Chem 51, Spring 2015
Exam 8 (Chp 8)

Name KEY

120 ~~115~~ pt
+4

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?
   A) 90 g of sodium acetate dissolved in 100 g of water 90/100
   B) 450 g of sodium acetate dissolved in 500 g of water 80/100
   C) 240 g of sodium acetate dissolved in 300 g of water
   D) 100 g of sodium acetate dissolved in 200 g of water 50/100

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

The amount of oxygen increases in the blood stream. This happens because gases are more soluble in liquids as the pressure of the gas over the liquid increases. When a person has a breathing

24 pt ***(Continue writing on the next page if needed.)***

device the pressure of oxygen is higher than normal so the concentration of oxygen in the blood stream becomes higher than normal.

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

$MgBr_2$

A magnesium bromide solution produces A (1) magnesium ion(s) and B (2) bromide ion(s) per mole of magnesium bromide.
Question 14 **Question 15**

$Al_2(CO_3)_3$ produces B (2) aluminum ion(s) and C (3) carbonate ion(s) per mole of $Al_2(CO_3)_3$
Question 16 **Question 17**

16 pt

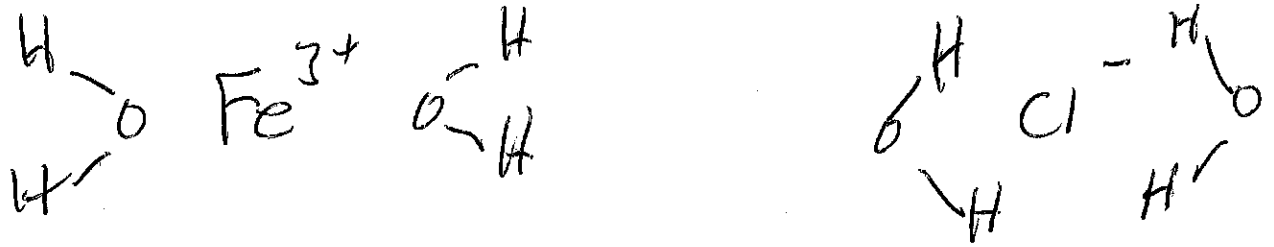
Write the equation *(include the symbol for solid, liquid, gas or aqueous)* and draw a diagram showing hydration of the ions when solid $FeCl_3$ dissolves in water.

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

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

$$FeCl_3(s) \xrightarrow{H_2O} Fe^{3+}(aq) + 3\,Cl^-(aq)$$

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



CHP 8.4 Concentrations

(7 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]*

8

$$14.7\,g \times \frac{1\,mol}{164\,g}\,Ca(NO_3)_2 \times \frac{1}{750\,mL} \times \frac{1000\,mL}{1\,L} = 0.12\,M \text{ or } 0.12\,\frac{mol}{L}$$

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

(5 pt) **% calc:**

$$\frac{45\,mg\,Pb}{1750\,mL} \times \frac{1\,g}{1000\,mg} \times 100 = 0.0026\,\%$$

(5 pt) **ppm calc:**

$$\frac{45\,mg\,Pb}{1750\,mL} \times \frac{1\,g}{1000\,mg} \times 10^6 = 26\,ppm$$

(5 pt) **ppb calc:**

$$\frac{45\,mg\,Pb}{1750\,mL} \times \frac{1\,g}{1000\,mg} \times 10^9 = 26{,}000\,ppb$$

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

$$?\,mL = 150\,mg \times \frac{5\,mL}{100\,mg} = 7.5\,mL$$

~~44~~ 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**

$$\frac{155\ mEq\ Cl^-}{1\ L} \times 1250\ mL \times \frac{1\ L}{1000\ mL} \times \frac{1\ Eq}{1000\ mEq} = 0.194\ Eq\ Cl^-$$

4

(5 pt) **moles**

$$0.194\ Eq\ Cl^- \times \frac{1\ mol\ Cl^-}{1\ Eq\ Cl^-} = 0.194\ mol\ Cl^-$$

4

(3 pt) **grams**

$$0.194\ mol\ Cl^- \times \frac{35.45\ g\ Cl^-}{1\ mol\ Cl^-} = 6.88\ g\ Cl^-$$

CHP 8.5 Dilution ($C_1V_1=C_2V_2$ 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

$$C_f = 0.015\ M = C_i \left(\frac{1}{10}\right)^3 = C_i \left(\frac{1}{1000}\right) = C_i (0.001)$$

$$C_i = \frac{0.015\ M}{0.001} = 15\ M$$

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

$$C_1V_1 = C_2V_2$$

$$1.25\ L \times 0.150\ M = 2.75\ M \times V_2$$

$$\frac{1.25 \times 0.150\ M}{2.75\ M} = V_2 = 0.0682\ L \times \frac{1000\ mL}{1\ L} = 68.2\ mL$$

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

$$125\ mL \times 2.50\ M = 575\ mL \times C_2$$

$$\frac{125\ mL \times 2.50\ M}{575\ mL} = C_2 = 0.543\ M$$

22 pt

HOLY

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. high solute / low water
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. wrong blood is hyper. cell is hypo it would deflate

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 NO. CAN'T PASS THROUGH MEMBRANE
B) sodium chloride inside and outside.
C) albumin inside and outside NO
D) water inside only ALB, STARCH INSIDE
E) starch outside only NO

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 A to the dialyzing solution.

28. As the blood re-enters the patient, its solute concentrations are C 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 A NON POLAR SMALL
30. cholesterol B LARGE
31. Na^+ (no energy required) B IONIC
32. Cl^- (energy required) C IONIC

18 pt

28

24

16

48

28

18

~~32~~ 128

8 bonus pt.