CLARKSTAN

ALPHA-COUNTER

(PATENT APPLIED FOR)

FOR THE IMMEDIATE, POSITIVE DETECTION OF RADIOACTIVE ORES AND RADIOACTIVE ELEMENTS

The Model 501 Alpha-Counter is designed expressly for the detection of radioactive ore and elements. It operates wherever alpha particles (rays) are present. It indicates visually by means of an activated phosphor screen. Scintillations from alpha particles appearing on the screen are magnified by a novel lens system (patent applied for) and are viewed through an eyepiece. It is guaranteed to operate where alpha particles are present. All uranium ores emit alpha particles somewhat in proportion to their richness. The Model 501 Alpha-Counter operates with *all* uranium minerals. Ultraviolet (black light) does not.

FOR THE PROSPECTOR, the Model 501 Alpha-Counter is a means of positive identification of radioactivity in ores. Uranium bearing ores of all types may be checked for the presence of uranium and/or thorium - or any of their radioactive by-products emitting alpha radiation. Some of the ores which may be detected with the Alpha-Counter are; uraninite (pitchblend), gummite, carnotite, euxenite, autunite, uranophane, thorianite, cyrtolite, samarskite, ampangabeite, and ellsworthite. There are more than a hundred uranium bearing ores which may be detected by the Model 501 Alpha-Counter.

FOR THE EXPERIMENTER, the Model 501 Alpha-Counter may be used to determine the presence of radium in self-luminescent paint; of thorium in Welsbach (Coleman Lantern) mantles; of polonium in air-ionizing devices and all artificially radioactive elements which emit alpha particles.

FOR THE SCHOOL, the Model 501 Alpha-Counter may be used to demonstrate visually the spontaneous disintegration of radioactive elements. It may be used in place of a Crookes spintharascope with much greater satisfaction. It is absolutely harmless to the student.

FOR THE LABORATORY, the Model 501 Alpha-Counter is useful for the detection and estimation of alpha radiations from polonium sources and bombarded specimens. By counting the scintillations on the screen, approximate measurements of induced alpha radioactivity in many substances may be made. For closer work the screen of the Alpha-Counter can be calibrated against an electronic scintillation counter. Where the count is high, a small aperture iris of known area may be used between the screen and specimen. Due to the green color of the scintillations, use of the instrument under photographic red light may be made. A red filter cap is provided for quenching in case the phosphor is light struck. Working under low intensity red light does not materially affect the sensitivity of the eye to the blue-green scintillations of the Alpha-Counter. The simplicity, ruggedness, dependability, and low cost of the Model 501 Alpha-Counter makes it a useful laboratory tool.

FOR THE ASSAYER, the Model 501 Alpha-Counter may be used as an additional check on precipitates and concentrates. All uranium compounds are detectable by means of the Alpha-Counter. Quantitive analysis may be made by comparing samples with standards.

In limited uranium ore milling operations the Model 501 Alpha-Counter may be used for hand picking ore. It is not affected by random radiation. Every operator and miner should have a Model 501 Alpha-Counter.

NOTES

Alpha particles are a product of the spontaneous disintegration of the important radioactive elements. The Model 501 Alpha-Counter is one of the most sensitive of all instruments for detecting alpha particles (rays). Alpha particles, which are often referred to as "rays", are helium gas atoms without their two characteristic electrons (helium ions). They have a mean-free-path in air of from 2.37 to 8.16 cm. The initial radiation velocity is approximately 1-20 that of light.

Uranium, thorium, and **actinium** are the three parent radioactive elements. All others are disintegration products of these. **Radium** is a disintegration product of uranium.

For a wide variety of information pertaining to uranium, its ores, description, occurance, compounds, physics, uses and history; the text - "Uranium and Atomic Power" - is highly recommended. It is by Jack De Ment and H.C. Dake and published by the Chemical Publishing Company, Inc., Brooklyn, N. Y. ($4.00). Order direct from Clarkstan Corp.

NET PRICE - $5.00

CLARKSTAN
CORP.
Manufacturers of Fine Electronic, Industrial and Laboratory Equipment
Los Angeles 64, Calif., U.S.A.

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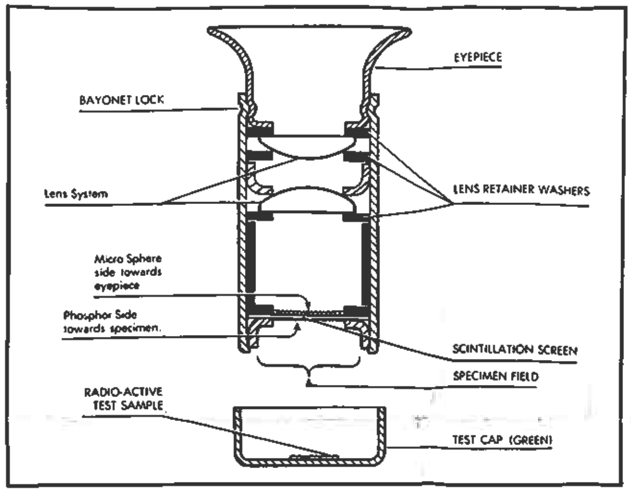
INSTRUCTIONS

For Using the Model 501 Alpha-Counter



To use the Alpha-Counter the operator must allow his eyes to become light sensitive. The pupils of the eyes will then be dilated. For the adult eye it takes from two to ten minutes in darkness or subdued light to become sufficiently sensitized. The eye when sensitized to the equivalent of night automobile driving or to viewing motion pictures or television will readily see the scintillations of the 501 Alpha-Counter. The light efficiency of the 501 Alpha-Counter is many times greater than in the familiar spintharascope. To determine when the eye is sensitized, first remove the instrument from the case. The cap marked with green is placed on the screen end of the tube. Inside this cap is a minute quantity of radioactive material. As soon as scintillations, with the green cap in place, can be seen - then the alpha radioactivity of other substances can also be seen. For the examination of all other specimens remove the green cap. Place the rim of the screen end of the Alpha-Counter against the specimen while under examination. The average range of the alpha radiation is about one inch. The scintillations appear as twinkling points of green light. The sparkling occurs at random over the field. Relative radioactivity of ores and other substances may be determined by tabulating the scintillations against time.

Before use the instrument should be kept in the case except in semi-darkness or under red light. When the phosphor (screen) is exposed to other than red light, a luminescence occurs. The half life of the glow is about two minutes. This means that for every two minutes the glow is reduced by one half. **Exposure to red light will reduce it** in about twelve seconds. Exposure of the screen of the instrument to white light does not damage it. It simply becomes unuseable for a period of about one hour if not quenched with red light. If the screen becomes light struck it may be quickly brought back to sensitivity by exposing to red light. A cap with the proper red filter is provided with the instrument. Place the cap with the red window on the screen end of the alpha counter. Hold the red window while on the counter close - not more than two inches from a 40-watt or larger, clear or frosted bulb. In about twelve seconds the overall greenish glow will have disappeared. It will then be ready for use as soon as the eye is sensitized. While quenching the green glow, the hand should be held over the eyepiece of the Alpha-Counter to prevent a light leak at the eyepiece.

Due to the relatively low intensity of the alpha particle scintilations, it is best to work at night. The eye is most sensitive at night. Some eyes are unusually low in retinal sensitivity. The incidence of this condition is about one per hundred persons. In such cases the scintillations cannot readily be seen.

The observer should not be discouraged if at first the scintillations are not readily visible. The operator has to know what he is looking for. The green cap specimen, when installed on the Alpha-Counter, will show him. The green cap which comes with the instrument has radioactive material in it which will last indefinitely. Nothing can destroy it. Unless it is covered up so that the alpha particles cannot get out or unless the material is removed from the cap, the Alpha-Counter will show scintillations from the test cap.

For ease of examining numerous uranium ore and other specimens, red light illumination is helpful. In the laboratory a clear, red 25-watt bulb may be used. In the field, a flashlight with several layers of red cellophane over the lens is good. An oil lantern with a red window may also be used. When examining self-luminous paint, such as is on watch hands and numbers, remove the glass face. The alpha particles do not penetrate the watch glass.

The screen is a thin cellophane window with the phosphor evenly spread over the outside to a density of about 100 mg/cm^2. **Do not touch the screen.** Abrasion will remove the phosphor. Should the screen become contaminated or damaged, a new one may be purchased from the factory or distributor. To replace the scintillation screen, first remove the eyepiece. A bayonet lock holds the eyepiece in place. Untwist the eyepiece about one-eighth turn counterclockwise. The entire assembly will slide out from the eyepiece end. Replace the old screen with the new one and reassemble according to the drawing.

The screen may become contaminated with powered ore or from some other source. If the contaminating substance is rich enough, the screen will show a background count higher than four or five per minute. Blowing may remove the contaminant. If it does not, a new screen should be installed.

The instrument is absolutely safe to use as much as is desired or necessary. There is very much less than the minimum allowable amount of radio-active material in the green test cap. The phosphor is not radioactive.

The Alpha-Counter may be carried in the pocket without any harm to person or instrument. Photographic film will not be exposed even when placed immediately adjacent to the outside of the test sample cap. Except for mechanical damage, there is nothing to wear out in the instrument.

NOTES

ALPHA PARTICLES ARE A PRODUCT OF THE SPONTANEOUS DISINTEGRATION OF THE IMPORTANT RADIOACTIVE ELEMENTS. THE MODEL 501 ALPHA-COUNTER IS ONE OF THE MOST SENSITIVE OF ALL INSTRUMENTS FOR DETECTING ALPHA PARTICLES (RAYS). ALPHA PARTICLES, WHICH ARE OFTEN REFERRED TO AS "RAYS", ARE HELIUM GAS ATOMS WITHOUT THEIR TWO CHARACTERISTIC ELECTRONS (HELIUM IONS). THEY HAVE A MEAN-FREE-PATH IN AIR OF FROM 2.37 TO 8.16 CM. THE INITIAL RADIATION VELOCITY IS APPROXIMATELY 1.20 THAT OF LIGHT.

URANIUM, THORIUM, AND **ACTINIUM** ARE THE THREE PARENT RADIOACTIVE ELEMENTS. ALL OTHERS ARE DISINTEGRATION PRODUCTS OF THOSE. **RADIUM** IS A DISINTEGRATION PRODUCT OF URANIUM.

CLARKSTAN CORP.
Manufacturers of Fine Electronic, Industrial and Laboratory Equipment
Los Angeles 64, Calif., U.S.A.

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LIST OF THE IMPORTANT URANIUM AN

	A	B	C	D	E	F	G	H	I	J	K	L	M	
	NAME OF ORE	FORMULA	MOLECULAR WEIGHT	CRYSTALLINE FORM and COLOR	SPECIFIC GRAVITY or DENSITY	HARDNESS Mho's Scale	STREAK	LUSTER	FLUORES-CENCE	PRIMARY or SECOND-ARY	% URANIUM OXIDES	% URANIUM	% THORIUM DIOXIDE	TH
1	AMPANGABEITE	Tantalo-niobate of U,Fe,Y,Pb,Th etc.		Rectangular prisms; reddish-brown	4.0-4.3	4	Light red	Greasy		Pri.	14-20	12.0-17.0	0.5-3.0	<
2	ALLANITE	$Ca_2(Al,Ce,Fe)_2$ $(Al\cdot OH)(SiO_4)_3$+Th		Monoclinic; black to yellowish-brown, opaque or subtranslucent	3.0-4.2	5.5-6.0		Submet. to resinous to pitchy		Pri.	<1	<1	≦3.4	≦
3	BECQUERELITE	$UO_2\cdot 2H_2O$	306.17	Orthorhombic; small amber-yellow to brownish crystals, transparent	5.20	2-3	Yellow	Adamantine toward greasy		Sec.	88.1	77.7		
4	BETAFITE	Niobate and titanate of U and CaO		Isometric; green-black to dark brown, opaque	4.0	5		Greasy		Pri.	17.25-31	15.0-27.0		
5	CURITE	$2PbO\cdot 5UO_3\cdot 4H_2O$	1945.25	Orthorhombic; orange-red transparent in thin sections	7.192-7.26	4-5	Orange	Adaman-tine		Sec.	73.55	61.21		
6	ELLSWORTHITE	Hydrous calcium-niobate complex + U and Ti		Isometric; massive or rounded crystals, amber-yellow to dark brn to blk	3.608-3.758	4	Dk. Br.	Vitreous		Pri.	19.0	16.0		
7	EUXENITE	Niobate-tantalate-titanate of Y, Er, Ce, U and Th		Orthorhombic; massive or crystals, brownish-black	4.7-5.0	4.7-6.5	Yellowish to red-dish-brn	Brilliant, metallo-vit. greasy		Pri.	1.0-5.0	1.0-4.0	1.0-5.0	1 4
8	GUMMITE	$(Pb,Ca,Ba)SiU_3O_{12}\cdot$ $5H_2O$(?)		Amorphous, gumlike masses; orange to reddish-yellow to brownish	3.9-5.16	2.5-3.0	Yellow to orangish	Greasy	Medium violet	Sec. fn URANIN-ITE	<60	<51		
9	KASOLITE	$3PbO\cdot 3UO_3\cdot 3SiO_2\cdot$ $4H_2O$	1744.29	Monoclinic; minute prismatic crystals, ochre-yellow to brownish	5.96	4-5		Resinous to greasy		Sec.	49.22	40.96		
10	MONAZITE	$(Ce,La,Di)PO_4+ThO_2+$ SiO_2 or $(Ce,La,Di)_2O_3$ $\cdot P_2O_5+ThO_2+SiO_2$		Monoclinic; small grains honey-yellow to brown or reddish, subtranslucent to subtransperent	4.9-5.3	5.0-5.5		Resinous		Pri.	0.15-0.25	<0.2	1.0-<18	<1.
11	ORANGITE (Var. THORITE)	$ThSiO_4$+He	324.21	Tetragonal; orange-yellow, transparent to opaque in thin sections	5.19-5.4	4.5-5.0	Lt. Or to dk. brn	Vitreous to resinous		Pri.			81.47	71
12	PARSONITE	$2PbO\cdot UO_3\cdot P_2O_5\cdot H_2O$	875.63	Monoclinic or triclinic; brownish, powder to compact	6.23	Soft		Dull		Sec.	26.75-32.68	22.26-27.2		
13	SAMARSKITE	$3(Ca,Fe,UO_2)\cdot O\cdot$ $(Ce,Y)O_3\cdot$ $3(Cb,Ta)_2\cdot O_5$		Orthorhombic; massive or imbedded grains or rough crystals, velvet-black	5.6-5.8	5-6	Red-brn to brnish gray	Vitreous to resinous		Pri.	9.6	8.16	0.8-3.4	1 4
14	THORIANITE (Not THORITE)	$(ThU)O_2$+(He,Ce,La, Pb,Fe)		Cubic; black, nearly opaque	9.32-9.33	6.5	Orange-brown to dark gray	Submet. to horny		Pri.	<8.1	<6.9	80.0	70
15	THORITE	$ThSiO_4$+He	324.21	Tetragonal; brown to black	4.5-5.0	4.5-5.0	Brown	Vit. to res.		Pri.			<81.47	<71
16	THORIUM METAL	Th	232.15	Dark gray	12.16	Ductile	Black	Leaden gray						10
17	THORIUM DIOXIDE (THORIA)	ThO_2	264.15	Cubic; white, earthy	9.69			Dull					100	87
18	URANIUM METAL	U	238.17	Cubic; nickel-white, black when comminuted	18.68	Hard, Ductile	Gray	Silver-white				100		
19	URANOUS OXIDE (URANIUM DIOXIDE)	UO_2	270.17	Rhombic or cubic; black or brown	10.88						100	88.15		
20	URANIC OXIDE (URANAL OXIDE) (U TRIOXIDE)	UO_3	286.17	Yellowish-red powder	7.29	Soft	Dull				100	83.22		
21	URANOSIC OXIDE (URANOUSURANATE)	$U_3O_8 = U(UO_4)_2$	842.51	Olive-green	7.31						100	84.80		
22	URANINITE GROUP: URANINITE	UO_3UO_2PbO +(Th,Ce,Y,He)	>800	Isometric in octahedrons crystals rare, velvety-black, greenish, grayish brownish-black, opaque	8.0-10.0	5.5-6.6	Brnish-blk to dk-grn	Submet., greasy or pitch-like to dull		Pri.	22.3-26.5 UO_3 57.4-59.3 UO_2	67.5-72.7	0.0-9.8	0 8
23	CLEVEITE (Var. URANINITE)	UO_3UO_2PbO etc +(Th,A,He,Y)	>800	Cubic modified by octahedron and dodecahedron brownish-black	7.5	5.5	Brnish-black	Dull		Pri.	72	61.2	>1	1.
24	BRÖGGERITE (Var. URANINITE)	UO_3UO_2PbO etc +(Th)	>800	Octahedrons; black	8.7 9.1	5.5		Submet.		Pri.	76.8	65.8	9	8
25	NIVENITE (Var. URANINITE)	UO_3UO_2PbO etc +(Y)	>800	Indistinct crystals; massive, velvet-black	8.01	5.5		Submet.		Pri.	65	55.0		
26	PITCHBLEND (mass.& alt. form of URANINITE	$UO_3UO_2PbO\pm ZrO_2$, CaO SiO_2, CeO_2, La, Y, Er, Dy, A, He, H_2O ThO_2	>800	Amorphous often with botryoidal surfaces; blk, brn, or greenish; opaque	6.5-8.5	5-6	Brnish to grnish	Sub-met. to gr, pitch to dull		Pri.	28 UO_3 45 UO_2	62.97	0.0->1	1.
27	CARNOTITE	$K_2O\cdot 2UO_3\cdot V_2O_5\cdot$ 2(or 3)H_2O	899.26	Hexagonal, rhombic; loosely coherent, powdery, canary-yellow	4.1	1-2	Yellowish	Dull		Sec.	<63.6	<52.97		
28	AUTUNITE (CALCIO-URANITE)	$CaO\cdot 2UO_3\cdot P_2O_5\cdot 8H_2O$	906.47	Orthorhombic; tabular crystals and scales, lemon-yellow, transparent to translucent	3.05-3.19	2.0-2.5	Pale yellow	Pearly	Strong yellow-green	Sec.	63.13	52.54		
29	TORBERNITE (COPPER-URANITE)	$Cu(UO_2)_2P_2O_8$ 8(or 12)H_2O	979.97	Tetragonal; micaceous, foliated or tabular crystals, green, transparent to translucent	3.22-3.6	2.0-2.5	Light green	Shining	Strong yellow-green	Sec.	<55.13	<45.60		
30	TROEGERITE (TRÖGERITE)	$(UO_2)_3As_2O_8\cdot 12H_2O$	1304.43	Monoclinic; tabular crystals, lemon yellow yellowish-white or gray	3.3	Soft	Light yellow to gray	Resinous	Yellow-green	Sec.	62.13	54.77		
31	TYUYAMUNITE (CALCIO-CARNOTITE)	$CaO\cdot 2UO_3\cdot V_2O_5\cdot nH_2O$ (n = 10-12)	980.33	Orthorhombic; scales and amorphous, earthy, yellow	3.7-4.3	Soft	Yellowish	Adamantine Pearly Earthy		Sec.	58.3	48.58		
32	URANOPHANE (URANOTIL)	$CaO\cdot 2UO_3\cdot SiO_2\cdot 7H_2O$	814.47	Orthorhombic; minute acicular prisms in radiated or stellate aggregations, massive with fine fibrous structure, honey-yellow to lemon or pale yellow	3.81-3.90	2-3	Yellow	Pearly	Strong yellow-green or yel'ish	Sec.	70.3	58.48		

AND THORIUM ORES OF THE WORLD

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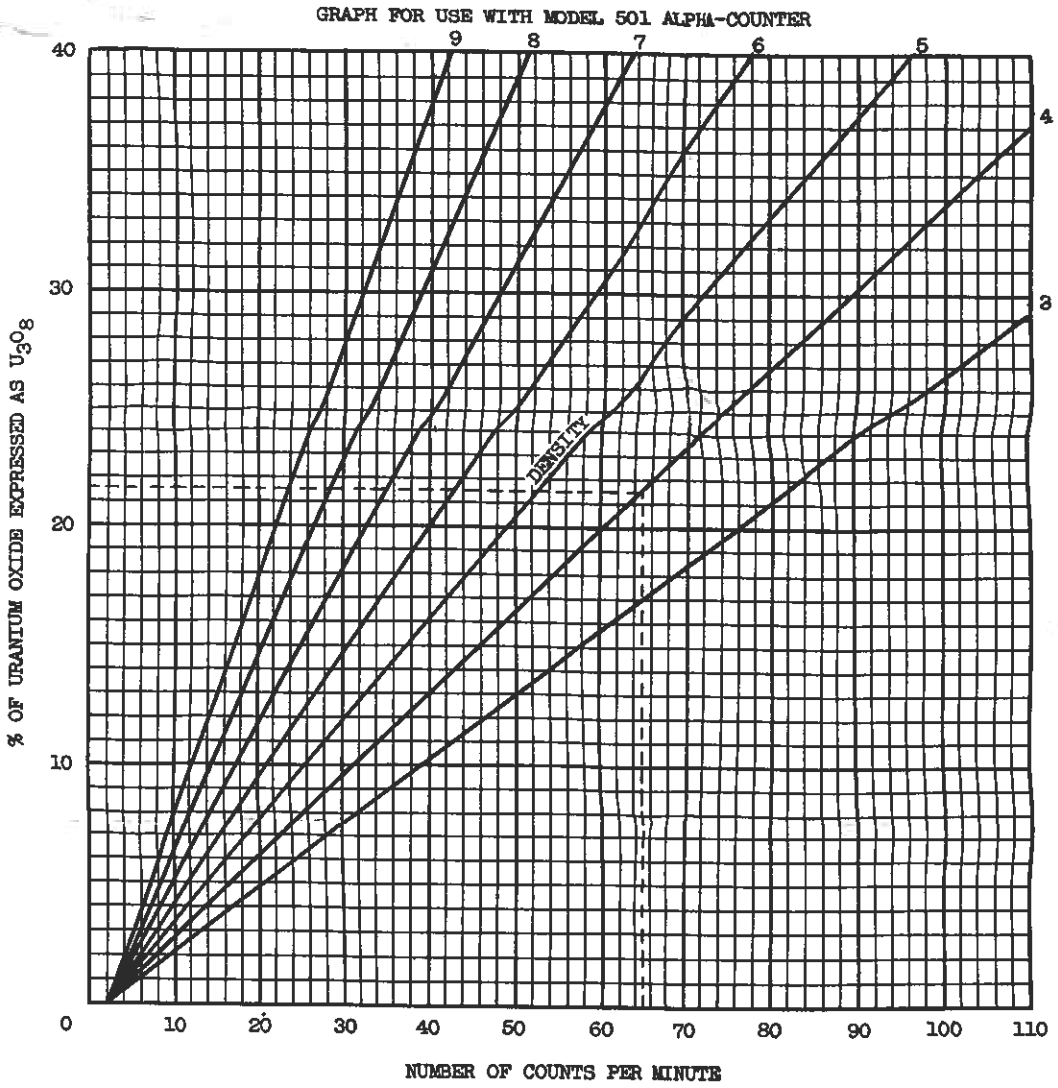
M	N	O	P	Q
% [cut off]RIUM [cut off]IDE	% THORIUM	MEAN PARTICLE RANGE-MICRONS	MAXIMUM COUNTS per MINUTE for MODEL 501 ALPHA-COUNTER	WHERE URANIUM AND THORIUM ORES ARE FOUND AND REMARKS
.5- .0	<2	29.4	50	Ampangabe, Madagascar; Minas Gerais, Brazil
.4	≦3.0	29.8	12	New York; Texas; Virginia; N.J.; Sweden; Greenland; Norway; Russia
		25.4	>100	Katanga, Belgian Congo; Wolsendorf, Bavaria; Great Bear Lake, Canada and others
		30.0	75	Madagascar; Transbaikalia, Siberia
		21.4	>75	Katanga, Belgian Congo; Great Bear Lake, Can. (prob) Villeneuve, Quebec (prob)
		32.3	60	Hastings Co. and Halliburton Co., Ontario
0- 0	1.0-4.0	26.6	>90	Brazil; Norway; Sweden; Finland; Ireland; N.Carolina; S.Carolina
		25.5-30.0	>100	N.H.; N.C.; Belgian Congo; Bohemia.
		23.3	75	Kasolo, Katanga, Belgian Congo
0-	0.9-<15.8	25.6	<40	Peidmont region of N.C.& S.C.; Brazil, coast of Espirite Santo & Bahio; Travancore, India; New S. Wales; Ceylon; S.Queensland
.47	71.60	25.0	>90	Sweden; Madagascar; Norway
		22.7	50	Katanga and Kasolo, Belgian Congo
8- 4	1.0-4.0	23.6	20	Canada; N.C.; Colo.; Md.; Siberia
0	70.3	22.6	50	Ceylon; Madagascar; Siberia; Easton, Penn.
.47	<71.60	26.7	<100	Norway; Sweden
	100	>8	>100	Th^{232} Not found native
	87.88	<20	<100	Welsbach mantles. Thorium dioxide is prob. only oxide of thorium
		7.7	>>110	Isotopes; U^{234}, U^{235}, U^{238}
		<20	<90	
		<21	>100	
		<21	>100	
0- 3	0.0-8.6	19.8-20.5	75	Rumania; Bohemia; Saxony E. Africa; Conn.; Colo.; Canada
1	1.0	21.0	80	Arendal region of Norway; Saxony; N.C.; S.C.; Texas
	8.8	20.0	75	Annerod, Norway
		20.5	70	Llano Co., Texas
0-	1.0	20.4-22.2	80	Great Bear Lake, Canada; Belgian Congo; Bohemia; Czechoslovakia; Colo. Texture of ore pitchlike
		29.5	<100	Colo., Utah; Ariz.; Penn.; Belgian Congo; S. Australia
		35.0	<110	France; lim. quan. in Conn., N.Hamp.; N.C.; Saxony & Portugal
		34.8	<100	Mt.Painter, Australia; Schneeberg, Saxony; Bohemia; Cornwall
		34.4	<100	Schneeberg, Saxony
		30.0	100	Montrose Co., Colo.; Grand Co. and Garfield Co., Utah; Siberia; Russian Turkestan
		31.0	>100	Kupferberg, Silesia; near Schneeberg, Saxony; Mitchel Co., N.C.; Delaware Co., P.A.; near Lusk, Wyo.; Mt.Painter, S.Australia; Norway; Bavaria

GRAPH FOR USE WITH MODEL 501 ALPHA-COUNTER



HOW TO USE THE CHART AND GRAPH FOR THE APPROXIMATE DETERMINATION OF URANIUM OXIDE (U_3O_8) IN ORE SAMPLES

(1) Find out what ore the sample is. The chart lists the characteristics. The color, general appearance, hardness and density are important.

(2) Determine by means of the Clarkstan Model 501 Alpha-counter how many counts per minute the ore shows. This determination should be made by using a stop-watch or watch with a second hand.

(3) Under the vertical column (E) the density or specific gravity is listed. For the ore under examination find out what the density is.

(4) On the graph the slanting lines are for the different density ores. Find the slant line corresponding to the density of the ore under examination.

(5) Find the point on the graph where the vertical counts-per-minute line that corresponds to the figure found in step (2) crosses the density line.

(6) Follow the horizontal line that crosses the above point to the left. Here is the per cent of uranium oxide in the sample.

Example: A sample of gummite shows a count with the Model 501 Alpha-Counter of 65. The density is 4. The richness of U_3O_8 is 21½% as shown on the graph.

CAUTIONS --

Make certain that the ore is the same throughout. It must be reasonably homogeneous. The surface exposed to the alpha-counter screen during the count must be a fair sample of the whole piece of ore. A thin layer of U-oxide will give as high a count as a solid piece. A thin layer should not be used to determine the quality of the whole piece.

EXPLANATIONS OF CHART

A. The name of the ore as generally accepted by authorities.

B. The chemical formula is given for identification in other literature and for computations. Often the exact formula is not known or cannot be determined.

C. The molecular weight is used in determining columns K, L, M and N.

D. The crystalline form and color are the first properties to consider in identification of an ore.

E. Specific gravity and density are synonymous. The specific gravity of an ore is the ratio of its density to that of water. A S.G. of 5 means that the sample is 5 times as heavy as the same volume of water. As an example; in ores the S.G. of a piece of pitchblend may be 8 and the S.G. of a piece of carnotite only 4. A given volume of the pitchblend ore will be twice as heavy as the same volume of carnotite ore. Rough estimates can be made by comparing weights and samples in the hand.

F. Moh's scale is the standard field test for hardness. 1, very easily scratched by the finger nail; 2, easily scratched by the finger nail; 3, scratched by a brass pin or copper wire or coin; 4, easily scratched with a knife blade; 5, scratched with difficulty with a knife blade; 6, easily scratched with a file; 7, ore scratched with difficulty with a file but will scratch window and bottle glass. 8, 9 and 10 will easily scratch glass. Some minerals of the various hardnesses are as follows: 1, talc; 2, gypsum; 3, calcite; 4, fluorite; 5, apatite; 6, orthoclase; 7, quartz; 8, topaz; 9, corundum or sapphire; 10, diamond.

G. The streak is the color of the mark made by the ore when scratched on unglazed porcelain.

H. The luster is the general appearance of the ore.

I. Fluorescence is the color of the ore when irradiated with ultra-violet light. This test is made in darkness or very subdued light.

J. The difference between primary and secondary ores is that secondary ores are, in general, derived from primary ores. Secondary ores are frequently deposits of waterborne, altered primary ores. They will often be found in cracks and crevices as fine to coarse veining in a greater bulk of other rocky matrix. Primary ores are those which were formed in the earliest stages of the formation of the earth's crust. Primary uranium ores are generally radioactively stable. Secondary uranium ores may not be, though for practical purposes may be usually considered so.

K. % of uranium oxide, (U_3O_8) generally found in a rich ore. These figures are for the ore when the bulk of the matrix is removed.

L. % uranium. These figures are derived from the formula.

M. % thorium dioxide is found with or without uranium compounds. Some ores contain both uranium and thorium.

N. % thorium as derived from the formula.

O. The mean particle range is the distance that the alpha particle travels in the ore before it is stopped. 1 micron = .001 millimeters. The alpha particle range is a function of the density.

P. Maximum count per minute is for an ideal ore. Generally the counts-per-minute will be much less than the figure given. Some fine specimens of ores will give, however, figures greater than can be counted by eye.

The symbols > and < mean greater than and less than.

Net Price 25c

CLARKSTAN CORP.
Manufacturers of Fine Electronic, Industrial and Laboratory Equipment
11921 W. PICO BOULEVARD
Los Angeles 64, Calif., U.S.A.

Compiled by Geo. A. Argabrite

Data Unit 200

The New

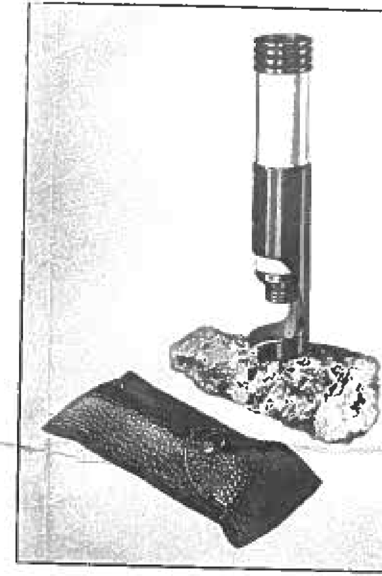
CLARKSTAN POCKET WIDE-FIELD MICROSCOPE

MODEL 233

Magnification
Range from 20x to 60x

INDISPENSABLE TO:

- Engineers
- Manufacturers
- Minerologists
- Geologists
- Metallurgists
- Agriculturalists



The Clarkstan pocket microscope has excellent optics equivalent to those provided in pedestal type microscopes.

QUALITY - This instrument offers laboratory quality for use in field or shop.

WIDE FIELD OPTICS - The entire field is in focus.

NO CHROMATIC ABERRATION ·

VERY HIGH LIGHT EFFICIENCY

ADJUSTABLE MAGNIFICATION - for any power between 20x and 60x. All parts are in brass or steel plated and with dulite finish. The instrument comes complete with genuine grained cowhide leather case.

MODEL 233 . NET PRICE $12.75

CLARKSTAN CORP.
Manufacturers of Fine Electronic, Industrial and Laboratory Equipment
Los Angeles 64, Calif., U.S.A.

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All prices are F.O.B. Factory and are subject to change without notice