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Mercury---Quicksilver
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INTRODUCTION

The production of quicksilver in 1914 was 16,548 flasks, 75 lbs. each, valued at $811,680, showing a decreased output of 3,665 flasks compared with the production of 1913. This decrease was entirely due to a much smaller yield from California. The production from California, which amounted to 15,591 flasks, valued at $627,228 in 1913, was only 11,303 flasks, valued at $554,414 in 1914. The production of Nevada increased from 1,645 flasks, valued, at $66,178 in 1913, to 2,089 flasks, valued at $102,465, in 1914. The combined output of Arizona and Texas increased from 2,977 flasks, valued at $119,765, in 1913, to 3,156 flasks, valued at $154,801, in 1914.

None of the mines in Oregon, Utah or Washington produced any quicksilver in 1914, and the output was derived from 20 properties in California, 7 in Nevada, and 3 in Arizona and Texas.

The present high prices have stimulated the search for new ore bodies, and the active operation of the old properties, but the present outlook does not indicate any largely increased domestic production.

ORES OF MERCURY

The most common minerals of mercury are metallic mercury, cinnabar and calomel. Of these, cinnabar is the most important, and is practically the only ore of mercury.

MERCURY

Composition:—Hg with sometimes a little silver.

General Description:—Native mercury is a tin-white liquid with metallic lustre. It is usually found in little globules scattered in the gangue, or in cavities in association with cinnabar or calomel.

Physical Characteristics:—

Lustre, metallic. Sp. Gr. (13.59) very heavy.
Color, tin white. Opaque liquid.

Qualitative Tests:—Entirely volatile. When heated with bismuth flux on plaster, it forms a volatile yellow and scarlet coating, which becomes black on further heating. With bismuth flux on coal it gives a faint yellow coating at a distance. When heated in closed tube
with dry soda or litharge, it forms a mirror-like sublimate, which may be collected in globules. Soluble in nitric acid.

CINNABAR (NATURAL VERMILLION)

Composition:—(HgS.) A sulphide of mercury, when pure, carrying 86.2 per cent of Hg. Usually, however, contains impurities such as clay, iron oxide, etc.

General Description:—Very heavy, bright vermillion to brownish-red mineral, usually of a fine granular massive texture. Rarely as incrustations of a bright scarlet powder; also earthy red mass.

Physical Characteristics:—

Hardness (2-2.5) scratched by a cent.

Sp. Gr. (8-8.2) heavy.

Lustre, adamantine to dull. Tenacity, brittle to sectile.

Streak, scarlet.

Color, vermillion-red when pure, to brownish-red when impure.

Qualitative Tests:—Wholly volatile without fusion when free from gangue. If some of the powdered ore is thoroughly fused in the reducing flame, and either

(a) Placed in bright silver, moistened, crushed and allowed to stand, the silver will become brown or black, or

(b) Heated with dilute hydrochloric acid, hydrogen sulphide will be given off which has an odor of rotten eggs.

(The above tests are for sulphur.)

In closed tube gives a black sublimate which becomes red when rubbed. If heated in closed tube with dry soda a metallic mirror is obtained, and by rubbing with a splinter of wood, globules of metallic mercury may be collected. If the powdered ore is moistened with hydrochloric acid and rubbed on bright copper, the copper is made silver white. Soluble in aqua regia (3 parts hydrochloric and 1 part nitric acid).

Occurrence:—Cinnabar is usually found filling fissures and cavities in sedimentary rocks, or as impregnations in sandstone and limestone; sometimes in granite or porphyry, associated with iron, copper, antimony, arsenic and native gold. The important localities for the occurrence of cinnabar in the United States: California, Texas, Nevada, Arizona, Idaho, Oregon, Utah, and Washington.

CALOMEL (HORN MERCURY)

Composition:—Mercuric chloride (Hg₂Cl₂) containing 84.9 per cent Hg.
General Description:—A gray or brown translucent mineral of the
consistency of horn, usually found as a coating in cavities in associa-
tion with cinnabar.

Physical Characteristics:—
Hardness (1-2) scratched by finger nail, soft.
Lustre, adamantine.
Streak, white.
Color, gray, white, brown.

Qualitative Tests:—Volatilizes without fusion, yielding a white
coating. When heated with dry soda in closed tube forms a metallic
mirror.

Other minerals of mercury are tiemanite, the selenide (HgSe);
onofrite, the sulphoselenide (HgSeS); kleinitite, the mercurammonite;
montroydite, the mercuric oxide; and terlinguaite, the oxychloride of
mercury.

GEOLOGICAL OCCURRENCES

In their geological occurrence the ores of mercury are almost in-
variably associated with igneous rocks, although the walls are often
sedimentary. Geographically, the few chief quicksilver-producing
localities are distributed along the great mountain chain of Eurasia
and the western Cordilleras, and thus lie within the volcanic belt of
eastern Asia and that of western North and South America. This,
and the close association of mercury deposits with geysers, hot springs;
fumeroles, and other volcanic phenomena, have lead to the belief that
these deposits are of volcanic origin.

As a whole, the deposits of mercury are found as fissure filling and
often as cementing breccias; sometimes the ore is found impregnating
the red wall rock and possibly replacing it. These fissures are often
irregular in shape and link larger fissures, forming stock-works. The
deposits also occur in zones of fracture, along bedding planes and
jointing planes.

QUICKSILVER IN ARIZONA

The occurrence of quicksilver in Arizona has been known for a
number of years, but due to the decline in the demand for and pro-
duction of the same, there have not been sufficient incentives to induce
the development of these deposits. At present, however, because of
the large use of mercury in the preparation of fulminate for explosives,
the available supply has been rapidly withdrawn from the market, and a large demand has been created, thus raising the price paid per unit about 100 per cent. At the present time, therefore, low grade cinnabar deposits might be worked at a profit under the transportation conditions prevailing in Arizona.

Quicksilver is found in Maricopa, Yuma, Gila, and Yavapai counties.

Maricopa County.

Here the quicksilver deposits occur in the Mazatzal Mountains, on the northeastern boundary between Maricopa and Gila counties. This locality has taken the name of Sunflower district from the nearby Sunflower ranch. The Sunflower district extends over the Mazatzal range into Gila County on the east, although the principal locations are on the west side of the range, in Maricopa County, near the headwaters of Sycamore Creek, and include Pine Mountain. A number of claims have been located there by Messrs. Bowman, Murphy and others; the Sunflower Cinnabar Mining Co. of Phoenix has taken over some of these claims and has done considerable development work. Up to the present, this company has produced but a small quantity of quicksilver, which has been obtained by simply retorting the ore as mined, the gangue containing enough lime to reduce the cinnabar to metallic mercury. This method of reduction, however, involved considerable loss of quicksilver, and more efficient modes of treatment will have to be employed in order to work the deposits profitably and for any length of time.

The ore is cinnabar associated with quartz and is contained in green, probably chlorite, schists. It usually contained from 3 to 4 per cent of quicksilver, although some stringers carry ore of much higher grade.

According to recent newspaper reports, a number of other claims have been located in this district, and active development work is going on.

Yuma County.

The deposits are located in the Plomosa mining district, at Cinnabar, in the southern part of the Dome Rock Mountains, about eight miles southwest of Quartzite.

The rocks in this locality are arenaceous shales which have been metamorphosed into quartz mica schists. In places the country rock is fractured and brecciated, and along the fault zone lie the veins carrying cinnabar, sparsely distributed throughout a highly siliceous gangue. The veins also contain gold, copper glance, and tourmaline, and the cinnabar is usually associated with the tourmaline.
The Cinnabar Development Co., operating claims in this district, produced a small quantity of quicksilver, partly from ore on the dumps, mined previous years. The property is equipped with a 30-ton Scott furnace and a 3-ton Johnson-McKay retort plant.

The occurrence of Cinnabar is also reported at Rye, Gila County, and at Skull Valley, Yavapai County.

QUICKSILVER ELSEWHERE IN THE UNITED STATES

Quicksilver occurs in workable quantities at a number of places along the Pacific coast of North America. Its chief localities are in the coast ranges of California. The deposits extend into Oregon, but are of no great importance. In small quantities it has been mined in Utah and Nevada, and in western Texas. Of these, California is the largest producer, having yielded practically all of the quicksilver that has been produced so far in the United States.

QUICKSILVER IN FOREIGN COUNTRIES

Quicksilver occurs in many localities in Mexico, of which Guadalcazar, in the state of Guerrero, and Huitzuco, in San Luis Potosi, have proven most productive. In South America, the mines at Huancavelica, in Peru, have been in the past vast producers.

In Europe, Almaden in Spain is by far the most important of all the deposits known today, but Idura in Austria and Avala in Serbia are of great value. In Asia the great deposits of Kwei-Chun are described as being of great possibilities.

MARKET AND PRICES

The domestic quicksilver market was unfavorable and the prices very low during the first seven months of 1913, but upon the outbreak of the European war the prices jumped and producers in a position to profit were encouraged to make their maximum output. The average San Francisco domestic market price was $40.23 a flask of 75 pounds for the year 1913, against $52.05 in 1912 and $46.01 in 1911. In 1914 the following monthly averages were recorded in San Francisco: January, $39.25; February and March $39; April, $38.90; May, $39; June, $38.60; July, $37.50; August, $80; September, $76.25; October, $53; November, $55; December, $53; December, 1915, $80.

The average price for the year will therefore be about $49, the highest since 1890. The total productive capacity of the quicksilver
mines of this country as at present known is by no means unlimited, and although high prices may bring spurts of activity and new ore bodies may at any time be discovered, the present outlook is not for excessive production. These facts, and the present improbability of excessive importation, indicate high prices throughout the war, at least.

USES

Quicksilver is used mainly in the manufacture of fulminate for explosive caps, of drugs, of electric appliances and scientific apparatus, and to a diminishing degree in the recovery of precious metals, especially gold, by amalgamation. A new use in Scotland is the floating of lights of lighthouses upon a body of quicksilver. It is used also in the manufacture of paints for protective coatings on metals.