Unit 6 Practice Problems (with answers at end)

> As lightning to the children eased
> With explanation kind,
> The truth must dazzle gradually
> Or every man be blind.
> --Emily Dickinson

VSEPR

1. Classify the following molecules or ions by VSEPR and draw the structure of each:

a. H_3O^+ b. BF_3 c. NH_2^- d. PF_6^- e. $XeOF_4$ (Xe is central) f. ICl_2^-

> Access to power must be confined to men who are not in love with it.--Plato

Hybridization

2. Draw the complete orbital diagram for normal and hybridized aluminum. What type of hybrid is this? What geometry would you expect for the compound $AlCl_3$?

> He that knows nothing doubts nothing.
> --G. Herbert

Dipoles

3. For each of the molecules or ions on the facing page, determine whether a net dipole exists.

Intermolecular forces

4. What types of intermolecular forces would you expect for each of the following:

a. CCl_4 b. OCS (carbon is central) c. NH_3 d. H_2

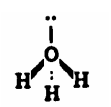
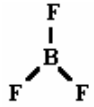
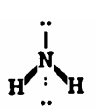
> The music is the shining path over which the poet travels to bring his song to the world.
> --Lotte Lehmann

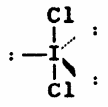
Phase Transformations and weak forces

5. What are the strongest attractive forces that must be overcome to:

a. melt Benzene, C_6H_6 (symmetrical ring of 6 carbons)
b. dissolve Br_2 in CCl_4
c. melt NaCl
d. boil SiH_4

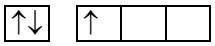
Answers:

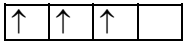




1. AB_3E AB_3 AB_2E_2 AB_6 AB_5E AB_2E_3

2.

Al [Ne]  **before hybridization**

Al* [Ne]  **after hybridization**

sp^2 hybrids have trigonal planar geometry

3. a. from H's to O b. none c. from H's to N d. none e. from Xe to O f. none

4. a. dispersion b. dipole-dipole, dispersion
c. hydrogen bonding, dipole-dipole, dispersion d. dispersion

5. a. dispersion b. dispersion c. ionic bonding d. dispersion