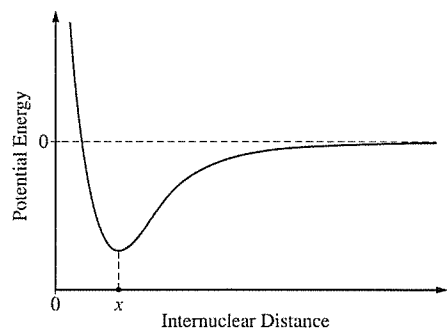


Ch. 8&9 Review

1. The lattice energy of a salt is related to the energy required to separate the ions. For which of the following pairs of ions is the energy that is required to separate the ions largest?

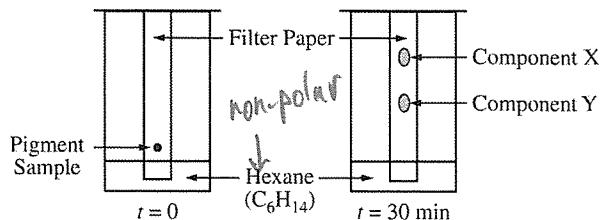
- (A) $\text{Na}^+(\text{g})$ and $\text{Cl}(\text{g})$
- (B) $\text{Cs}^+(\text{g})$ and $\text{Br}(\text{g})$
- (C) $\text{Mg}^{2+}(\text{g})$ and $\text{O}_2(\text{g})$
- (D) $\text{Ca}^{2+}(\text{g})$ and $\text{O}_2(\text{g})$

*larger charge
smaller radius*



2) The potential energy of a system of two atoms as a function of their internuclear distance is shown in the diagram above. Which of the following is true regarding the forces between the atoms when their internuclear distance is x ?

- (A) The attractive and repulsive forces are balanced, so the atoms will maintain an average internuclear distance x .
- (B) There is a net repulsive force pushing the atoms apart, so the atoms will move further apart.
- (C) There is a net attractive force pulling the atoms together, so the atoms will move closer together.
- (D) It cannot be determined whether the forces between atoms are balanced, attractive, or repulsive, because the diagram shows only the potential energy.



*X traveled farthest
must be more like solvent*

3) In a paper chromatography experiment, a sample of a pigment is separated into two components, X and Y, as shown in the figure above. The surface of the paper is moderately polar. What can be concluded about X and Y based on the experimental results?

- (A) X has a larger molar mass than Y does.
- (B) Y has a larger molar mass than X does.
- (C) X is more polar than Y.
- (D) Y is more polar than X.

Ion	Ionic Radius (pm)
Li^+	60
Na^+	95
Ca^{2+}	99
In^{3+}	81

4) Based on Coulomb's law and the information in the table above, which of the following cations is most likely to have the weakest interaction with a chloride (Cl^-) ion?

- (A) Li^+
- (B) Na^+
- (C) Ca^{2+}
- (D) In^{3+}

*weak attractive force
low charge
large radius*

$C-H = .4$
 $Si-Cl = 1.2$
 $S-F = 1.5$

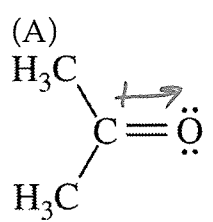
Element	Electronegativity
H	2.1
C	2.5
S	2.5
F	4.0
Cl	3.0
Si	1.8

Greater
 difference
 in Electronegativity
 greater
 polarity

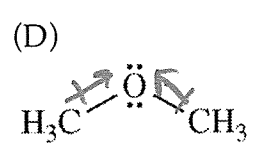
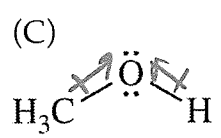
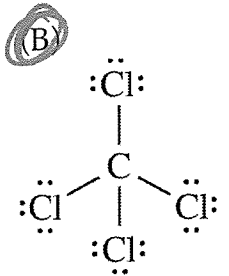
5) On the basis of the information above, which of the following arranges the binary compounds in order of increasing bond polarity?

- (A) $CH_4 < SiCl_4 < SF_4$
- (B) $CH_4 < SF_4 < SiCl_4$
- (C) $SF_4 < CH_4 < SiCl_4$
- (D) $SiCl_4 < SF_4 < CH_4$

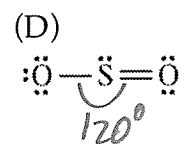
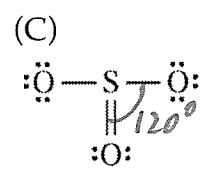
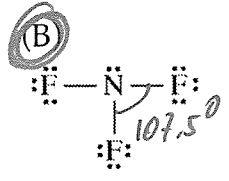
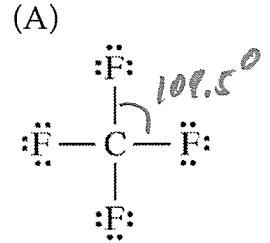
6) Which of the following molecules is least soluble in water?



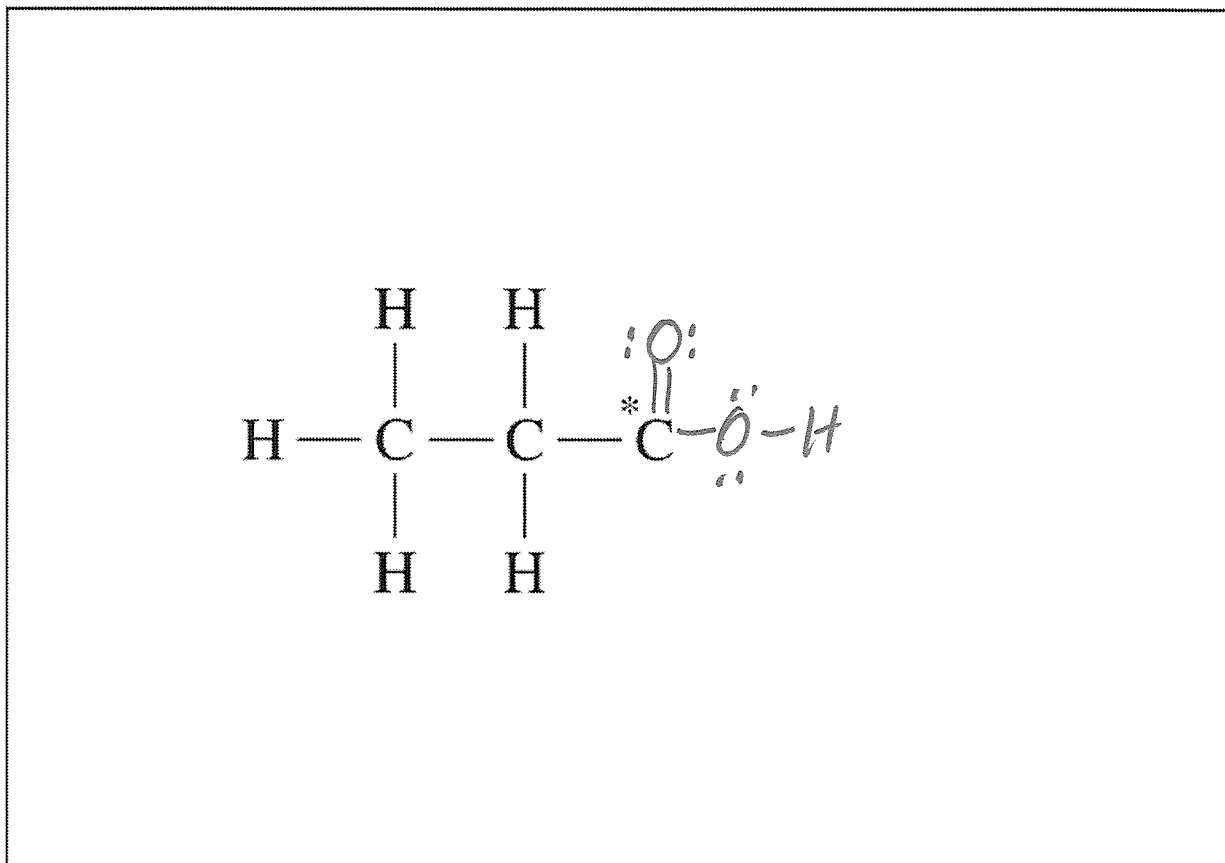
low solubility
 means different
 polarity
 water is polar
 low



7) Which of the following Lewis electron-dot diagrams represents the molecule that contains the smallest bond angle?



1) Propanoic acid, C_2H_5COOH , is an organic acid that is a liquid at room temperature.
(a) An incomplete Lewis diagram for the propanoic acid molecule is provided in the box below. Complete the diagram, showing how the remaining atoms in the molecule are arranged around the carbon atom marked with an asterisk (*). Your structure should minimize formal charge and include any lone pairs of electrons.



(b) Identify the hybridization of the carbon atom marked with the asterisk.

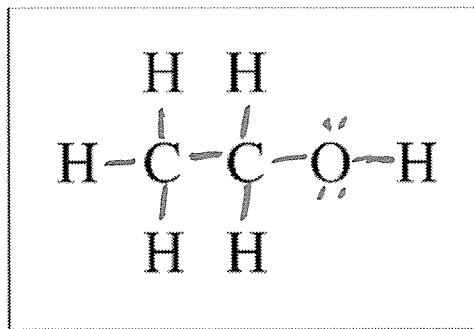
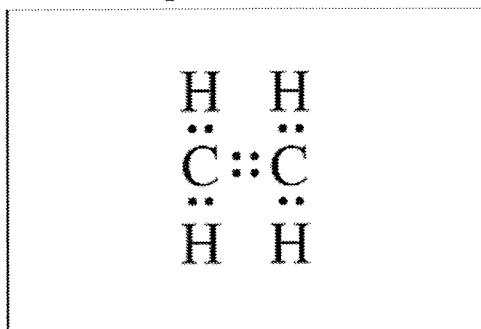
sp^2 (3 electron domains)

(c) Identify the geometry around the carbon atom marked with the asterisk.

trigonal planar

2) Ethene, $C_2H_4(g)$, may be prepared by the dehydration of ethanol, $C_2H_5OH(g)$, using a solid catalyst

a) The Lewis electron-dot diagram for C_2H_4 is shown below in the box on the left. In the box on the right, complete the Lewis electron-dot diagram for C_2H_5OH by drawing in all of the electron pairs.



b) What is the approximate value of the C-O-H bond angle in the ethanol molecule?

$\sim 104.5^\circ$ (2 lone pairs)

c) What is the approximate value of the H-C-C bond angle in the ethene molecule?

$\sim 120^\circ$

d) What is the molecular geometry around the oxygen in the ethanol molecule?

Bent

e) What is the hybridization of the valence orbitals in the oxygen atom of ethanol?

sp^3 (4 electron domains)