIA State Geologist, West Virginia Geological and Economic Survey, Morgantown, W. Va.

WISCONSIN State Geologist, Wisconsin Geologic and Natural History Survey, Science Hall, University of Wisconsin, Madison 6, Wisc.

- (74) The geology of north central Wisconsin, the rare metals and minerals, by Samuel Weidman, Wisconsin Geol. Survey Bull. 16, pp. 662-663, 1907.

WYOMING State Geologist, Geological Survey of Wyoming, Laramie, Wyo.

- (75) The electrometallurgical resources of the North Platte River basin, Wyo., by C. S. Dietz, Wyoming Geol. Survey Bull. 32, pp. 15, 53-54, 1932.

- (76) Titaniferous magnetite deposits of the Laramie Range, Wyo., by R. A. Diemer, Wyoming Geol. Survey Bull. 31, 23 pp. June 1941.

TEXTBOOKS AND REFERENCE BOOKS

These books can be consulted in many public and university libraries. Listing is in chronological order.

- (77) Non-metallic minerals, by R. B. Ladoo, pp. 629-637, McGraw-Hill Book Co., Inc., New York, 1925.
- (78) Mineral deposits, by Waldemar Lindgren, pp. 786-790, McGraw-Hill Book Co., Inc., New York, 1933.
- (79) Economic geology of mineral deposits, by E. R. Lilley, pp. 765-766, Henry Holt and Co., New York, 1936.
- (80) Mineral reserves of the United States, and its capacity for production, by Kenneth Leith and D. M. Liddell, prepared for the Planning Committee for Mineral Policy, National Res. Committee, Washington, D. C., pp. 222-223. March 1936.
- (81) Economic geology, by Heinrich Ries, pp. 698-701, 7th ed., John Wiley and Sons, Inc., New York, 1937.
- (82) Industrial minerals and rocks, pp. 893-910, A. I. M. E., New York, 1937; 2d ed., pp. 1042-1073, 1949.
- (83) Introductory economic geology, by W. A. Tarr, pp. 144-146, 2d ed., McGraw-Hill Book Co., Inc., New York, 1938.
- (84) Principles of economic geology, by W. H. Emmons, pp. 531-532, 2d ed., McGraw-Hill Book Co., Inc., New York, 1940.
- (85) Economic mineral deposits, by A. M. Bateman, pp. 617, 618, John Wiley and Sons, Inc., New York, 1942.
- (86) Ore deposits as related to structural features, edited by W. H. Newhouse, p. 137, Titanium district of Roseland, Va., by C. S. Ross, Princeton Univ. Press, Princeton, N. J., 1942.
- (87) Rarer metals, by J. A. DeMent and H. C. Dake, pp. 70-90, Chem. Pub. Co., New York, 1946.
- (88) Strategic minerals, by J. B. DeMille, pp. 501-510, McGraw-Hill Book Co., Inc., New York, 1947.
- (89) Titanium, by A. F. Matthews, O. C. Ralston, and C. S. Ross, Investigation of national resources, prepared by combined staffs of Bur. Mines and U. S. Geol. Survey, published as part of hearings before National Resources Economic Subcommittee of the Committee on Public Lands of the Senate, pp. 299-300, 1 pl.; Supt. of Documents, Govt. Printing Office, Washington 25, D. C. \$1.75 (unbound). Also available as Mineral Resources of the United States: Public Affairs Press, 2153 Florida Ave., Washington 8, D. C., 1948. \$5.00 (bound). Copies of map showing distribution of U. S. titanium reserves available on request to Director, Geol. Survey, Washington 25, D. C.
- (90) Titanium, its occurrence, chemistry, and technology, by Jelks Barksdale, Ronald Press Co., New York, 1949.

SCIENTIFIC JOURNALS

The publications listed below, which contain information on titanium in the United States and Canada, can be consulted in many public and university libraries. These publications are listed in chronological order.

- (91) Description of some of the combinations of titanium occurring within the United States, by Archibald Bruce, Am. Min. Jour., vol. 1, pp. 233-243, 1814.
- (92) A deposit of titanite iron ore from Wyoming (abstract), by Waldemar Lindgren, Science, vol. 16, pp. 984-985, 1902.

- (93) Titanium and titaniferous iron ores, by N. P. Hulst, Lake Superior Mining Inst. Proc. vol. 10, pp. 31-47, 1905.
- (94) Occurrence of rutile in Virginia, (near Roseland, Nelson County) by T. L. Watson, Econ. Geology, vol. 2, pp. 493-504, 1907.
- (95) Occurrence of rutile in Virginia, by Charles Catlett, Econ. Geology, vol. 2, pp. 796-797, 1907.
- (96) Contributions to the geology of Rhode Island; notes on the history and geology of Iron Mine Hill, Cumberland, by B. L. Johnson, Am. Jour. Sci., ser. 4, vol. 25, pp. 1-12, 1908.
- (97) Contributions to the geology of Rhode Island; the petrography and mineralogy of Iron Mine Hill, Cumberland, by C. H. Warren, Am. Jour. Sci., ser. 4, vol. 25, pp. 12-38, 1908.
- (98) The distribution of the elements in igneous rocks, by H. S. Washington, Am. Inst. Min. Met. Eng. Trans., vol. 39, pp. 735-764, 1909. Reprinted in Ore Deposits, by S. F. Emmons, pp. 729-758, New York, 1913.
- (99) Association of rutile and cyanite from a new locality, (Charlotte County, Va.) by T. L. Watson and J. H. Watkins, Am. Jour. Sci., ser. 4, vol. 32, pp. 195-201, 1911.
- (100) The ilmenite rocks near St. Urbain, Quebec; a new occurrence of rutile and sapphirine, by C. H. Warren, Am. Jour. Sci., ser. 4, vol. 33, pp. 263-277, 1912.
- (101) A titaniferous iron-ore deposit in Boulder County, Colo. by E. P. Jennings, Am. Inst. Min. Met. Eng. Trans., vol. 44, pp. 14-25, 1913.
- (102) The relation of the titaniferous magnetites of northeastern Minnesota to the Duluth gabbro, by T. M. Broderick, Econ. Geology, vol. 12, pp. 663-696, 1917.
- (103) A selected bibliography on titanium, Jour. of the Franklin Inst., Philadelphia, Dec. 1917.
- (104) Titanium and zirconium, by L. E. Barton, Mineral Industry, 1918, McGraw-Hill Book Co., New York, 1919.
- (105) Titaniferous iron ores in Canada, by W. L. Goodwin, Trans. Canadian Min. Inst., vol. 22, pp. 86-99, 1919.
- (106) Geology of a vein occurrence of rutile-ilmenite in a new locality (Franklin County, Va.) by T. L. Watson, Washington Acad. Sci. Jour., vol. 12, no. 20, pp. 447-454, Dec. 4, 1922.
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