Magnetism

Overview: Minerals that react when you place them in a magnetic field have magnetic properties. How attracted they are to the magnet depends on the temperature and the properties of the mineral itself.

What to Learn: A magnetic field is the area around a magnet or an electrical current that attracts or repels objects that are placed in the field. The closer the object is to the magnet, the more powerfully it's going to experience the magnetic effect. Nearly all minerals that are magnetic have iron as a component.

Materials

- Magnet
- Rock samples (samples in the video that stuck to the magnet are lodestone [which is the magnetic form of magnetite] and meteorites)

Experiment

1. Label and number each of your samples and record this on your data table.
2. Hold your mineral close to the magnet and observe how strongly it is attracted to the magnet. How far away do you have to be to start influencing the sample?
3. Complete the data table.
4. There are several magnetic properties that geologists use to specify the type of magnetism within a mineral:

    - Ferromagnetism is the kind of magnetism you'll see in magnetite and pyrrhotite, as these have strong attraction to magnetic fields.
    - Paramagnetism is a weak attraction to magnetic fields, such as with the minerals hematite and franklinite.
    - Diamagnetism occurs in only one mineral, bismuth, which means it's repelled from magnetic fields.
    - Magnetism is found in only one mineral called lodestone, which is the magnetic version of magnetite. It's really rare, since it's only found in a couple locations in the entire world. Lodestone is weakly magnetic, but if you drop small paperclips, staples, and iron filings onto a piece, they'll stick.

Magnetism Data Table

Sample	**Observations** *("Magnetic" or "Attracted to a Magnetic Field" or None")*

Reading

Minerals can become attracted to a magnetic field if they are heated to a certain temperature. These minerals become ferromagnetic after heating them up. Some minerals also act as magnets when they are heated, but this effect is only temporary for as long as the mineral stays at that temperature.

Magnetism is a very useful way of identifying a mineral, because it's so precise. When testing for magnetism, you'll get better results if you use the strongest magnet you can find. You'll find minerals that respond to magnets (without heating them up first) are metallic-looking samples.

Most student-grade geology books refer to minerals that are attracted to magnetic fields as "magnetic," which leads to confusion because there's a difference between being "magnetic" (acting as a magnetic field) and being "attracted *to* magnetic fields." When you fill out your observations in the data table, keep this in mind when you write down what you see by using the words "magnetic" or "attracted to a magnetic field."

Exercises

1. Is lodestone the same as magnetite?
2. Which mineral is repelled from any magnetic field?
3. Which element is usually present in minerals that have magnetic properties?

Answers to Exercises: Magnetism

1. Is lodestone the same as magnetite? (Lodestone is the magnetic version of magnetite)
2. Which mineral is repelled from any magnetic field? (bismuth)
3. Which element is usually present in minerals that have magnetic properties? (iron)