

## IRON OXIDES.

As a rule, the minerals which consist essentially of iron oxides are looked upon as iron ores. In this report they will not be treated as such, but in the light of those uses which do not depend upon the extraction of their metallic values.

*Magnetite* is a hard, black mineral of metallic lustre, composed of ferrous-ferric oxide ( $\text{FeO} \cdot \text{Fe}_2\text{O}_3$ , or  $\text{Fe}_3\text{O}_4$ ). It gets its name from being strongly magnetic.

*Hematite*<sup>1</sup> consists of ferric oxide, or sesquioxide of iron ( $\text{Fe}_2\text{O}_3$ ). It varies in colour from bright red to black, though, when ground to a fine powder, it is always red.

*Limonite* is the hydrated sesquioxide of iron ( $2 \text{Fe}_2\text{O}_3 \cdot 3 \text{H}_2\text{O}$ ). It is known also as *brown hematite*. Its colour varies from yellowish brown to black.

*Bog iron ore* is a loose earthy variety of limonite occurring in bogs.

*Ochre* is the name applied to the earthy variety of limonite, usually highly argillaceous. Its colour varies from brilliant yellow to dull yellowish brown.

The presence of manganese oxides in ochre gives a brown or reddish colour. This manganiferous ochre is called *umber*, after Umbria, in Italy, where it was first utilized. *Sienna* is like umber in composition, but contains less of the oxides of manganese and is lighter in colour.

## USES.

The principal uses of these ferruginous materials are in the paint industry, where they are employed as pigments. Trueness and depth of colour are the prime requisites. They should be very finely ground, and free from grit. They are used either raw or calcined, according to the colour desired.

The very finely ground raw hematite produces the colours known as Indian red and Venetian red, but the principal source of these colours is from the residue from pyrite burning.

In testing all these materials for their suitability as pigments, a carefully dried and finely ground sample should be mixed with oil and applied with a knife to a slip of clear glass.

<sup>1</sup> Hematite, calcined limonite and the residue from pyrite roasting are known, commercially, as "red oxide."