Atoms, Elements, and Minerals

Atoms are composed of protons (+), neutrons, and electrons (-). A given element always has the same number of protons. An atom in which the positive and negative electric charges do not balance is an ion.

Ions or atoms bond together in very orderly, three-dimensional structures that are crystalline.

A crystalline substance is considered a mineral (in geologic terms) if it is naturally occurring and inorganic and has a definite chemical composition.

The three most abundant elements in the earth's crust are oxygen, silicon, and aluminum. Most minerals are silicates, with the silicon-oxygen tetrahedron as the basic building block.

Feldspars are the most common minerals in the earth's crust. The next most abundant minerals are quartz, the pyroxenes, the amphiboles, and the micas. All are silicates.

Minerals are usually identified by their **physical properties**. **Cleavage** is perhaps the most useful physical property for identification purposes. Other important physical properties are external **crystal form, fracture, hardness, luster, color, streak, and specific gravity / heft.**

The interaction between the internal and external forces of the earth is illustrated by the rock cycle, a conceptual device relating igneous, sedimentary, and metamorphic rocks to each other, to surficial processes such as weathering and erosion, and to internal processes such as tectonic forces. Changes take place when one or more processes force earth's material out of equilibrium.

Plummer's summaries are available on-line – see the link in my sources for more materials including interactive quizzes and a glossary. (VH)

cleavage- The ability of a mineral to break along preferred planes.

crystal form- Arrangement of various faces on a crystal in a definite geometric relationship to one another.

fracture- The way a substance breaks where not controlled by cleavage.

hardness- The relative ease or difficulty with which a smooth surface of a mineral can be scratched; commonly measured by Mohs' scale.

luster- The quality and intensity of light reflected from the surface of a mineral.

streak- Color of a pulverized substance; a useful property for mineral identification.

specific gravity- The ratio of the mass of a substance to the mass of an equal volume of water, determined at a specified temperature.

Color is likely to be the first physical property you notice about a mineral sample, but it may not help that much to identify a mineral. Many minerals can be the same color, but because of trace elements, different samples of the same mineral often have different colors.

Write the definitions of these terms:

Matter –
Atom –
Element –
Compound -
Crystal –

Crystaline solid –

Can you pronounce the most abundant elements in the Earth's crust correctly?

Oxygen, silicon, aluminum, iron, calcium, sodium, potassium, magnesium.

Pronounce some other elements:

Which elements have the stress (přízvuk) on the second syllable?

Fill in the gaps with a suitable expression:
Although account designated despite key resembles unlike whereas

Each element is _____ by its atomic number.
Oxygen and silicon _____ for almost seventy-five percent of elements in the earth's crust.
Magnesium _____ aluminum in many ways.
Iron is _____ aluminum. Iron is heavy, _____ aluminum is light.
_____ copper and aluminum are both good **conductors**, aluminum is used in aviation because it is far lighter.

_____ the great number of minerals and many differences among minerals, all minerals have four things **in common**. Each mineral is a mixture or a combination of certain _____ elements.

Explain the words in bold type:
Conductors = , in common =
Make these negative:

____*organic, color*___ , ____*regular,*

Compare:
*Heavy -*_____*, dense -* _____*, abundant -* _____
Light - _____*, dark -* _____*,*