



SNS COLLEGE OF TECHNOLOGY
(AN AUTONOMOUS INSTITUTION)
COIMBATORE-35

II YEAR / III SEMESTER
19CET201-ENGINEERING GEOLOGY



IRON ORE

Iron ores are rocks and minerals from which metallic iron can be economically extracted. The ores are usually rich in iron oxides and vary in color from dark grey, bright yellow, or deep purple to rusty red. The iron is usually found in the form of magnetite (Fe_3O_4 , 72.4% Fe), hematite (Fe_2O_3 , 69.9% Fe), goethite ($\text{FeO}(\text{OH})$, 62.9% Fe), limonite ($\text{FeO}(\text{OH}) \cdot n(\text{H}_2\text{O})$, 55% Fe) or siderite (FeCO_3 , 48.2% Fe).





IRON ORE

<https://youtu.be/BDzbkJ-hBe4>

https://youtu.be/KWa_fpaPZMo

<https://youtu.be/mmkvILW2z2s>



MAGNETITE

Magnetite is **magnetic**, and hence easily separated from the **gangue** minerals and capable of producing a high-grade concentrate with very low levels of impurities.

The grain size of the magnetite and its degree of commingling with the silica **groundmass** determine the grind size to which the rock must be comminuted to enable efficient magnetic separation to provide a high purity magnetite concentrate. This determines the energy inputs required to run a milling operation.

Mining of banded iron formations involves coarse crushing and screening, followed by rough crushing and fine grinding to **comminute** the ore to the point where the crystallized magnetite and quartz are fine enough that the quartz is left behind when the resultant powder is passed under a magnetic separator.

Generally most magnetite banded iron formation deposits must be ground to between 32 and 45 micrometers in order to produce a low-silica magnetite concentrate. Magnetite concentrate grades are generally in excess of 70% iron by weight and usually are low phosphorus, low aluminium, low titanium and low silica and demand a premium price.



GANGUE MINERALS





HEMATITE

Due to the high **density** of **hematite** relative to associated **silicate** gangue, hematite beneficiation usually involves a combination of beneficiation techniques.

One method relies on passing the finely crushed **ore** over a slurry containing **magnetite** or other agent such as **ferrosilicon** which increases its density. When the density of the slurry is properly calibrated, the hematite will sink and the **silicate mineral** fragments will float and can be removed.





USES OF HEMATITE

- It is one of the finest iron ores in the world and one of the most important pigment minerals as well.
- It is a dense and inexpensive material.
- It is also used for ballasts for ships.
- It is used as gemstones or in making jewellery as well.
- It can be used for its calming and protective properties.
- It is used as polishing compounds.
- Hematite is also kept in the homes because it gives great energy and the ability to get the mind to focus.



Mohs Scale of Mineral Hardness



1-Talc



2-Gypsum



3-Calcite



4-Fluorite



5-Apatite



6-Feldspar



7-Quartz



8-Topaz



9-Corundum



10- Diamond

GeologyIn.com



**Mohs relative
hardness**

**Mineral
example**

Scratch test

1	Talc	Scratch with fingernail
2	Gypsum	Scratch with fingernail
3	Calcite	Scratch with copper penny
4	Fluorite	Easily scratch with knife
5	Apatite	Scratch with knife blade
6	Orthoclase	Scratch with steel file
7	Quartz	Scratch with window glass
8	Topaz	Scratches quartz
9	Corundum	Scratches topaz
10	Diamond	Scratches corundum



THANK YOU...