SOIL 4120/5120 NOTES - Weathering of rocks and minerals – HOW IS SOIL MADE?

8 Most Common ELEMENTS in the Earth's crust

Element		Mass %	Volume %
		46.60	91.97
		27.72	0.80
		8.13	0.77
		5.00	0.68
		3.63	1.48
		2.83	1.60
		2.59	2.14
		2.09	0.56

Essential elements for PLANTS

First 4 are not from weathering →

Derived from weathering of rocks and minerals

C HOPKNS CaFe Mg B Mn CuZn Cl CoMo Ni

C Hopkins café managed by mine cousins Clyde, Como, and Nicky

So what are the minerals that provide these plant essential nutrients?

First of all – what is a MINERAL?

1)

2)

3)

4)

5)

6)

	Organic compounds	Inorganic compounds
C containing?		
Alive?		
Most distinguishing characteristic – bonds		

There are 2 types of minerals

Primary (1^o) –

Secondary (2^o) –

Common primary and secondary minerals on slide.

You don't need to memorize these chemical formulas but you do need to know what elements plants obtain from these minerals given the formula.

ROCKS → MINERALS → NUTRIENTS → LIFE

Rocks – most are consolidated assemblages of minerals.

3 categories based on mode of transportation.

1) **Igneous** – formed when molten material, magma, cools and solidifies.

   a) Intrusive –

   b) Extrusive –

   CHEMICAL DIFFERENCES

   Felsic –

   Mafic –

	FELSIC (Si and K rich)	MAFIC (Fe and Mg rich)
Intrusive (macroxyln.)		
Extrusive (microxyln.)		

2) **Sedimentary** – most abundant rocks on the Earth's surface
   a. Clastic –

      mud → **shale** sand → **sandstone** silt → **siltstone**

   b. Non-clastic –

      (organisms that generate non-clastic rocks include bacteria, algae, diatoms, corals, mollusks).

      Dolomite, limestone, gypsum, chert, coal.

Most sedimentary rocks are a combination of clastic and non-clastic.

3) **Metamorphic** –

WEATHERING … over time

Particle size

Specific surface area

Clay

Acidity , pH

Weathering: the physical and chemical alteration of rocks and minerals at the surface of the earth.

PHYSICAL WEATHERING – change in particle size with no change in chemistry.

1) Heating and cooling
2) Freeze and thaw
3) Friction and impact
4) Biological weathering

BIOGEOCHEMICAL WEATHERING – change in chemical composition

1) Carbonation
2) Hydrolysis
3) Hydration
4) Dissolution
5) Oxidation-Reduction
6) Biological