Molecular Architecture – Introduction

This package contains a tremendous amount of information about all attractive forces between atoms. This is the backbone of knowledge that leads to why matter appears and behaves the way it does. In other words, all physical properties such as melting point, boiling point, crystallinity, hardness, malleability, ductility, solubility, conductivity plus others.

Page #1: <u>**Classification of Matter According to Forces**</u>
- **Macromolecules**: occur whenever ionic or metallic bonds are present, or whenever covalent bonds link **"endlessly"** such as in diamond (a covalent network solid)
- **Discrete Covalent Molecules**: occur whenever a small and limited number of atoms are linked together by covalent bonds (for example all organic chemistry molecules)
- **Intramolecular Force**: occurs within a molecule (ionic, covalent or metallic bonding)
- **Intermolecular Force**: occurs between discrete covalent molecules only (van der Waals, dipole interactions, hydrogen bonding)

Page #2: <u>**Three Bond Types:**</u>
- Three different types of bonding: **ionic, covalent and metallic** (intramolecular forces).
- Ionic and metallic bonds **always** result in macromolecules.
- Covalent bonds can form either:
    - macromolecules (covalent network solid or network solid)
    - discrete covalent molecules (molecular solids, liquids and gases)

Page #3 and #4: <u>**Physical Properties of Ionic, Covalent Network and Metallic Solids**</u>
- **Ionic Solids**
- **Covalent Network Solids** (or just **"Network Solids"**)
- **Metallic Solids**
- does not apply to any small discrete covalent molecules such as the molecules studied in organic chemistry

Page #5: <u>**Physical Properties of Molecular Solids – Based on Intermolecular Forces**</u>
- **van der Waals**
- **Dipole Interactions**
- **Hydrogen Bonds**

Page #6: <u>**Chapter #4 Suggested Reading and Selected Questions**</u>

Page #7: <u>**Detailed Classification Scheme**</u>

Page #8: <u>**Types of Solids**</u>

Read all pages through and carefully. Additional reading: chapter 13 from the old text "Experimental Foundations" and do
#1 to 31 starting on page 351