

Notes 01/28

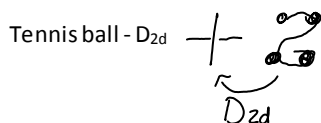
Monday, January 28, 2008

10:01 AM



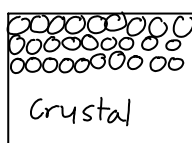
Notes 0128

Audio recording started: 10:01 AM Monday, January 28, 2008

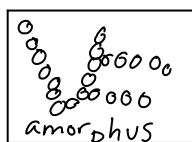


• Crystalline Solids

- Are very high symmetry
- Atoms are uniform throughout and will look the same in different places
- Ordered crystal:



ordered

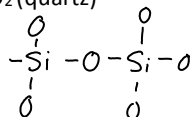


disordered

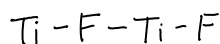
• Types of Crystalline Solids

1. **Extended covalent solid (network solid)** - atoms or molecules linked together by covalent bonds throughout the crystal

- Example: diamond C (C connected by strong C-C bonds)
- Example: graphite C (C connected by strong C=C bonds)
- Example: BN (B connected to N by strong B-N bonds)
- Example: Si
- Example: C_{60} (fullerene)
- Example: SiO_2 (quartz)



- Example: TiF_3

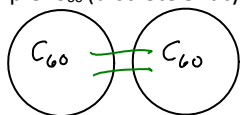


2. **Metallic Solid Metals or Combination of Metal (Alloys)**

- Example: Ti, Fe
- Example: FeCo

3. **Molecular Solid**

- Example: C_{60} (discrete entity)

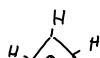


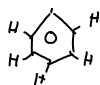
weak forces between molecules

- Example: H_2O - molecular solid
- Example: HF

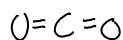


- C_6H_6





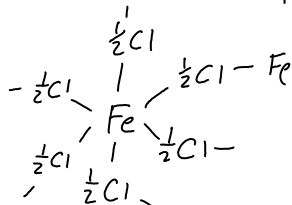
- CO_2



- B_6O

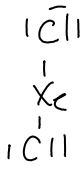
- What category does each fall into:

- FeCl_3 - not metallic solid because no metal, not covalent because 3 bonds is very low coordination number for a metal which is not preferred. It is molecular solid.

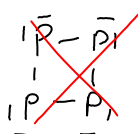


- XeCl_2 - molecular solid

molecular structure



- P_4

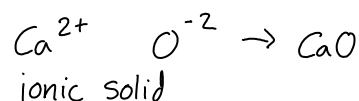


4. Ionic solids - 1st column or 2nd column with nonmetals (main group elements)

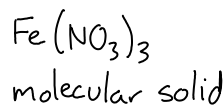
- Example: LiCl , NaBr , Ca_3N_2

- What formula is reasonable?

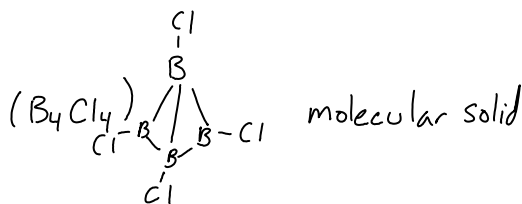
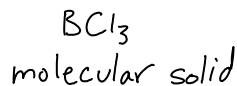
1. Ca O



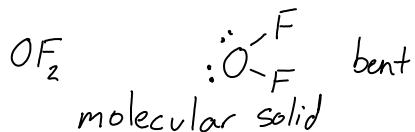
2. $\text{Fe}^{\text{III}} \text{NO}_3$



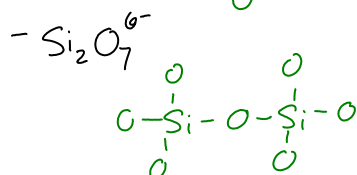
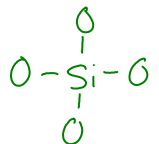
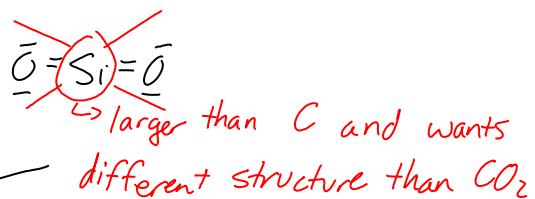
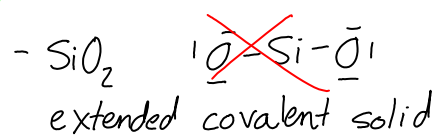
3. B Cl



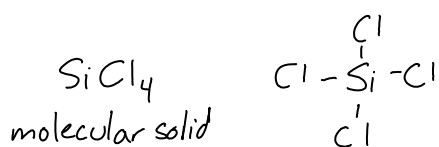
4. O F



4. Si O



5. Si Cl



Covalent Bonding



- Determine the nature of the atomic orbitals (valence orbitals)

