12-3 Solids

* We know solids have definite shape & volume
  - this is because they have more order and attraction between molecules than other states.

  - Also more dense than liquids & gases

Solids come in 4 main forms (ignoring atoms)

1. Network Solids
   - held together by covalent bonds (sharing e's)
   - very hard, high melting pts., poor conductors
   ex) diamonds & quartz

2. Ionic Solids
   - held together by charge (involving ions)
   - hard, but brittle, high melting pts, poor conductors
   ex) NaCl, KBr, $CaCO_3$

3. Molecular Solids
   - held together by covalent bonds
   - fairly soft, low to moderate M.P.'s, poor conductors
   ex) I_2, H_2O, CO_2, sugar

4. <u>Metallic Solids</u>

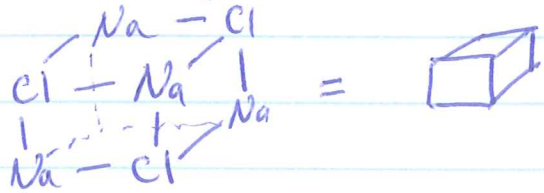
- held together by metallic bonds (involves the wide sharing of valence e's)
- soft to hard, low → high M.P.'s, malleable (can flatten) & ductile (can be pulled into wires) good conductors
ex) copper, gold, silver

Many of these solids are known as <u>crystalline solids</u> - which have very organized & geometric configurations that make up individual <u>unit cells</u>

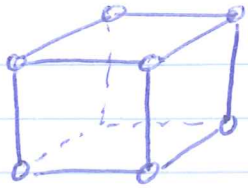
<u>Unit cells</u> are the simplest breakdown of a crystal - which still have the same chemistry as the entire structure. see pg 421 for examples

- atoms involved in crystalline solids meet and bond @ different angles & cause change to overall shape of crystals

ex) Halite crystal (NaCl)

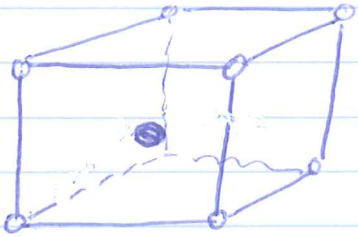


Simple Cubic

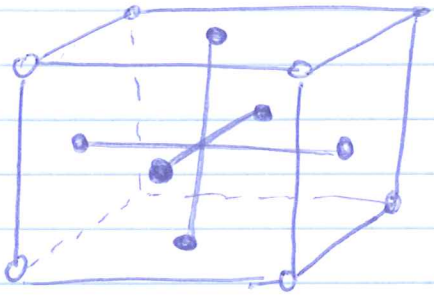


all 90° angles

Body Centered



Face-centered



Amorphous Solids

- cool too quickly for crystals to form
- no organized crystalline structure

ex) plastics, rubber, glass.