# Section 14-1

# Properties of Minerals

# Properties of Minerals

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Try to scratch a penny with a paper clip.

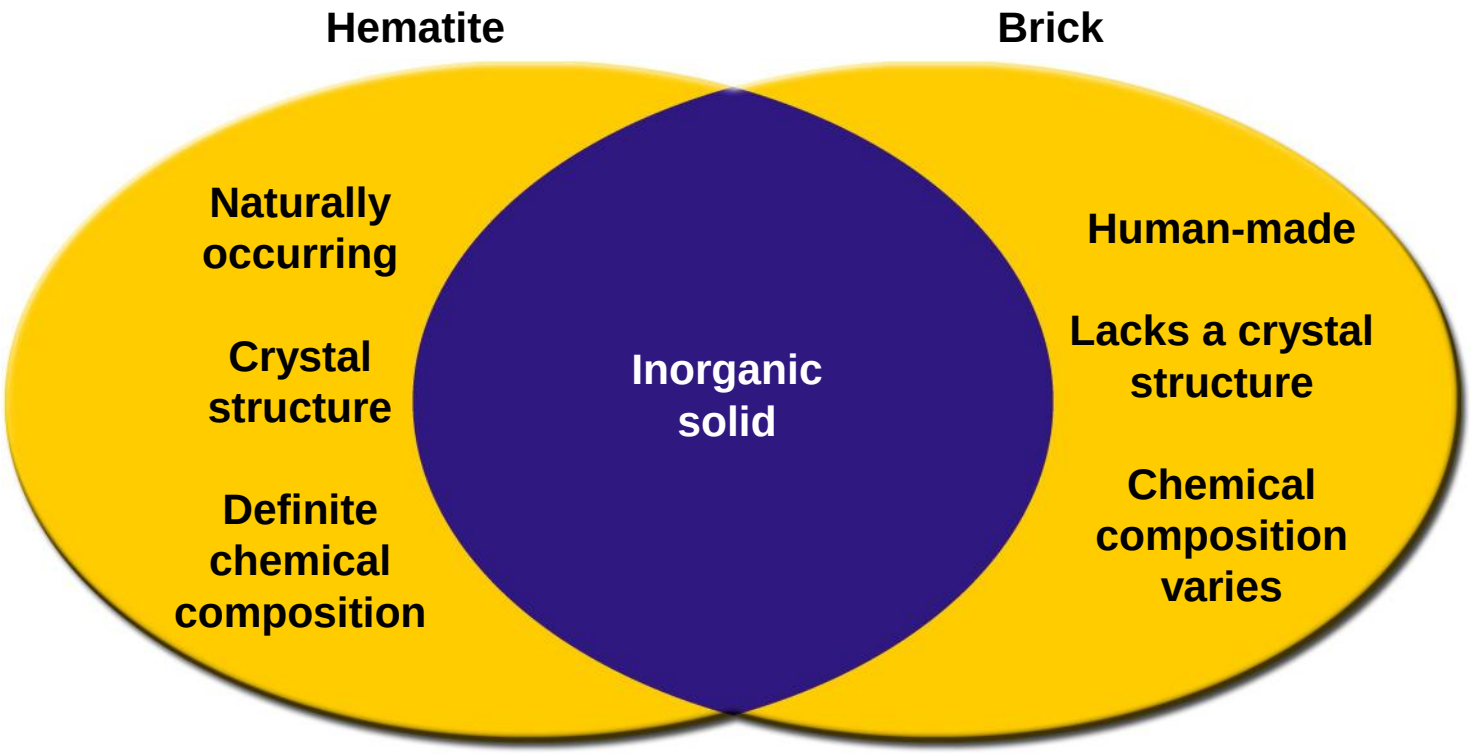
Now, try to scratch the paper clip with the penny.

Which of the two objects is harder?

## What is a mineral?

- A naturally occurring, inorganic solid that has a crystal structure and a definite chemical composition.

# Properties of Minerals



# How are minerals identified?

- Hardness – Mohs Hardness scale
- Color
- Streak
- Luster
- Density
- Crystal Systems
- Cleavage and Fracture – How they break
- Special Properties

# Properties of Minerals

SCIENCE EXPLORER

| Mohs Hardness Scale | | |
|---|---|---|
| **Mineral** | **Rating** | **Testing Method** |
| Talc | 1 | Softest known mineral. It flakes easily when scratched by a fingernail. |
| Gypsum | 2 | A fingernail can easily scratch it. |
| Calcite | 3 | A fingernail cannot scratch it, but a copper penny can. |
| Fluorite | 4 | A steel knife can easily scratch it. |
| Apatite | 5 | A steel knife can scratch it. |
| Feldspar | 6 | Cannot be scratched by a steel knife, but it can scratch window glass. |
| Quartz | 7 | Can scratch steel and hard glass easily. |
| Topaz | 8 | Can scratch quartz. |
| Corundum | 9 | Can scratch topaz. |
| Diamond | 10 | Hardest known mineral. Diamond can scratch all other substances. |

# Properties of Minerals

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Adventures in Life, Earth, and Physical Science



## 56 Properties and Uses of Minerals

| Name | Magnetite | Quartz | Rutile | Sulfur | Azurite | Microcline Feldspar |
|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| **Hardness** | 6 | 7 | $6-6\frac{1}{2}$ | 2 | $3\frac{1}{2}-4$ | 6 |
| **Color** | Black | Transparent or in a range of colors | Black or reddish brown | Lemon yellow to yellowish brown | Blue | Green, red-brown, pink, or white |
| **Streak** | Black | Colorless | Light brown | White | Pale blue | Colorless |
| **Crystal Shape** |  |  |  |  |  |  |
| | Cubic | Hexagonal | Tetragonal | Orthorhombic | Monoclinic | Triclinic |
| **Luster** | Metallic | Glassy | Metallic or gemlike | Greasy | Glassy to dull or earthy | Glassy |
| **Special Properties** | Magnetic | No | No | No | Reacts to acid | No |
| **Density ($g/cm^3$)** | 5.2 | 2.6 | 4.2–4.3 | 2.0–2.1 | 3.8 | 2.6 |
| **Uses** | A source of iron used to make steel | Used in making glass and electronic equipment | Contains titanium, used in aircraft and cars | Used in fungicides and industrial chemicals | A source of copper metal | Used in pottery glaze and scouring powder |

# Section 14-2

# How Minerals Form

# How Minerals Form

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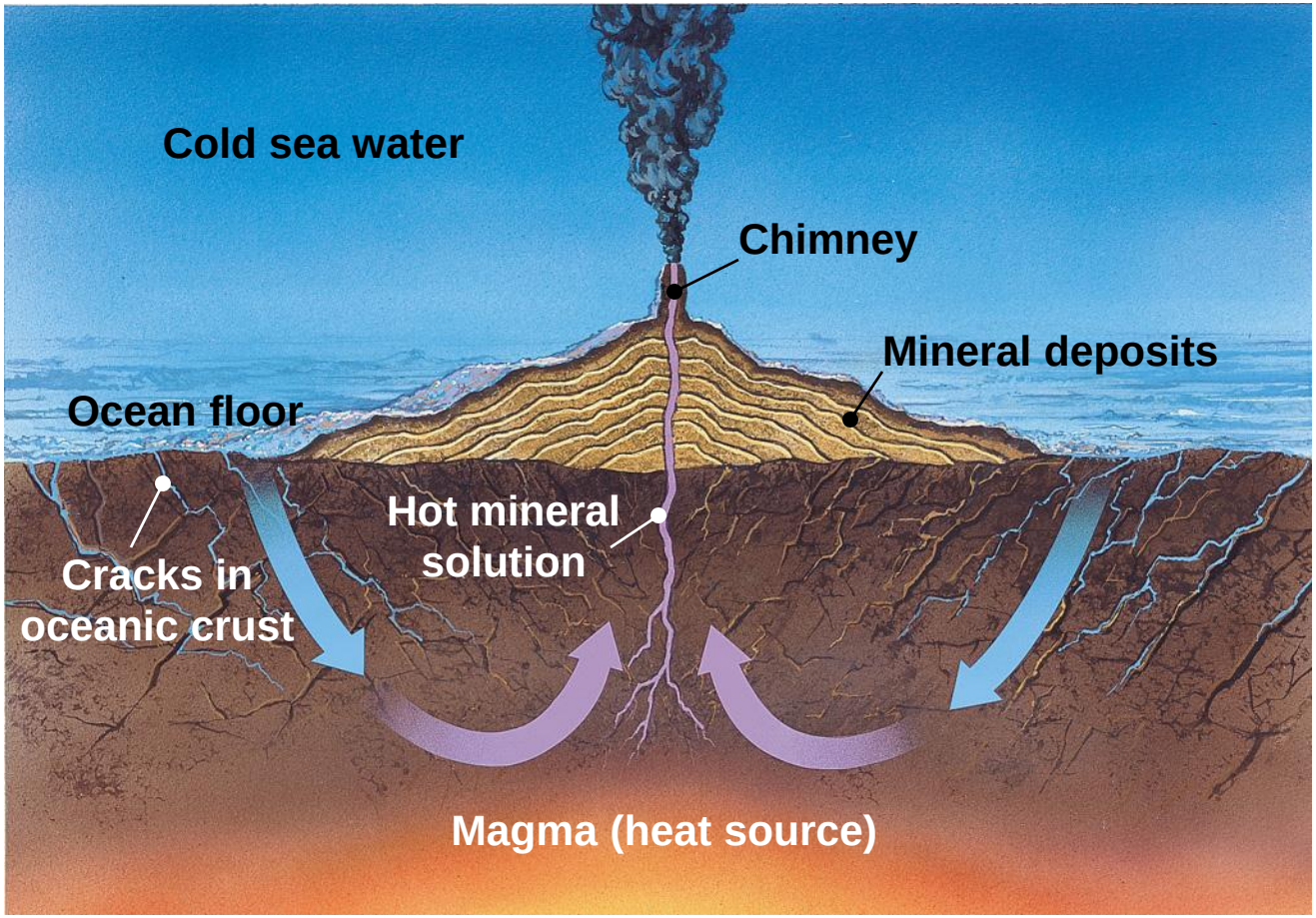
## Minerals form in two ways:

- **Crystallization of melted materials**
  - **when hot magma cools**
  - **when lava cools**
  - **cooling speed**
- **Crystallization of materials dissolved in water**
  - **hot water dissolves elements when they cool they crystallize**
  - **when water evaporates**

# How Minerals Form



# How Minerals Form

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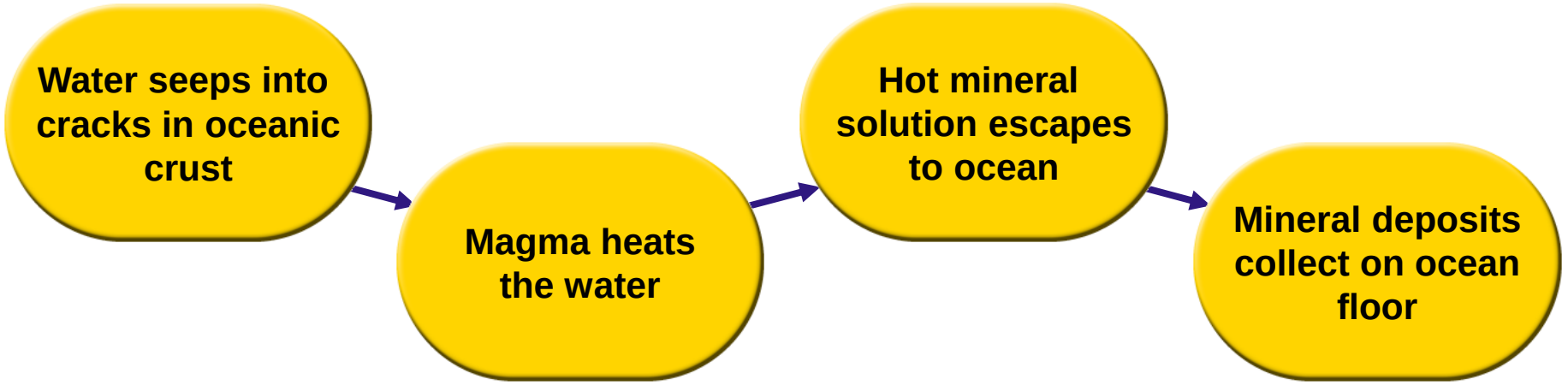
**Formation of Mineral Deposits on Ocean Floor**



# Section 14-3

# Mineral Resources

# Mineral Resources

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**Solve this riddle:**

**It is a kind of iron, but can't press clothes or curl hair.**

**It is a kind of "oar" but can't row a boat.**

**What is it?**

**It is iron ore.**

## Uses of Minerals:

- source of metals
- gemstones
- used in foods
- used in medicines
- used in fertilizers
- used in building materials
- used in making optics and glass
- used in making electronic equipment
- used in making china and pottery
- used in cleaning products

# Mineral Resources

SCIENCE EXPLORER

**The Smelting Process:**

1. Iron, limestone, and coke are mixed.
2. Ore mixture is placed in blast furnace.
3. Chemical changes produce iron and carbon dioxide gas.
4. Iron and slag sink to bottom.
5. Molten iron and slag are poured off.