IMF Practice

1992

Explain each of the following in terms of atomic and molecular structures and/or intermolecular forces.

(a) Solid K conducts an electric current, whereas solid KNO_3 does not.

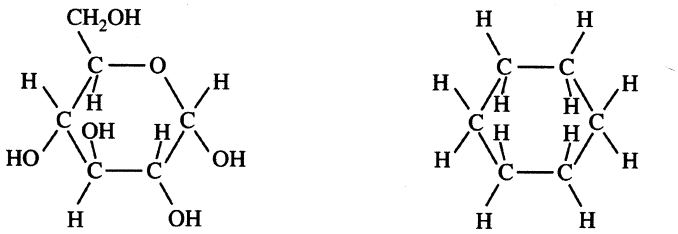
(b) $SbCl_3$ has measurable dipole moment, whereas $SbCl_5$ does not.

(c) The normal boiling point of CCl_4 is 77°C, whereas that of CBr_4 is 190°C.

(d) $NaI_{(s)}$ is very soluble in water, whereas $I_{2(s)}$ has a solubility of only 0.03 gram per 100 grams of water.

2006

(a) The structures for glucose, $C_6H_{12}O_6$, and cyclohexane, C_6H_{12}, are shown below.



Identify the type(s) of intermolecular attractive forces in

(i) pure glucose

(ii) pure cyclohexane

(b) Glucose is soluble in water but cyclohexane is not soluble in water. Explain.

(c) Consider the two processes represented below.

Process 1: $H_2O_{(l)} \rightarrow H_2O_{(g)}$ $\Delta H^\circ = +44.0$ kJ mol^{-1}

Process 2: $H_2O_{(l)} \rightarrow H_{2(g)} + \frac{1}{2} O_{2(g)}$ $\Delta H^\circ = +286$ kJ mol^{-1}

(i) For each of the two processes, identify the type(s) of intermolecular or intramolecular attractive forces that must be overcome for the process to occur.

(ii) Indicate whether you agree or disagree with the statement in the box below. Support your answer with a short explanation.

When water boils, H_2O molecules break apart to form hydrogen molecules and oxygen molecules.

2009

(d) Two types of intermolecular forces present in liquid H_2S are London (dispersion) forces and dipole-dipole forces.

(i) Compare the strength of the London (dispersion) forces in liquid H_2S to the strength of London (dispersion) forces in liquid H_2O, Explain.

(ii) Compare the strength of the dipole-dipole forces in liquid H_2S to the strength of dipole-dipole forces in liquid H_2O. Explain.