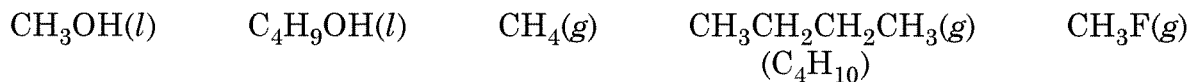


****KEEP YOUR WORK AND ANSWERS COVERED.****

1. (30 pts) Indicate whether each statement is true (T) or false (F). Be certain T or F is clearly indicated.

- T Condensation of a gas results in a decrease in entropy.
F For liquids, stronger intermolecular forces result in a greater EVP.
T Sulfur dichloride has a permanent dipole.
F Helium is softer than neon.
F In an fcc lattice, there are four face-center positions.
F Potassium ion has a stronger ion-dipole interaction with water than does sodium ion.
F For a molecular solid, $\Delta H_{\text{soln}}^{\circ} = \Delta H_{\text{latt}}^{\circ} + \Delta H_{\text{hydr}}^{\circ}$.
F Any substance which has a positive $\Delta H_{\text{soln}}^{\circ}$ cannot dissolve in water (to a significant extent).
F All hydrocarbon compounds have a positive $\Delta H_{\text{hydr}}^{\circ}$.
F The solubility of a gas increases as temperature increases.

- ** 2. (6 pts) Consider the following compounds for dissolving into water.



Which compound is most favored by entropy for dissolving into water?

CH_3OH

Which compound is most opposed by entropy for dissolving into water?

C_4H_{10}

- ** 3. (5 pts) You have a container of CO_2 and H_2O at equilibrium at $25\text{ }^{\circ}\text{C}$. The pressure of $\text{CO}_2(g)$ is 963 Torr and the gas volume is 8.40 L. The $\text{CO}_2(aq)$ solution volume is 11.6 L. Circle the mass (in g) of CO_2 dissolved in the solution. For CO_2 , $k_{\text{H}} = 0.034 \text{ M/atm}$.

11	14	18	<u>22</u>	25	28
30.	33	36	42	46	49

4. (5 pts) For an aqueous solution of 21.0 %m/m nitric acid, circle the molality of the acid.

3.01	3.62	3.73	<u>4.22</u>	4.68	4.95
5.08	5.23	5.65	6.17	6.39	6.70

5. (3 pts) What is the strongest intermolecular force in BrF_3 ?

dispersion

- (3 pts) Out of all phase changes for a pure substance, which one has the most positive ΔH° ?

sublimation

- (3 pts) Comparing HCl and HBr gases, which one has stronger dipole-dipole interactions (as pure compounds)?

HCl

- (3 pts) Comparing KNO_3 and CaCO_3 , which one has the more negative $\Delta H_{\text{hydr}}^\circ$?

CaCO_3

- ** 6. (5 pts) A 5-gallon container holds some $\text{H}_2\text{O}(l)$ and some $\text{H}_2\text{O}(g)$ at equilibrium at 25 °C. The gas volume is 18.9 L. Circle the number of grams of $\text{H}_2\text{O}(g)$ which are present.

0.121	0.167	0.219	0.248	0.332	0.387
<u>0.436</u>	0.451	0.549	0.577	0.618	0.674

7. (8 pts) List the primary intermolecular forces which are operating for each of the following (pure) compounds.

Cl_2SO_2 dispersion, dipole-dipole

GeF_4 dispersion

AsH_3 dispersion, dipole-dipole

last name: 319 -03 E×I

8. (6 pts) Consider the solid phases for each of the following.

CO ZnO SiO₂ KF PF₃

Which compound(s) form(s) a molecular solid?

CO, PF₃

Which compound(s) form(s) an ionic network solid?

ZnO, KF

** 9. (6 pts) Three of the following compounds are gases at 25 °C and 1 atm. Circle the three which are the gases.

Cl₄ PH₃ S₂Cl₂ (ClSSCl) H₂O₂ (HOOH) HCl CH₄

10. (6 pts) Using enthalpies of formation, calculate the following.

$\Delta H_{\text{hydr}}^{\circ}$ (in kJ) for hydrogen fluoride:

-47.53

$\Delta H_{\text{cond}}^{\circ}$ (in kJ) for hydrogen fluoride:

-27.23

** 11. (4 pts) Of the following, circle the one which is the most soluble in water (on a molar basis).

CH₃CO₂H(l) C₆H₆(l) N₂(g) PH₃(g) I₂(s)

12. (7 pts) For each compound below in water, list the primary intermolecular forces which are operating between the compound and the water.

HClO₂ (HOClO) dispersion, dipole-dipole, H-bonding

Br₂ dispersion, dipole-induced dipole