

Moorpark College Chemistry 11
Fall 2008

Instructor: Professor Torres

Examination #2: Section Two
October 6, 2008

Name: _____ (print)

Name: _____ (sign)

Directions: Make sure your examination contains ELEVEN total pages (including this cover sheet) when instructed to do so. Answer all the questions in the spaces provided. Be sure to show all your work for partial credit.

NEGATIVE ION	POSITIVE ION	SOLUBILITY*
Chloride (Cl ⁻), Bromide (Br ⁻), Iodide (I ⁻)	Ag ⁺ , Pb ²⁺ , Cu ⁺	Insoluble
Phosphate (PO ₄ ³⁻), Carbonate (CO ₃ ²⁻), Sulfite (SO ₃ ²⁻), Hydroxide (OH ⁻)	All positive ions EXCEPT alkali ions and NH ₄ ⁺	Insoluble
Sulfate (SO ₄ ²⁻)	Ca ²⁺ , Sr ²⁺ , Ba ²⁺ , Ra ²⁺ , Ag ⁺ , Pb ²⁺	Insoluble
Sulfide (S ²⁻)	All positive ions EXCEPT alkali ions, alkaline earth ions, NH ₄ ⁺	Insoluble

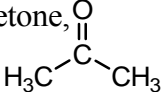
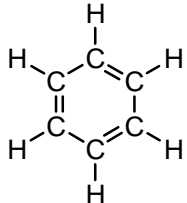
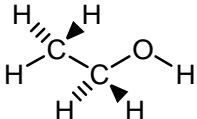
* NOTE: All nitrates, perchlorates, and acetates are soluble.

Li > K > Ca > Na > Mg > Al > Mn > Zn > Cr > Fe > Cd > Ni > Sn > Pb > H₂ > Cu > Ag > Au

Question	Points
1. – 25. (50 pts.)	
26. (8 pts.)	
27. (20 pts.)	
28. (16 pts.)	
29. (6 pts.)	
TOTAL (100 points)	

Chemistry 11 Fall 2008
Examination #2

For the first portion of this exam, select the best answer choice for the questions below and mark the answers on your scantron. Then answer the free response questions that follow (100 pts. total; multiple choice 2 pts. each).

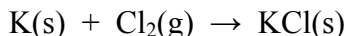
1. A sample of He(g) occupies 57.9 L at 300. K and 1.00 atm. Determine the volume (in mL) of this sample at 150. °C and 201 kPa. ($101.3 \text{ kPa} = 1 \text{ atm}$)
- A. 709 mL
B. 4.11×10^4 mL
C. 8.16×10^4 mL
D. 1.41×10^3 mL
E. 5.79×10^4 mL
2. Which of the following is expected to be *most* miscible in methanol (CH₃OH)?
- A. hexane, CH₃CH₂CH₂CH₂CH₂CH₃
B. acetone, 
- C. benzene, 
- D. ethyl alcohol, 
- E. bromoform, CHBr₃
3. How many liters of gas is 23.4 g of nitrogen at 750 mmHg and 28.0 °C?
- A. 586 L
B. 20.9 L
C. 0.771 L
D. 29.4 L
E. 1.94 L

4. A gasoline additive known as MTBE ($C_5H_{12}O$) is burned in air. When the equation is balanced using smallest whole numbers, determine the sum of the coefficients for the overall process.
- A. 39
 - B. 37
 - C. 29
 - D. 24
 - E. 20

For Questions 5 – 6, consider: A student requires 50.0 mL of 0.60 M $HClO_4(aq)$ for a particular experiment. She finds a bottle filled with very little concentrated 6.0 M $HClO_4$.

5. Determine the quantity of concentrated 6.0 M $HClO_4(aq)$ required for this dilution.
- A. 5.0 mL
 - B. 25.0 mL
 - C. 45.0 mL
 - D. 50.0 mL
 - E. 55.0 mL
6. How much water (in mL) must be added to make the desired amount?
- A. 5.0 mL
 - B. 25.0 mL
 - C. 45.0 mL
 - D. 50.0 mL
 - E. 55.0 mL
7. Which of the following compounds is a weak electrolyte?
- A. $HNO_3(aq)$
 - B. $HClO_3(aq)$
 - C. $Ba(OH)_2(aq)$
 - D. $Mg(OH)_2(aq)$
 - E. $HI(aq)$

For Questions 8 – 9, consider the reaction of 5.00 g of potassium with 7.00 g of chlorine to form potassium chloride according to the *unbalanced* reaction below:



8. Determine the mass of potassium chloride formed in this reaction.
- A. 12.0 g KCl
 - B. 14.7 g KCl
 - C. 9.53 g KCl
 - D. 7.36 g KCl
 - E. 4.77 g KCl
9. While in the laboratory, a student conducting this particular experiment mixes the prescribed masses of reactants and obtains 8.75 g of potassium chloride. Determine the percentage yield for this student's experiment.
- A. 72.9%
 - B. 59.5%
 - C. 91.8%
 - D. 109%; impurities are present in the final product
 - E. 119%; impurities are present in the final product
10. Which of the following is properly ranked in order of increasing melting point?
- A. diamond < SrBr₂ < Kr < C₆H₁₂O₆ (glucose)
 - B. Kr < diamond < SrBr₂ < C₆H₁₂O₆ (glucose)
 - C. Kr < C₆H₁₂O₆ (glucose) < SrBr₂ < diamond
 - D. Kr < SrBr₂ < C₆H₁₂O₆ (glucose) < diamond
 - E. SrBr₂ < Kr < C₆H₁₂O₆ (glucose) < diamond
11. Which of the following does NOT correctly characterize ideal gases?
- A. Gases are compressible.
 - B. Gases assume the shape/volume of their container.
 - C. Gases are in continuous, random motion.
 - D. The average kinetic energy of gas molecules does not change with time as long as temperature remains constant.
 - E. Gases exist ideally under conditions of low temperature and high pressure.

12. A solution contains 28% phosphoric acid by mass. This means that _____ .
- A. 1 mL of this solution contains 28 g of phosphoric acid
 - B. 1 L of this solution has a mass of 28 g
 - C. 100 g of this solution contains 28 g of phosphoric acid
 - D. 1 L of this solution contains 28 mL of phosphoric acid
 - E. the density of this solution is 2.8 g/mL
13. Determine the concentration of OH⁻ ions in a solution at 25 °C with pH = 4.28.
- A. 4.28
 - B. 9.72
 - C. 1.91×10^{-10}
 - D. 5.22×10^{-5}
 - E. 1.66×10^4
14. Arrange the following liquids in order of *decreasing* boiling point:
- | | |
|---|---|
| butane, C ₄ H ₁₀ ; | octane, C ₈ H ₁₈ ; |
| 2-octanone, CH ₃ CO(CH ₂) ₅ CH ₃ ; | octanol, CH ₃ (CH ₂) ₇ OH |
- A. butane > octane > 2-octanone > octanol
 - B. butane > 2-octanone > octane > octanol
 - C. octanol > butane > octane > 2-octanone
 - D. octanol > 2-octanone > octane > butane
 - E. octane > 2-octanone > butane > octanol
15. Of the following listed substances, which one ONLY has London dispersion forces as its intermolecular force?
- A. CH₃OH
 - B. NH₃
 - C. H₂S
 - D. Kr
 - E. HCl
16. How many grams of H₃PO₄ are in 175 mL of a 3.5 M solution of H₃PO₄?
- A. 0.61 g
 - B. 60. g
 - C. 20. g
 - D. 4.9 g
 - E. 6.1×10^2 g

17. Determine the total number of N atoms in 10. g of NH_4NO_3 .
- A. 1.0 atom N
 - B. 1.5×10^{23} atoms N
 - C. 3.0×10^{23} atoms N
 - D. 7.4×10^{22} atoms N
 - E. 2.0 atoms N
18. Consider two separate containers of liquid acetic acid (CH_3COOH) versus liquid bromine (Br_2). Based on your knowledge of intermolecular forces, which of the following statements is TRUE?
- A. Acetic acid possesses stronger intermolecular forces, lower surface tension, and a lower vapor pressure than liquid bromine.
 - B. Acetic acid possesses stronger intermolecular forces, lower surface tension, and a higher vapor pressure than liquid bromine.
 - C. Acetic acid possesses stronger intermolecular forces, higher surface tension, and a lower vapor pressure than liquid bromine.
 - D. Acetic acid possesses stronger intermolecular forces, higher surface tension, and a higher vapor pressure than liquid bromine.
 - E. None of the above
19. Determine the pH of an aqueous solution at 25 °C that contains $[\text{OH}^-] = 3.98 \times 10^{-9}$ M.
- A. 8.400
 - B. 5.600
 - C. 9.000
 - D. 3.980
 - E. 7.000
20. The label on a 750 mL bottle of wine states that its alcohol content is 12% (v/v). How much alcohol is present in the bottle?
- A. 6.3 mL
 - B. 9.0 mL
 - C. 90. mL
 - D. 120 mL
 - E. 180 mL

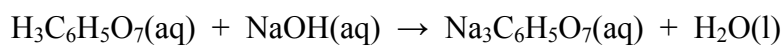
21. An intensive care patient requires 100. g of glucose over the course of 12 hours. How many liters of a 5% (w/v) glucose solution must be given?
- A. 1 L
 - B. 2 L
 - C. 5 L
 - D. 2000 L
 - E. 1000 L
22. Which of the following statements is INCORRECT?
- A. Blood pressure is measured at the brachial artery in the arm using a sphygmomanometer.
 - B. With each beat of the heart, blood is pushed into the arteries, causing a temporary increase in blood pressure called the systolic pressure.
 - C. The diastolic pressure is the lowest pressure reached when the heart prepares for another beat.
 - D. A patient with a blood pressure reading of $\frac{144}{91}$ is suffering from stage 2 hypertension.
 - E. A patient with a blood pressure reading of $\frac{116}{78}$ is healthy.
23. Which of the buffer systems below IS important for maintaining the pH of body fluids?
- A. $\text{HC}_2\text{H}_3\text{O}_2/\text{NaC}_2\text{H}_3\text{O}_2$
 - B. $\text{H}_3\text{PO}_4/\text{NaH}_2\text{PO}_4$
 - C. $\text{H}_2\text{CO}_3/\text{NaHCO}_3$
 - D. $\text{NaHCO}_3/\text{Na}_2\text{CO}_3$
 - E. None of the above
24. Determine the statement below that CORRECTLY describes the process of breathing.
- A. During inhalation, the rib cage relaxes, causing an increase in the volume of the thoracic cavity.
 - B. During inhalation, the diaphragm moves back up into the thoracic cavity to its resting position.
 - C. A pressure gradient is created during inhalation when the pressure inside the lungs increases and volume decreases.
 - D. The volume of the thoracic cavity decreases during expiration, which squeezes the lungs and decreases their volume.
 - E. All of the above are incorrect.

25. Which of the following species is predicted to be the most volatile?

- A. CBr₄
- B. CCl₄
- C. CF₄
- D. CH₄
- E. C₆H₆ (benzene)

END OF MULTIPLE CHOICE

26. (8 pts.) Consider the *unbalanced* molecular equation in which citric acid (H₃C₆H₅O₇) is reacted with sodium hydroxide:



If 62.7 mL of 1.20 M NaOH(aq) is titrated with 32.0 mL of H₃C₆H₅O₇(aq), what is the molarity of H₃C₆H₅O₇(aq)?

27. (20 pts. total; 5 pts. each) Write BALANCED equations (net ionic where appropriate) for each laboratory situation. *Assume that solutions are aqueous unless otherwise indicated.* Write NR if no reaction occurs.

A. Calcium acetate is mixed with rubidium sulfate.

B. Iron pellets are reacted with hydroiodic acid (HI).

C. Perchloric acid (HClO_4) is reacted with potassium hydroxide.

D. Zinc solid is added to magnesium nitrate.

28. (16 pts. total; 4 pts. each) Briefly define/explain each of the following terms:

A. dynamic equilibrium

B. polarizability

C. nonelectrolyte

D. buffer solution

29. (6 pts.) **LAST APPLICATION!** Determine the thickness (in mm) of a sheet with dimensions 75.0 cm x 35.0 cm formed by 7.88×10^{23} atoms of lead. The density of lead is 11.35 g/cm^3 .