2 Explain the term “polarizability.” What kinds of molecules tend to have high polarizabilities? What is the relationship between polarizability and intermolecular forces?

7 The compounds Br₂ and ICl have the same number of electrons, yet Br₂ melts at –7.2°C and ICl melts at 27.2°C. Explain.

9 The binary hydrogen compounds of the Group 4A elements and their boiling points are CH₄, –162°C; SiH₄, –112°C; GeH₄, –88°C; and SnH₄, –52°C. Explain the increase in boiling points from CH₄ to SnH₄.

10 List the types of intermolecular forces that exist between molecules (or basic units) in each of the following species and explain each in terms of the polarity of the substance.
(a) Benzene (C₆H₆)
(b) Chloroform (CH₃Cl)
(c) Phosphorus trifluoride (PF₃)
(d) Sodium chloride (NaCl)
(e) Carbon disulfide (CS₂)
11 Ammonia is both a donor and an acceptor of hydrogen in hydrogen-bond formation. Draw a diagram showing the hydrogen bonding of an ammonia molecule with two other ammonia molecules.

12 Which of the following species are capable of hydrogen-bonding among themselves? (a) C₂H₆, (b) HI, (c) KF, (d) BeH₂, (e) CH₃COOH

13 Arrange the following in order of increasing boiling point: RbF, CO₂, CH₃OH, CH₃Br. Explain your arrangement in terms of polarity of the substance and intermolecular forces present.

15 Which member of each of the following pairs of substances would you expect to have a higher boiling point? Explain in terms of substance polarity and intermolecular forces.

(a) O₂ and Cl₂:

(b) SO₂ and CO₂:

(c) HF and HI:
17 Explain in terms of intermolecular forces why:
(a) $\text{NH}_3$ has a higher boiling point than $\text{CH}_4$

(b) $\text{KCl}$ has a higher melting point than $\text{I}_2$

18 Describe the attractive forces that must be overcome in order to perform the following processes:
(a) Melt ice

(b) Boil molecular bromine

(c) Melt solid iodine

(d) Dissociate $\text{F}_2$ into $\text{F}$ atoms

100 Which of the following substance has the highest polarizability? $\text{CH}_4$, $\text{H}_2$, $\text{CCl}_4$, $\text{SF}_6$, $\text{H}_2\text{S}$.

108 Are the following statements true or false? Explain if false.
(a) Dipole-Dipole interactions between molecules are greatest if the molecules possess only temporary dipole moments.

(b) All compounds containing hydrogen atoms can participate in hydrogen-bond formation.

(c) Dispersion forces exist between all atoms, molecules, and ions.

(d) The extent of ion-induced dipole interaction depends only on the charge on the ion.

115 The fluorides of the second-period elements and their melting points are: $\text{LiF}$, $845^\circ\text{C}$; $\text{BeF}_2$, $800^\circ\text{C}$; $\text{BF}_3$, $–126.7^\circ\text{C}$; $\text{CF}_4$, $–184^\circ\text{C}$; $\text{NF}_3$, $–206.6^\circ\text{C}$, $\text{OF}_2$, $–223.8^\circ\text{C}$; $\text{F}_2$, $–206.6^\circ\text{C}$. Classify the type(s) of intermolecular forces present in each compound.