CONSTITUENTS OF DIAMOND-BEARING BLACK SANDS FROM ANGOLA, PORTUGESE WEST AFRICA

O. F. POINDEXTER, *Case School of Applied Science, Cleveland, Ohio.*

The sands were taken from along the Kasai, Tangatshimo, Tshikappa, and Tulua Rivers in Portugese West Africa, and were sent to Case School a number of years ago by F. M. Rapp, a former student.

The entire sample weighing about twenty pounds was carefully gone over and the diamonds picked out by hand. This can be readily done without the use of a lens, even for the smallest diamonds. A total of twenty one small diamonds weighing 0.1353 grams or 0.68 carats, was secured. The largest diamond weighs 0.0115 grams or 0.06 carats. This latter is a clear white stone and is an almost perfect dodecahedron.

In form the diamonds are simple octahedrons, parallel growths of same and twins after the spinel law. Also simple dodecahedrons with rounded faces, combinations of the octahedron and dodecahedron, and the octahedron and the trisoctahedron. Also cleavage pieces and irregular fragments. As to color there are ten whites, five yellows, four browns and two greens. Mr. Rapp states that at the time of collection there was no commercial use for the material. It was not made clear whether or not the sands have been artificially concentrated, but they are believed to be in the natural state.

Other minerals present are as follows.—

QUARTZ—abundant, mostly grains, a few crystals observed.

GARNET—probably pyrope, abundant, no crystals observed.

CYANITE—abundant, bluish blades up to 4 mm. in length.

DIALLAGE—abundant, long barrel-shaped grains resembling corundum. Longest 1.5 cm. Some of the grains show about 90° cleavage. This is readily obtained upon crushing. The barrel shape is probably the result of wear.

CORUNDUM—(ruby) plentiful, occurs as rose red, lustrous grains. One blue grain possibly sapphire was observed but no determination was made on it.

TOURMALINE—(black) rare, only one crystal was positively identified. This crystal is 2 mm. long, striated vertically and with typical cross section.

HORNBLENDE—one crystal, 3 mm. long, the angles were not measured.

STAUROLITE—rare, several crystals observed. Longest 6 mm.

ZIRCON—rare, one crystal, 2 mm. long observed.

RUTILE—plentiful, striated tetragonal crystals.

ILMENITE—abundant, constitutes practically all of the black metallic material. Non-magnetic.

HEMATITE—sparingly, many appear to be roughly octahedral and are probably after magnetite. The specular variety is also present.

PYRITE—a few irregular grains and partial cubes.

No especial determinative methods were applied to the majority of the above minerals since they are common constituents of such sands. Determination being based upon physical characters and crystal form. Microscopic examination was made on cyanite, diallage and corundum, and chemical tests were made on the ilmenite, rutile and hematite.

Grains suggesting the following were picked out but no determinations were made because only one grain of each was secured, spinel, columbite, beryl, topaz. Feldspars and various types of of chalcedony are undoubtedly present, also possibly opal.

The most abundant and most interesting mineral present in the sand has not been listed above. This is a black, glassy substance with a conchoidal fracture and resembles obsidian. This material makes up probably from 65 to 75 per cent of the sand and constitutes about 90 per cent of the black minerals.

As yet no analysis has been made so that no definite statement can be made as to what the mineral is.

Dr. Vincent L. Ayres in an unpublished thesis describes an "Obsidianoid Augite" from Rice, Arizona, to which the material is somewhat similar in its physical and optical properties. The mineral scratches glass easily and is scratched by quartz with great difficulty. This agrees with Ayres's 6.5 hardness for the "obsidianoid augite." Specific gravity is 3.70 as against Ayres's 3.38. Cleavage is very rarely observed even in crushed material under the microscope.

Under the microscope the mineral is colorless to brownish, depending upon the thickness of the fragment. The colored fragments are distinctly pleochroic in yellowish and brownish tones. The optical character is positive. The indices are somewhat higher than those indicated by Ayres, ranging from 1.74 to 1.76 (Becke Method). Ayres gives the following,— $\alpha = 1.708$, $\beta = 1.714$, $\gamma = 1.731$. The "obsidianoid augite" is less strongly colored in thin fragments and is non-pleochroic.

Comparing the physical and optical properties with those of the "obsidianoid augite," it seems very possible that the black mineral of the diamond sands may be a variety richer in iron. The higher indices, greater specific gravity, deeper color and pleochroism would lend support to this supposition.

A further report upon this mineral will be made when an analysis has been made.