

2005

(7)  
(9)  
(10)



ii  $\text{NH}_3$  has a Higher Bpt due to a stronger IM Force!

(b) (i) Both  $\text{KCl}$  &  $\text{NaCl}$  have ionic Bonds

(ii)  $\text{NaCl}$  has a greater Lattice Energy ( $LE = k \frac{Q_1 Q_2}{d}$ ) due to  $\text{Na}^+$  &  $\text{Cl}^-$  being closer so more energy is required to overcome the Ionic Forces in  $\text{NaCl}$  more than  $\text{KCl}$

(c) (i) all have  $n=3$

(ii) Going From  $\text{Si} \rightarrow \text{Cl}$  the atom decreases in size & the effective nuclear charge increases therefore more energy is required to remove the outermost  $e^-$  so I.E. increases.

(d) (i) Cu

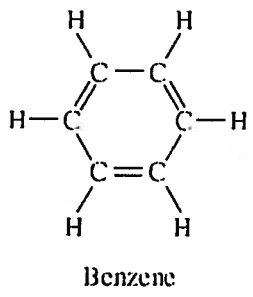
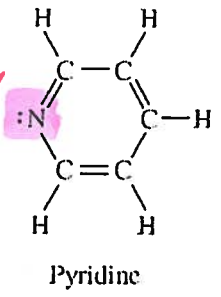
(ii) 62.93 is greater abundance given it is closer to the Average atomic mass of 63.55 amu!

6. Answer the following questions by using principles of molecular structure and intermolecular forces.

(a) Structures of the pyridine molecule and the benzene molecule are shown below. Pyridine is soluble in water, whereas benzene is not soluble in water. Account for the difference in solubility. You must discuss both of the substances in your answer.

Have Dipole Dipole IM force w/ H<sub>2</sub>O

This molecule is slightly polar + therefore soluble in H<sub>2</sub>O

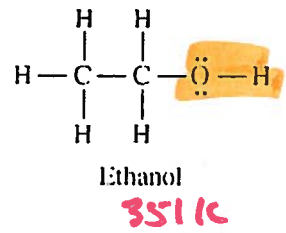
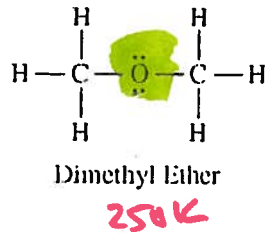


Benzene is Nonpolar and all LDF so insoluble in H<sub>2</sub>O

(b) Structures of the dimethyl ether molecule and the ethanol molecule are shown below. The normal boiling point of dimethyl ether is 250 K, whereas the normal boiling point of ethanol is 351 K. Account for the difference in boiling points. You must discuss both of the substances in your answer.

Dipole Dipole IM Force + LDF

This is a bent molecule + polar!



This molecule has LDF + H-bonding! So a stronger IM force + a higher bpt 😊

(c) SO<sub>2</sub> melts at 201 K, whereas SiO<sub>2</sub> melts at 1,883 K. Account for the difference in melting points. You must discuss both of the substances in your answer.

(d) The normal boiling point of Cl<sub>2</sub>(l) (238 K) is higher than the normal boiling point of HCl(l) (188 K). Account for the difference in normal boiling points based on the types of intermolecular forces in the substances. You must discuss both of the substances in your answer.

SO<sub>2</sub> is molecular and only has Dipole-Dipole IM Force, and LDF  
 However, SiO<sub>2</sub> has a very large mp due to it being a covalent network compound (like C<sub>8</sub> = diamond) linked by much stronger covalent bond!

Although Cl<sub>2</sub> has LDF + HCl is Dipole-Dipole (A stronger IM and LDF force) Cl<sub>2</sub> has a much <sup>24</sup> greater MM and many more e<sup>-</sup>'s so it is more polarizable and a stronger overall IM Force! ∴ therefore a higher bpt! 😊