

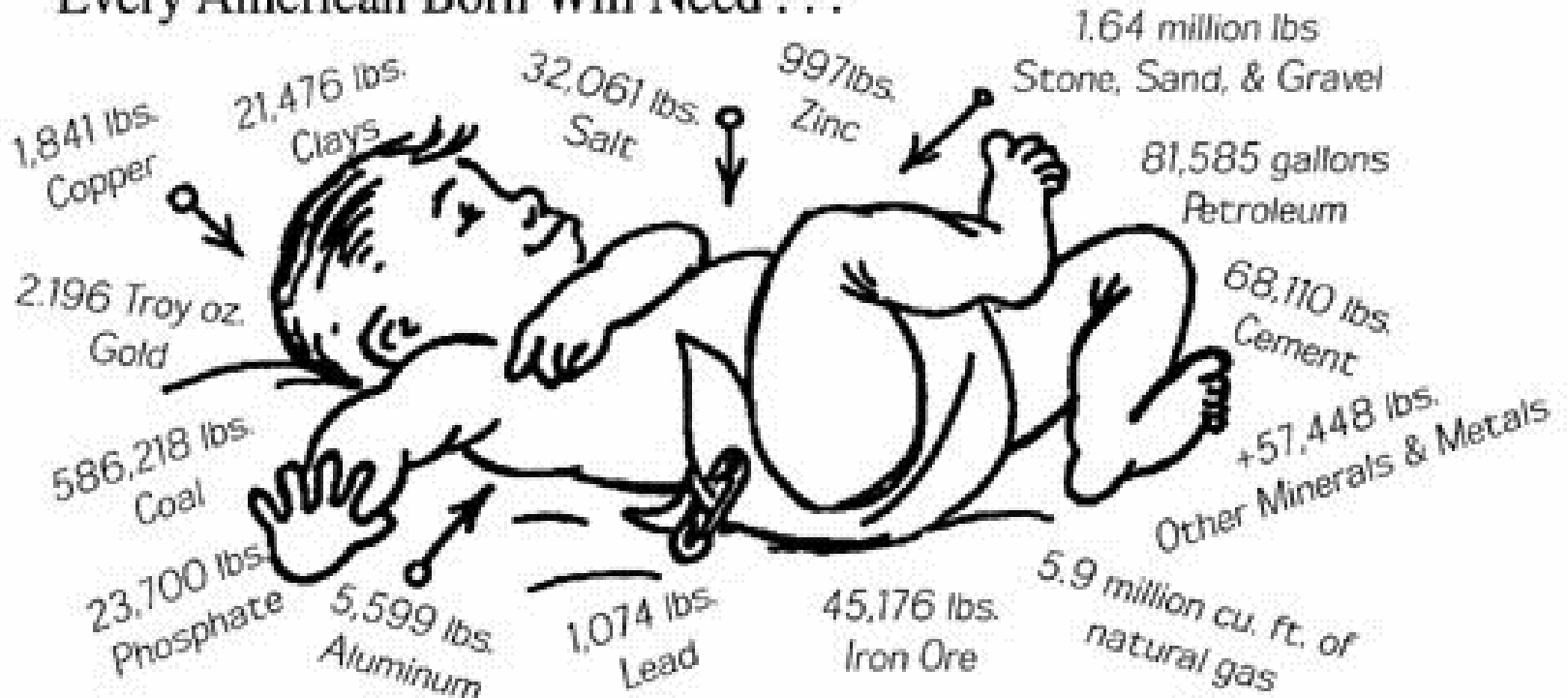
Minerals



- Natural
- Solid
- Inorganic
- Definite chemical composition
- Crystal structure due to internal arrangement of atoms

<http://www.minerals.net/gemstone/index.htm>

Every American Born Will Need . . .



3.7 million pounds of minerals, metals, and fuels in his/her lifetime

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<http://www.mii.org/www.mii.org>

General Facts about Minerals

- Between 2 - 3,000 have been identified
- A few are “native elements” -- made of only one element, such as sulfur, gold, copper, and graphite (carbon)
- Most are compounds, especially the silicate group (Si, O).
- Other important groups are oxides, carbonates, and sulfides.

Less than a dozen are common in most rocks

- Quartz
- Feldspar (group)
- Muscovite (white mica)
- Biotite (black mica)
- Calcite
- Pyroxene
- Olivine
- Amphibole (group)
- Magnetite, limonite, and other iron oxides
- Pyrite

Common uses include:

- Aluminum--packaging, transport, building
- Beryllium--gemstones, fluorescent lights
- Copper--electric cables, wires, switches
- Feldspar--glass and ceramics
- Iron--buildings, automobiles, magnets
- Calcite--toothpaste, construction
- <http://www.mii.org/commonminerals.php>

Minerals are identified by their key characteristics

- hardness
- crystal shape (form)
- luster
- color
- streak
- cleavage/fracture
- density (specific gravity)
- special properties
 - reaction to acid
 - fluorescence
 - salty taste
 - magnetism

Mineral Hardness



- Ability to scratch another mineral
- Mohs scale from 1 (talc) to 10 (diamond)
- Quartz (most common mineral and most dust particles) is 7

Crystal Shape (Form)

- External structure due to internal arrangement of the atoms
- Six basic groups of shapes, with about three dozen variations



<http://www.minerals.net/mineral/carbonat/aragonit/aragoni1.htm>

Luster



- Describes how light reflects off the surface
- Main categories are “metallic” and “non-metallic”
- Non-metallic includes “dull,” “glassy,” “waxy,” “pearly,” and others <http://www.minerals.net/mineral/sulfides/pyrite/pyrite2.htm>

<http://www.minerals.net/mineral/sulfides/pyrite/pyrite2.htm>

Color



- results from ability to absorb some wavelengths and reflect others
- some minerals have characteristic colors
- others vary due to chemical differences or impurities (atoms mixed inside the main elements)

Streak

- Color of the powder when rubbed on a “streak plate” (unglazed porcelain)
- May be same as hand-specimen or different
- Some paint is based on powdered minerals (streaks).



Mineral cleavage/fracture

- Some minerals split along flat surfaces when struck hard--this is called mineral cleavage
- Other minerals break unevenly along rough or curved surfaces--this is called fracture
- A few minerals have both cleavage and fracture

Density (Specific Gravity)

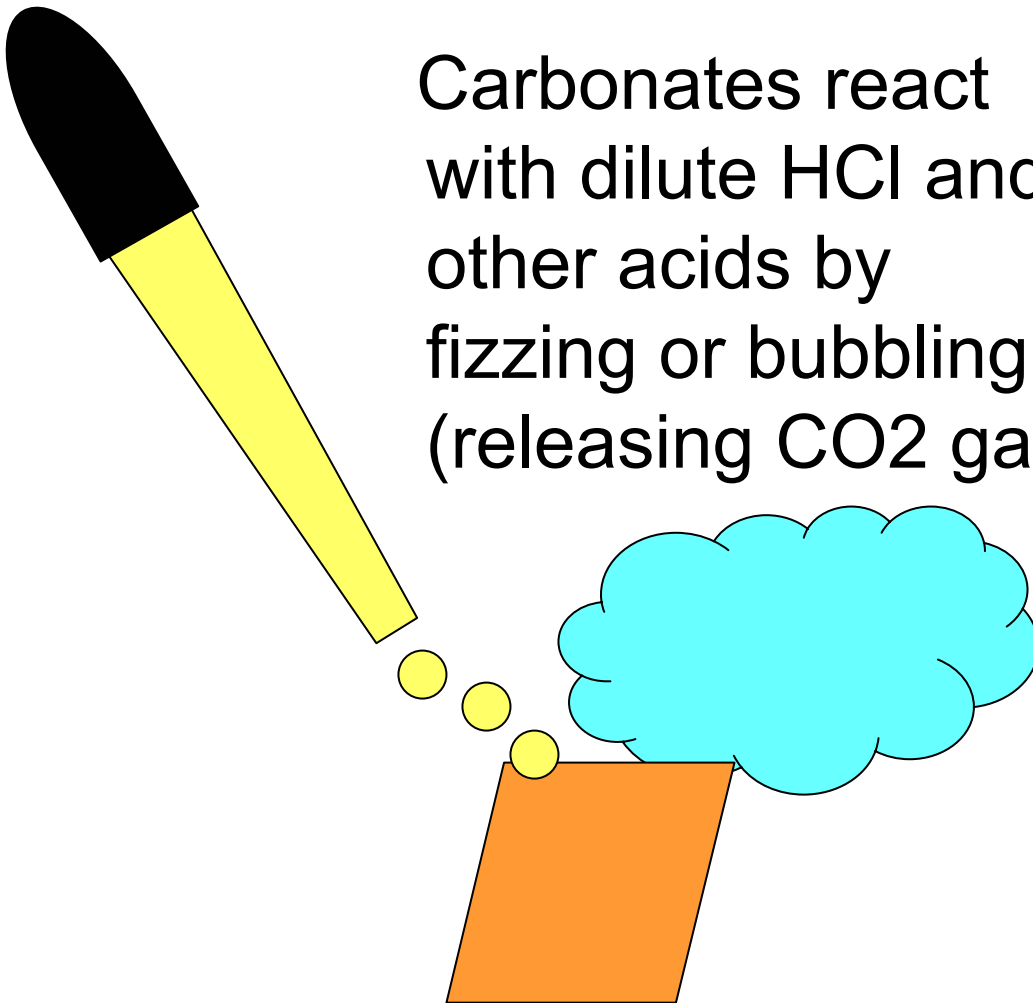
- All minerals have density (mass / volume), but some are very dense
- Examples include galena, magnetite, and gold
- Specific Gravity is the density of the mineral compared with density of water



<http://www.minerals.net/mineral/elements/gold/gold1.htm>

Special Characteristics-- the “Acid Test”

Carbonates react
with dilute HCl and
other acids by
fizzing or bubbling
(releasing CO₂ gas)



Special Characteristics-- Fluorescence



- Some minerals will glow when placed under short-wave or long-wave ultraviolet rays
- Franklin and Ogdensburg NJ are famous for their fluorescent minerals

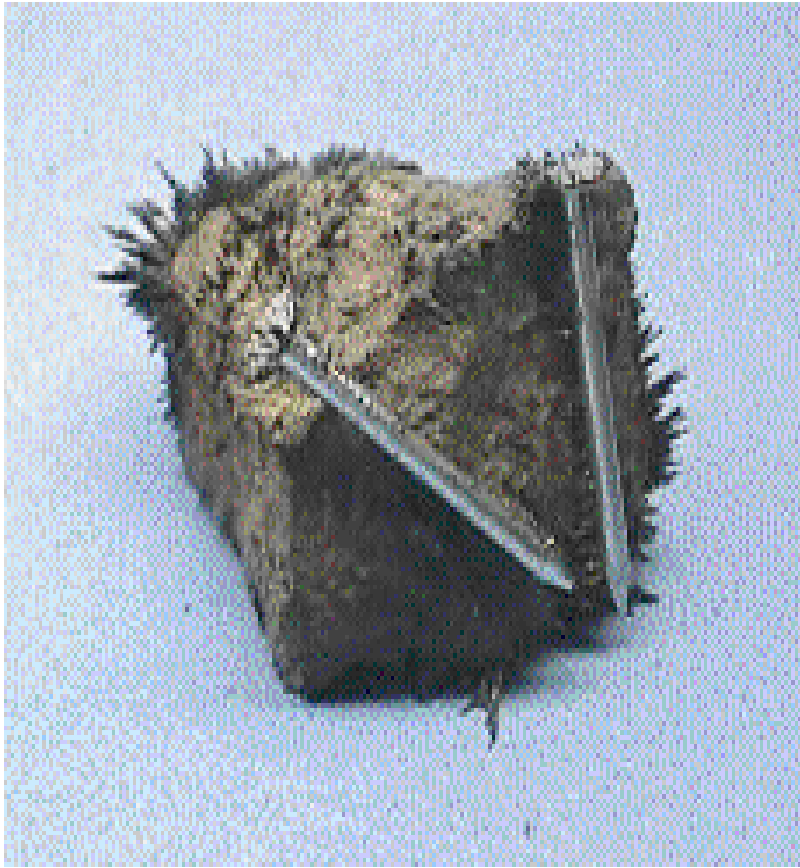
<http://www.sterlinghill.org/Tour%20information.htm>

Special Characteristics-- Salty Taste

- DO NOT TASTE MOST MINERALS!
- Halite is the exception--it will taste salty



Special Characteristics-- Magnetism



- Many iron minerals will produce an invisible magnetic force field
- “Lodestone” was used by Vikings more than 1,000 years ago as compasses

<http://www.minerals.net/mineral/oxides/magnetit/magneti4.htm>

Useful Web Sites

- www.mii.org
- www.mineral.galleries.com/minerals
- www.mineral.net
- www.usgs.gov