Minerals

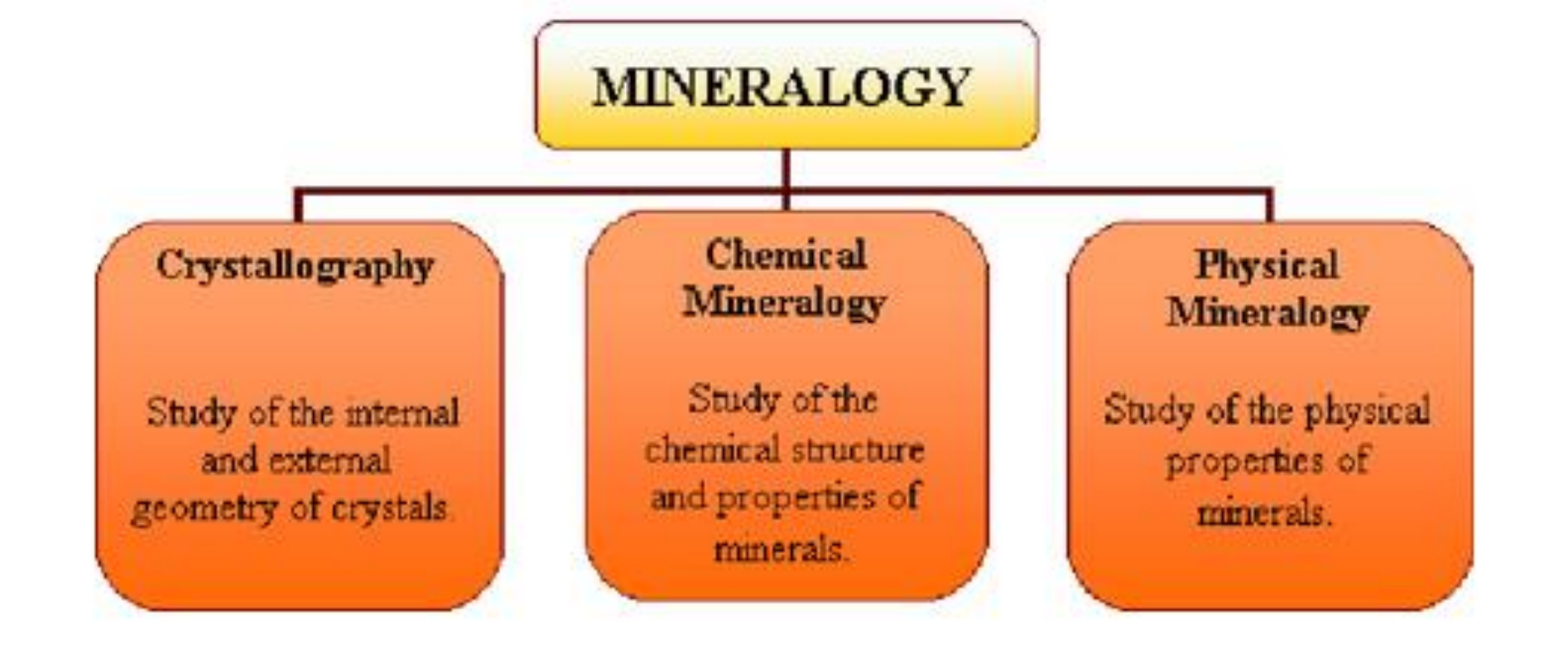
Courtesy of:
http://www.mineralogicalassociation.ca

Mineral basics

The definition of a mineral has several parts:

1. It must be naturally occurring. Crystals produced in laboratory (synthetic) are not, strictly speaking, minerals.
2. It must be inorganic, meaning that it is not the product of a biological process.
3. It must be a crystalline solid. A mineral is a single, solid substance (phase) which cannot physically be separated into simpler compounds. Rocks are usually aggregates of minerals that can be physically separated from one another.
4. It must have a definite chemical composition that can be represented by a chemical formula (e.g., SiO_2). But this composition is not necessarily fixed, olivine, for example, may vary in composition from Mg_2SiO_4 to Fe_2SiO_4. However, the chemical variation occurs between strict limits and any given composition has a specific formula (e.g., $Mg_{1.8}\ Fe_2SiO_4$).

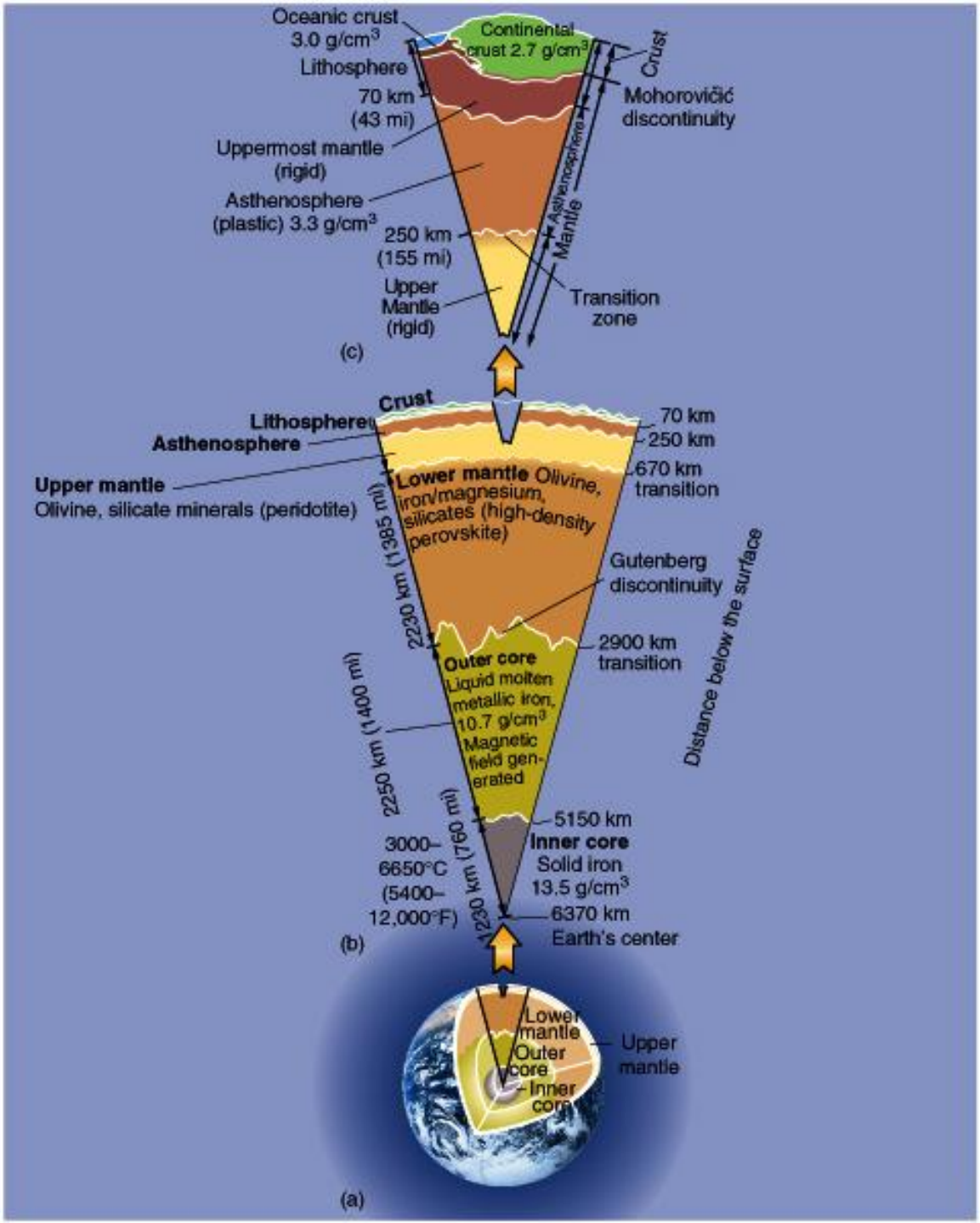
From this definition, you can see that mineralogy relates chemistry and physics to geologic materials through these tree sub-disciplines:



Why study minerals?

Rocks are aggregates of minerals. Therefore, studying minerals is essential in understanding how the earth and other planets formed and evolved.

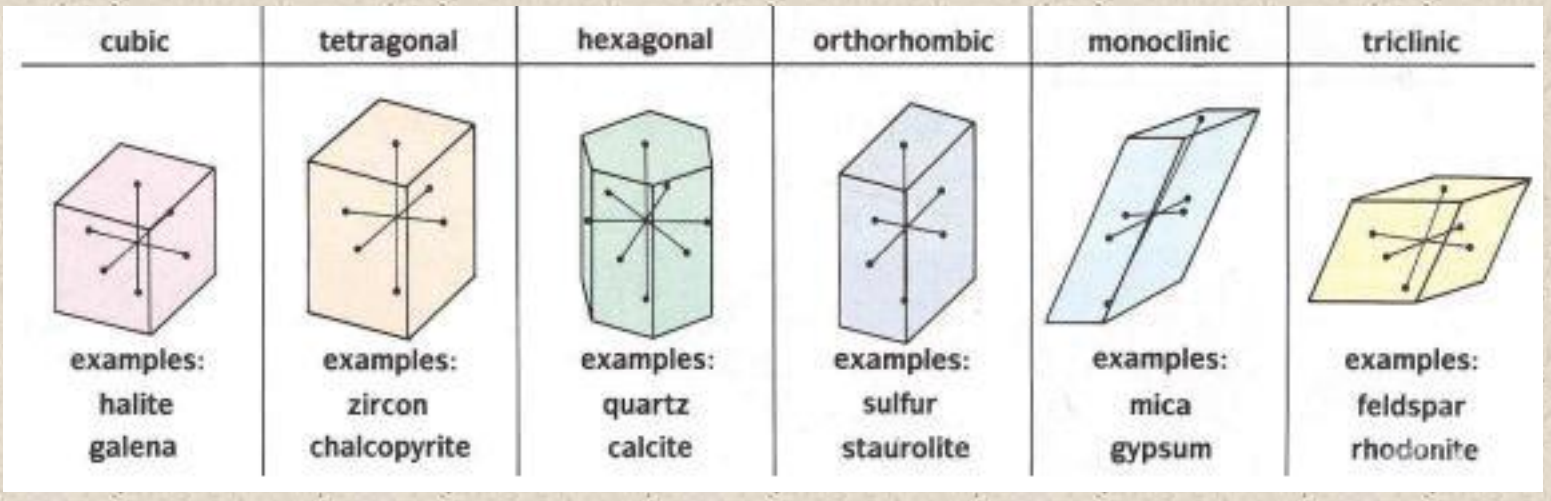
Some minerals have economical value (e.g. gold, cupper, nickel, diamond etc.). Understanding how those minerals form will help exploration geologists find them.



How to recognize minerals

The most common minerals properties used to identify hand specimen are the crystal form, color, streak, Luster, hardness, density and cleavage (fracture and parting).

1. Crystal form:
   Minerals are grouped into systems according to their crystal symmetry (regularity of form). The figure below shows the six main systems.



2. Color:
   Some minerals have more than one color for example; purple amethyst and yellow citrine are both varieties of quartz. In contrast, yellow is the only color of sulfur and is therefore a useful tool in identifying this mineral.

3. Streak:

The streak is the color of the powder made by crushing a mineral. For example, hematite could take different forms and color but its streak is always reddish brown.

4. Luster

It's the way light reflects off the surface of a mineral. For example, pyrite and many sulfides have a metallic luster because they reflect most of the light hitting their surfaces. Terms for luster are shown in red.

5. Hardness

We measure the hardness of a mineral by how easy we can scratch it using different tools like finger nails, piece of glass and piece of copper (usually a penny).

MINERALS	HARDNESS	COMMON TEST
Diamond	10	Scratches all common material
Corundum	9	Scratch a knife blade or window glass
Topaz	8	
Quartz	7	
Feldspar	6	
Apatite	5	Scratched by knife blade or window glass
Fluorite	4	
Calcite	3	Scratched by copper coin
Gypsum	2	Scratched by finger nails
Talc	1	

6. Density

The density is measure by comparing the weight of a sample with the weight of an equal volume of water. Density is one of the tools to help identify galena, which has a very high density (7.58 g/cc) and talc, which has a low density (2.7 g/cc).

http://www.mineralogicalassociation.ca/poster/index.php

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