Chem 51, Spring 2015 Name_____
Exam 8 (Chp 8) 120 pt

Use your Scantron to answer Questions 1-32. There is only one answer for each Question. Questions are 2 pt each.

CHP 8.1 Solutions are Mixtures

1. A saturated solution:
   A) contains as much solvent as it can hold
   B) contains no double bonds
   C) contains dissolved solute in equilibrium with undissolved solid
   D) will rapidly precipitate if a seed crystal is added.

2. Of the following, which can serve as the solvent in a solution?
   A) A liquid B) A solid C) A gas D) All of the above

3. Which of the following is considered a colloid?
   A) 0.9% NaCl B) mayonnaise C) vinegar (5% acetic acid) D) water E) 5% glucose

4. Which of the following statements best describes the phrase "like dissolves like"?
   A) The only true solutions are formed when water dissolves a polar solute.
   B) A solvent and a solute with similar intermolecular forces will easily make a solution.
   C) The only true solutions are formed when water dissolves a nonpolar solute.
   D) A solvent will dissolve a solute that has a similar mass.

CHP 8.2 Formation of Solutions

5. Which of the following would be most soluble in water?
   A) $CH_3(CH_2)_6CH_3$ B) $CH_3(CH_2)_6OH$ C) $CH_3(CH_2)_4OH$ D) $CH_3(CH_2)_3OH$ E) $CH_3(CH_2)_2OH$

6. Which of the following has the **LEAST** effect on the solubility of a **solid** in a liquid solvent?
   A) Temperature B) Pressure C) Polarity of the solvent D) Polarity of the solute

7. Identify the solute in a solution that is 1.4% NaCl in water.
   A) Na^+ B) Cl^- C) NaCl D) H_2O E) Both Na^+ and Cl^-

8. A saturated solution:
   A) contains as much solvent as it can hold
   B) contains no double bonds
   C) contains dissolved solute in equilibrium with undissolved solid
   D) will rapidly precipitate if a seed crystal is added.

9. Given that the solubility of sodium acetate (Molar mass = 82 g/mol) is 76 grams per 100 grams of water. Which of the following solutions would be unsaturated? *Hint: If needed, convert to g/100 g water to figure this out.*
   A) 90 g of sodium acetate dissolved in 100 g of water
   B) 450 g of sodium acetate dissolved in 500 g of water
   C) 240 g of sodium acetate dissolved in 300 g of water
   D) 100 g of sodium acetate dissolved in 200 g of water

(6 pt) Explain <u>what happens</u> to the amount of oxygen in the blood stream and <u>why this happens</u> when a person receives oxygen from a breathing device.

<u>24 pt</u> ***(Continue writing on the next page if needed.)***

CHP 8.3 Chemical Equations for Solution Formation

10. A water solution of acetic acid, vinegar, barely lights a light bulb (low conductivity). This means that vinegar is a(n):
A) weak electrolyte B) strong electrolyte C) non-electrolyte D) semi-electrolyte

11. Which of the following would make a non-electrolyte solution?
A) HCl(aq) B) $C_6H_{12}O_6$(aq) C) Na_2CO_3(aq) D) KCl(aq)

12. Which of the following would make a strong electrolyte solution?
A) 0.9% NaCl B) mayonnaise C) vinegar (5% acetic acid) D) water E) 5% glucose

13. Ammonia makes a weak electrolyte solution with water. The equation is $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$
The solution contains A) NH_3 B) H_2O C) NH_4^+ D) OH E) All of these

Match the numbers to the appropriate blanks in the sentences that ask for the number of ions in solutions of each ionic compound.

A) 1 B) 2 C) 3 D) 4

A magnesium bromide solution produces _____magnesium ion(s) and _____bromide ion(s) per mole of magnesium bromide. **Question 14** **Question 15**

$Al_2(CO_3)_3$ produces _____aluminum ion(s) and _____carbonate ion(s) per mole of $Al_2(CO_3)_3$
Question 16 **Question 17**

16 pt

Write the equation (*include the symbol for solid, liquid, gas or aqueous)* and draw a diagram showing hydration of the ions when solid $FeCl_3$ dissolves in water.

(2 pt) What is the name of the intermolecular attraction when this happens?

(6 pt)***Write the equation here:***

(10 pt) ***Draw the diagram here:***

CHP 8.4 Concentrations

(8 pt) Calculate the molarity of a solution prepared by dissolving 14.7 g of $Ca(NO_3)_2$ in enough water to make 750. mL of solution. *[$Ca(NO_3)_2$ molar mass = 164 g]*

What is the concentration in percent (m/v), ppm (m/v) and ppb (m/v) of a solution that contains 45 mg of lead in 1750 mL of solution?

(6 pt) **% calc:**

(6 pt) **ppm calc:**

(6 pt) **ppb calc:**

18. How many equivalents are there in a solution that contains 4.25 moles of K^{1+} ?

A) 4.25 Eq B) 8.50 Eq C) 2.13 Eq D) 1.00 Eq

19. The physicians order reads: Zantac 150 mg. The label reads: Zantac 100 mg / 5ml. How many mL should be given?

A) 7.5 mL B) 15 mL C) 12.5 mL D) 11.25

48 pt

A Ringer's solution for IV fluid replacement has a concentration of 155 mEq Cl^- per liter. If a patient receives 1250 mL of Ringer's how much Cl^- was given to the patient in

(8 pt) **equivalents**

(4 pt) **moles**

(4 pt) **grams**

CHP 8.5 Dilution ($C1V1=C2V2$ and $C_{final} = C_{initial}\, d^n$

20. If after 3 serial dilutions, where one mL is diluted to 10 mL each time, and the final concentration of the solution is 0.015 M, what was the original concentration?

A) 0.0050 M B) 15 M C) 0.045M D) 0.000015M

21. Calculate the volume (in mL) of a 2.75 M solution that must be used to make 1.25 L of a 0.150 M solution.

A) 0.0682 mL B) 68.2 mL C) 0.0330 mL D) 33.0 mL

22. What is the molarity of the solution obtained by diluting 125 mL of 2.50 M NaOH to 575 mL?

A) 0.272 M B) 0.543 M C) 1.84 M D) 11.5 M

22 pt

CHP 8.6 Osmosis and Diffusion

23. When it comes to osmosis through a membrane in an aqueous solution
    A) The hypotonic solution is the one which has a higher water concentration
    B) The isotonic solution is one where the solute concentration is greater.
    C) The hypertonic solution has the higher water concentration.
    D) The hypertonic solution has the lower solute concentration.

24. A raw egg without its shell is enclosed in a membrane. If the egg is then placed in pure water the egg expands. Which of the following statement correctly explains this observation?…
    A) The egg swelled in the water because the water was hypertonic to the egg.
    B) The egg expaned in the water because the egg was hypertonic to the water.
    C) The egg expanded because electrolytes flowed into the egg from the water.
    D) The egg was hypotonic to the water.
    E) The egg behaved just like a red blood cell in a dehydrated person.

25. Which of the following are isotonic to blood?
    A) 0.9% NaCl and 5% dextrose
    B) 0.9% dextrose and 5% NaCl
    C) 0.1% NaCl and 1% dextrose
    D) 1% NaCl and 10% dextrose
    E) 0.5% NaCl and 5% dextrose

26. An aqueous mixture containing starch (a colloid), NaCl, glucose, and albumin (a colloid) is placed in a dialyzing bag and immersed in distilled water. Which of the following correctly describes the location of the indicated substance after dialysis?
    A) albumin outside
    B) sodium chloride inside and outside.
    C) albumin inside and outside
    D) water inside only
    E) starch outside only

Use these to answer Questions 27 and 28 for a patient undergoing hemodialysis

. A) hypertonic B) hypotonic C) isotonic

27. As the blood leaves the patient, its solute concentrations are _____ to the dialyzing solution.

28. As the blood re-enters the patient, its solute concentrations are _____to the dialyzing solution.

CHP 8.7 Transport Across Cell Membranes

Identify which mechanism is involved in the passage of the following molecules or ions across a cell membrane:

A) passive diffusion; B) facilitated transport; C) active transport; D) endo or exocytosis

29. CO_2
30. cholesterol
31. Na^+ (no energy required)
32. Cl^- (energy required)

PERIODIC CHART OF THE ELEMENTS

1 H 1.00797																1 H 1.00797	2 He 4.0026
3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	*57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.980	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	‡89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 ? (271)	111 ? (272)	112 ? (277)						

*Lanthanide Series	58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.97
‡Actinide Series	90 Th 232.038	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (256)	103 Lr (257)

Electronegativity Chart of the Elements

	1A 1												3A 13	4A 14	5A 15	6A 16	8A 18
	H 2.1	2A 2 ← Current American Usage / IUPAC Notation →															H 2.1
	Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0
	Na 0.9	Mg 1.2	3B 3	4B 4	5B 5	6B 6	7B 7	← 8B 8	9	10 →	1B 11	2B 12	Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0
	K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8
	Rb 0.8	Sr 1.0	Y 1.3	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5
	Cs 0.7	Ba 0.9	La * 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Ti 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2
	Fr 0.7	Ra 0.9	Ac † 1.1	Rf	Db	Sg	Bh	Hs	Mt	‡	‡	‡					

* Lanthanide Series
† Actinide Series

‡ IUAPC has not yet named these elements.

Ce 1.1	Pr 1.1	Nd 1.2	Pm --	Sm 1.2	Eu --	Gd 1.1	Tb 1.2	Dy --	Ho 1.2	Er 1.2	Tm 1.2	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lw 1.3

USEFUL CONVERSION FACTORS AND RELATIONSHIPS

Length

SI unit: meter (m)

1 km = 0.62137 mi
1 mi = 5280 ft
= 1.6093 km
1 m = 1.0936 yd
1 in. = 2.54 cm (exactly)
1 cm = 0.39370 in.
1 Å = 10^{-10} m

Mass

SI unit: kilogram (kg)

1 kg = 2.2046 lb
1 lb = 453.59 g
= 16 oz
1 amu = 1.6605402 x 10^{-24} g

Temperature

SI unit: Kelvin (K)

0 K = −273.15°C
= −459.67°F
K = °C + 273.15
$°C = \frac{5}{9}$ (°F − 32°)
$°F = \frac{9}{5}$ °C + 32°

Energy (derived)

SI unit: Joule (J)

1 J = 1 kg-m^2/s^2
1 J = 0.2390 cal
= 1 C x 1 V
1 cal = 4.184 J
1 eV = 1.602×10^{-19} J

Pressure (derived)

SI unit: Pascal (Pa)

1 Pa = 1 N/m^2
= 1 kg/m-s^2
1 atm = 101,325 Pa
= 760 torr
= 14.70 lb/in^2
1 bar = 10^5 Pa

Volume (derived)

SI unit: cubic meter (m^3)

1 L = 10^{-3} m^3
= 1 dm^3
= 10^3 cm^3
= 1.0567 qt
1 gal = 4 qt
= 3.7854 L
1 cm^3 = 1 mL
1 in^3 = 16.4 cm^3

SCRATCH