

Understanding concepts

1. Main factor of hardness of a solid is the strength & direction of bonds btw its entities

2. Main type of bonding in solids

<u>compound</u>	<u>type of solid</u>	<u>bonding</u>
a) SiO_2	covalent network	covalent
b) Na_2S	ionic crystal	ionic
c) CH_4	molecular crystal	LF
d) C	covalent network	covalent
e) Cr	metallic crystal	metallic
f) CaO	ionic crystal	ionic

3. Melting point is proportional to the attractive forces btw entities in a solid. Strong bonds will result in a high mp while weak bonds holding the particles in their lattice site will result in a low mp.

4. Metals are generally malleable, ductile and flexible bcz the bonds btw the atoms in metals are nondirectional (due to delocalized electrons) so changing the atom position does not "break" the bond.

5.

a)	Al (s)	malleable	ductile	conductor	<u>mp</u> low for metals	<u>type of solid</u> metallic
	$\text{Al}_2\text{O}_3(\text{s})$	brittle	nonductile	nonconductor	high	ionic

b)

	$\text{CO}_2(\text{s})$	<u>mp</u> low	non conductor	soft	<u>type of solid</u> molecular	<u>solubility</u> soluble
	SiC (s)	high	non conductor	hard	covalent network	insoluble.

7. $\text{NaBr (s)} \rightarrow$ ionic

$\text{V (s)} \rightarrow$ metallic

$\text{P}_2\text{O}_5(\text{s}) \rightarrow$ molecular

$\text{SiO}_2(\text{s}) \rightarrow$ covalent network

a) high mp conducts electricity $\rightarrow \text{V (s)}$

b) low mp, soft $\rightarrow \text{P}_2\text{O}_5(\text{s})$

c) high mp soluble $\rightarrow \text{NaBr (s)}$

d) very high mp, nonconductor $\rightarrow \text{SiO}_2(\text{s})$

Section 4.6

4.

CO_2 (dry ice)
molecular
LF hold particles in place

low mp.
soft

SiO_2 (quartz)
covalent network
covalent bonds hold atoms in place

high mp
hard
brittle

5. High density. bcc atoms are closely packed together in solid form, held together strongly by mobile valence e^- that are dispersed throughout a structure of the material

6. covalent network → covalent bonds
✓

ionic - metallic → held by ions

✓
molecular → intermolecular forces (LF, DD, HB)

7. Coat zipper is graphite which will act as lubricant
graphite molecules only weakly held together by LF
which slide past each other

9.

$XCl_2 \rightarrow$ high mp & bp

\rightarrow cannot be molecular / atomic

\rightarrow soluble in H_2O

\rightarrow ionic

} ionic bez high mp
and solubility in
 H_2O .

$YCl_2 \rightarrow$ low mp

\rightarrow cannot be metallic, ionic, or covalent network

bez they all have high mp

\rightarrow non soluble in H_2O

- not polar molecular

\rightarrow soluble in benzene

\rightarrow non polar

} like dissolves
like

} molecular
solid &
non polar
compound