

Chapter 11 Book Problems

- ① liquid, molecules are close together & touching but not in an orderly, repeating pattern
- ② a) H bond b) H-bond & ion-dipole are strongest
b) dispersion
c) ion-dipole
d) dipole-dipole
- ⑤ propanol boiling pt > ethyl methyl ether
H bond dipole-dipole
↑ stronger intermolecular force
- ⑥ a) standard pressure = 1 atm
b.p. = ~ 350 K
f.p. = ~ 250 K
b) i) gas
ii) ~~gas~~ solid
iii) liquid
c) ~ 0.45 atm & ~ 190 K
- ⑦ c) Nb & O are metal & nonmetal = ionic
- ⑧ a) solid, liquid, gas
b) gas, liquid, solid
c) gas
- ⑬ a) dispersion
b) dipole-dipole
c) H-bond

Ch. 11 continued...

- (15) a) dispersion
b) H bond, dipole-dipole, dispersion
c) dipole-dipole, dispersion
- (16) a) H bond
b) dispersion
c) dispersion
d) dipole-dipole
- (17) a) ease with which the charge distribution in a molecule can be distorted to create an instantaneous dipole.
b) Sb, its valence e^- are farthest from nucleus & least tightly held
c) $\text{CH}_4 < \text{SiH}_4 < \text{SiCl}_4 < \text{GeCl}_4 < \text{GeBr}_4$
 \uparrow molecular weight \uparrow valence e^- distance
 \uparrow polarizability
d) $\text{CH}_4 < \text{SiH}_4 < \text{SiCl}_4 < \text{GeCl}_4 < \text{GeBr}_4$
 \uparrow molecular weight \uparrow polarizability \uparrow boiling pt
- (18) a) True
b) False
c) false
d) True
- (19) a) H_2S
b) CO_2
c) GeH_4 } \uparrow molecular weight \uparrow dispersion forces
- (20) a) Br_2
b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{SH}$

- (23) a) N, O, F
b) CH_3NH_2 , CH_3OH

- (24) a) HF can H bond
b) CHBr_3 - stronger dispersion force
 \uparrow molecular weight
c) ICl - dipole-dipole

- (26) a) C_6H_{14} - dispersion
 C_8H_{18} - dispersion \leftarrow higher boiling pt
b) C_3H_8 - dispersion
 CH_3OCH_3 - dispersion, dipole-dipole \leftarrow higher boiling pt
c) HOOH - dispersion, dipole-dipole, H bond \leftarrow highest boiling pt
 HSSH - disp, dipole-dipole
d) NH_2NH_2 - disp, dip, dip, H-bond \leftarrow highest boiling pt
 CH_3CH_3 - disp.

- (29) a) \uparrow temp., \uparrow KE which helps breaks intermolecular attractive forces so viscosity & surface tension decreases
b) \uparrow surface tensions means molecules resist changes in motion which \uparrow viscosity

- (30) a) adhesion = intermolecular forces that bind object to surface
cohesion = intermolecular forces that bind similar molecules to each other
b) adhesion = water to paper towel
cohesion = water to water

- (31) a) CHBr_3 has greater dispersion force
b) $\uparrow T$, \downarrow viscosity more molecules have enough KE to overcome intermolecular forces
c) cohesion between H_2O molecules
d) adhesion between wax and oil

- (33) a) melting
b) evaporation/boiling
c) freezing
d) condensation

- (35) melting does not require the complete separation of molecules so the energy requirement to melt is lower than evaporating

- (43) a) no effect
b) no effect
c) decreases, fewer molecules have enough KE to break intermolecular forces
d) increases, \uparrow KE breaks intermolecular forces
e) decreases, attractive forces from dispersion increase w/ increases in molecular weight $D = \frac{m}{v}$

- (46) a) False smaller molecular weight \downarrow disp. force
b) True \uparrow disp force \uparrow boiling point
c) False
d) True \uparrow disp force \uparrow vapor pressure

- (51) a)  b) 

- (69) a) dispersion
b) no, covalent network solids have strong covalent bonds connecting the molecules together, Argon only has weak intermolecular forces holding the molecules together

- (70) a) covalent - network solid
b) molecular covalent compound

- (72) a) ionic
b) metallic
c) ionic
d) molecular
e) molecular
f) molecular

- (73) molecular solids have weak intermolecular forces holding the lattice together; Covalent-network solids, covalent bonds join atoms into extended networks. Melting or deforming covalent-network solids means breaking covalent bonds which requires greater energy & ↑ melting pts.

- (74) a) metallic
b) molecular
c) ionic
d) covalent-network
e) ionic

- (75) ionic

- (77) a) Xe, higher dispersion force
b) SiO_2 , covalent network solid
c) KBr, ionic
d) C_6Cl_6 , both disp but this is higher molecular weight

- (78) a) HF, H bonding
b) C - covalent network solid
c) KCl - ionic
d) MgF_2 - greater charge

Chapter 13 Book Answers

① ion-solvent interaction is greater for Li^+ . Smaller ion, greater force with polar molecule.

- ⑮
- a) dispersion
 - b) H bond
 - c) ion-dipole
 - d) dipole-dipole

- ⑳
- a) water - polar-polar attract
 - b) dioxane - polar-polar attract

- ㉑
- a) hexane = nonpolar
 CCl_4 is also nonpolar so it attracts
 - b) benzene = nonpolar-nonpolar attract