Chem 142
Exam 2a
21st February 2005

Name:_____

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Q1. Name the processes below: (12 pts.)

a) Solid → Gas

b) Liquid → Solid

c) Gas → Liquid

d) Gas → Solid

Q2. What is meant by ΔH_{vap} and ΔH_{fus}? Why is ΔH_{vap} usually larger than ΔH_{fus} for most substances? (10 pts.)

Q3. Give an example of each type of solid: (4 pts.)

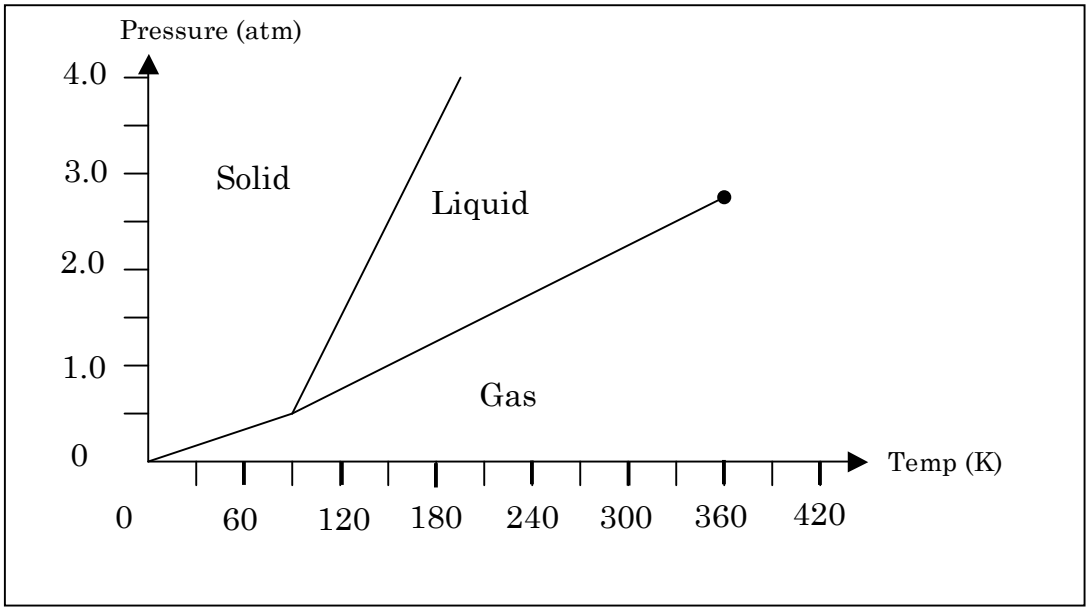
a) Molecular_____
b) Ionic_____
c) Metallic_____
d) Network covalent_____

Q4. Order the following compounds in terms of **increasing** melting point. Briefly explain the order you choose. (10 pts.)

$MgCl_2$, CH_3CH_2OH, CH_3OH, H_2, NaCl, CH_3Cl

Lowest mp **Highest mp**

Q5. Given the following phase diagram: (10 pts.)



a) What is the normal boiling point?

b) Where is the triple point?

c) Where is the critical point?

d) What is the melting point of the compound at a pressure of 2.0 atm?

e) How does the melting point depend upon pressure?

Q6. Which molecule will have the largest vapor pressure at a given temperature: CH_3NH_2 or CH_3CH_3? Explain your answer. (8 pts.)

Q7. Calculate the **molality** of a solution composed of 125 g of CH_3OH and 5.00 g of CH_3Cl. (10 pts.)

Q8. An *aqueous* solution of KBr is prepared that is 12.5 % KBr by weight. What is the KBr mole fraction of this solution? (10 pts.)

Q9. Calculate the freezing point of a solution consisting of 19.2 g of glucose, $C_6H_{12}O_6$ and 752 g of H_2O. K_f for water is 1.858 °C/m. (10 pts.)

Q10. The van't Hoff factor (i) for KNO_3 is significantly smaller than 2.00 at concentrations larger than 0.001 M. Explain why. (6 pts.)

Q11. 1.32 g of a polymer is dissolved in water, so that the final volume of solution is 1000. mL. The measured osmotic pressure of the polymer solution is 15.3 mmHg at a temperature of 22 °C. What is the molar mass of the polymer? (15 pts.)

$P_A = P_A^0 X_A$ $\quad \Delta P_A = P_A^0 X_B$ $\quad \Delta T_b = i k_b c_m$ $\quad S = k_H P$

$\Delta T_f = i k_f c_m$ $\quad \Pi = iMRT$

R = 0.08206 L.atm / (mol·K)
= 8.3145 J / (mol·K)
= 8.3145 kg·m^2 / (s^2·K·mol)
= 8.3145 kPa·dm^3 / (K·mol)
= 1.9872 cal / (mol·K)

1 atm = 760 mmHg = 101,325 Pa

Periodic Table of the Elements

1																	18
1 **H** 1.00794	2											13	14	15	16	17	2 **He** 4.002602
3 **Li** 6.941	4 **Be** 9.012182											5 **B** 10.811	6 **C** 12.0107	7 **N** 14.00674	8 **O** 15.9994	9 **F** 18.998403	10 **Ne** 20.1797
11 **Na** 22.989770	12 **Mg** 24.3050	3	4	5	6	7	8	9	10	11	12	13 **Al** 26.981538	14 **Si** 28.0855	15 **P** 30.973762	16 **S** 32.066	17 **Cl** 35.4527	18 **Ar** 39.948
19 **K** 39.0983	20 **Ca** 40.078	21 **Sc** 44.95591	22 **Ti** 47.867	23 **V** 50.9415	24 **Cr** 51.9961	25 **Mn** 54.938049	26 **Fe** 55.845	27 **Co** 58.9332	28 **Ni** 58.6934	29 **Cu** 63.546	30 **Zn** 65.39	31 **Ga** 69.723	32 **Ge** 72.61	33 **As** 74.92160	34 **Se** 78.96	35 **Br** 79.904	36 **Kr** 83.80
37 **Rb** 85.4678	38 **Sr** 87.62	39 **Y** 88.90585	40 **Zr** 91.224	41 **Nb** 92.90638	42 **Mo** 95.94	43 **Tc** [98]	44 **Ru** 101.07	45 **Rh** 102.9055	46 **Pd** 106.42	47 **Ag** 107.8682	48 **Cd** 112.411	49 **In** 114.818	50 **Sn** 118.71	51 **Sb** 121.76	52 **Te** 127.60	53 **I** 126.90447	54 **Xe** 131.29
55 **Cs** 132.90545	56 **Ba*** 137.327	71 **Lu** 174.967	72 **Hf** 178.49	73 **Ta** 180.9479	74 **W** 183.84	75 **Re** 186.207	76 **Os** 190.23	77 **Ir** 192.217	78 **Pt** 195.078	79 **Au** 196.96655	80 **Hg** 200.59	81 **Tl** 204.3833	82 **Pb** 207.2	83 **Bi** 208.98038	84 **Po** [210]	85 **At** [210]	86 **Rn** [222]
87 **Fr** [223]	88 **Ra**** [226]	103 **Lr** [262]	104 **Rf** [261]	105 **Db** [262]	106 **Sg** [266]	107 **Bh** [264]	108 **Hs** [265]	109 **Mt** [268]	110 [269]	111 [272]	112 [277]	113	114 [285]	115	116 [289]	117	118 [293]

*	57 **La** 138.9055	58 **Ce** 140.116	59 **Pr** 140.90765	60 **Nd** 144.24	61 **Pm** [145]	62 **Sm** 150.36	63 **Eu** 151.964	64 **Gd** 157.25	65 **Tb** 158.92534	66 **Dy** 162.50	67 **Ho** 164.93032	68 **Er** 167.26	69 **Tm** 168.93421	70 **Yb** 173.04
**	89 **Ac** [227]	90 **Th** 232.0381	91 **Pa** 231.03588	92 **U** 238.0289	93 **Np** [237]	94 **Pu** [244]	95 **Am** [243]	96 **Cm** [247]	97 **Bk** [247]	98 **Cf** [251]	99 **Es** [252]	100 **Fm** [257]	101 **Md** [258]	102 **No** [259]