

Non Sibi High School

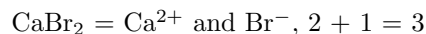
Andover's Chem 300: Accelerated/Honors Chemistry

Chapter 12, Review Quiz 1 Answers

1

Rank the compounds CaBr_2 , KI , MgS , and SiCl_4 from lowest to highest melting point.

SiCl_4 = molecular = lowest melting point because other three are ionic with the following sum of one cation's charge magnitude + one anion's charge magnitude:



highest sum = highest melting point, so $\text{SiCl}_4 < \text{KI} < \text{CaBr}_2 < \text{MgS}$

2

State whether each of the following is a good or poor conductor of electricity in the solid state:

- Na_2SO_4
- Xe
- SiC
- Zn

a. Na^+ and SO_4^{2-} = ionic = poor conductor in solid state because cations and anions are immobile (but good conductor in liquid or aqueous state because cations and anions are mobile)

b. nonmetal = molecular = poor conductor in solid state because electrons are localized (and also poor conductor in liquid state because electrons are localized)

c. network covalent with localized electrons = poor conductor in solid state

d. metallic = good conductor in solid state because electrons are delocalized (and also good conductor in liquid state because electrons are delocalized)

3

Rank the following from lowest to highest boiling point:

CH_3NH_2 , CO , H_2 , N_2 , SiO_2

SiO_2 = network covalent = highest boiling point because all others are molecular

CH_3NH_2 is capable of hydrogen bonding = second highest boiling point

CO = 14 total electrons, H_2 = 2 total electrons, N_2 = 14 total electrons

H_2 has fewest total electrons = weakest London forces = lowest boiling point

CO and N_2 have same total electrons = roughly equal London forces, but CO is polar with dipole-dipole forces whereas N_2 is nonpolar with no dipole-dipole forces = CO has third highest boiling point, so:

$\text{H}_2 < \text{N}_2 < \text{CO} < \text{CH}_3\text{NH}_2 < \text{SiO}_2$

4

Predict whether each solute below will dissolve to a greater extent in carbon tetrachloride or water:

- H_2O_2
- Br_2
- HCN
- NH_4NO_3

CCl_4 is nonpolar, whereas water is polar and is capable of hydrogen bonding.

a. H_2O_2 is capable of hydrogen bonding, so will dissolve to a greater extent in water, which can hydrogen bond as well.

b. The nonpolar Br_2 will dissolve to a greater extent in the nonpolar carbon tetrachloride.

c. The polar HCN will dissolve to a greater extent in the polar water.

d. $\text{NH}_4\text{NO}_3 = \text{NH}_4^+$ and NO_3^- = ionic, so will dissolve to a greater extent in the polar water (due to ion-dipole attraction).



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