

Chapter 10 Study Questions

1. 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) NH₃ or PH₃ b) C₄H₁₀ or C₆H₁₄ c) CO₂ or H₂O d) HCl or LiCl e) Na or NaCl
2. 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
3. List the substance types in (3) in order of increasing melting point.
4. Which of the types of substances in (3) conduct electricity as solids? as liquids?
5. Of the following substances: NaCl, diamond, Fe, F₂, C₃H₇OH, which one
a) has the lowest boiling point? b) is held together by ionic bonds?
6. Define boiling point, critical temperature, critical pressure, and triple point.
7. 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.
8. What are the three types of intermolecular attractive forces and list them in order of increasing strength?
9. The normal (1 atm) melting and boiling points of O₂ are -218°C and -183°C, respectively. Its triple point is at -219°C and 1.14 x 10⁻³ atm, and its critical point is at -119°C and 49.8 atm.
(a) Sketch the phase diagram for O₂, showing the 4 points given above and indicating the area in which each phase is stable. (b) Which is denser, O₂(s) or O₂(l)? Explain. (c) As it is heated, will solid O₂ sublime or melt at a pressure of 1 atm?
10. The vapor pressure of solid iodine (I₂) 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