

Chapter 10 Study Questions

- For each of the following pairs of substances, specify the type of interparticle bonding in each, and indicate which one has the higher boiling point:
a) NH_3 or PH_3 b) C_4H_{10} or C_6H_{14} c) CO_2 or H_2O d) HCl or LiCl e) Na or NaCl
- For each of the following types of solids, describe its structure and the nature of the forces holding it together, and give the formula of at least one example: (a) ionic; (b) covalent (molecular); (c) metallic; (d) network covalent
- List the substance types in (3) in order of increasing melting point.
- Which of the types of substances in (3) conduct electricity as solids? as liquids?
- Of the following substances: NaCl , diamond, Fe , F_2 , $\text{C}_3\text{H}_7\text{OH}$, which one
a) has the lowest boiling point? b) is held together by ionic bonds?
- Define boiling point, critical temperature, critical pressure, and triple point.
- Explain how each of the following affects the vapor pressure of a liquid: (a) surface area; (b) temperature; (c) intermolecular attractive forces; and (d) volume of liquid.
- What are the three types of intermolecular attractive forces and list them in order of increasing strength?
- The normal (1 atm) melting and boiling points of O_2 are -218°C and -183°C , respectively. Its triple point is at -219°C and 1.14×10^{-3} atm, and its critical point is at -119°C and 49.8 atm.
(a) Sketch the phase diagram for O_2 , showing the 4 points given above and indicating the area in which each phase is stable. (b) Which is denser, $\text{O}_2(s)$ or $\text{O}_2(l)$? Explain. (c) As it is heated, will solid O_2 sublime or melt at a pressure of 1 atm?
- The vapor pressure of solid iodine (I_2) at 30°C is 0.466 mm Hg. How many milligrams of iodine will sublime into an evacuated 1.00-liter flask?

Summary of Chapter 10: Liquids and Solids

Differences between gas, liquid, solid

sublimation

Relationship of interparticle forces and ΔH_{fus} , ΔH_{vap} , melting pt and boiling pt

vapor pressure

equilibrium vapor pressure of water as $f(T)$

relative humidity

dew point

boiling point

heating curve

critical temperature & pressure

phase diagrams

triple point

Intermolecular forces:

London dispersion forces, dipole forces, hydrogen bonds

Properties of the following types of solids (conductivity, melting points, solubility):

molecular, network covalent, ionic, metallic