

Problems - Chapter 12 (without solutions)

- 1) (7.23) Explain the term polarizability. What kind of molecules tend to have high polarizabilities? What is the relationship between polarizability and intermolecular forces?
- 2) (7.107) Which of the following substances has the highest polarizability: CH₄, H₂, CCl₄, SF₆, H₂S?
- 3) (7.34) Arrange the following in order of increasing boiling point: RbF, CO₂, CH₃OH, CH₃Br. Explain your reasoning.
- 4) (7.36) Which member of each of the following pairs of substances would you expect to have a higher boiling point? Explain your answers.
a) O₂ or Cl₂, b) SO₂ or CO₂, c) HF or HI
- 5) (7.38) Explain the following in terms of intermolecular forces.
a) NH₃ has a higher boiling point than CH₄
b) KCl has a higher melting point than I₂
- 6) (12.1) Explain why liquids, unlike gases, are nearly incompressible.
- 7) (12.12) The vapor pressure of benzene (C₆H₆) is 40.1 mm Hg at 7.6 °C. What is the vapor pressure at 60.6 °C? The molar heat of vaporization for benzene is 31.0 kJ/mol.
- 8) (12.16) Vapor pressure measurements for mercury at several different temperatures are given below. Plot this data in an appropriate way, and determine the molar enthalpy of vaporization for mercury.
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|-----------|-------|-------|-------|-------|-------|
| T (°C) | 200.0 | 250.0 | 300.0 | 320.0 | 340.0 |
| p (mm Hg) | 17.3 | 74.4 | 246.8 | 376.3 | 557.9 |
- 9) (12.18) What is an amorphous solid? How does it differ from a crystalline solid?
- 10) (12.50) How is the molar heat of sublimation related to the molar heat of fusion and the molar heat of vaporization? On what law is this relationship based?
- 11) (12.55) What is the critical temperature? What is the significance of the critical temperature in terms of the condensation of gases?
- 12) (12.64) Calculate the amount of heat (in kJ) required to convert 150.2 g of water into steam at T = 100. °C. Note that for water at 100.0 °C, $\Delta H^\circ_{\text{vap}} = 40.7 \text{ kJ/mol}$.