

Name _____

Chemistry 11100

Section _____

EXAM II

Total Points = 150

TA _____

Monday, 6:30 PM

October 15, 2012

Directions:

1. Each student is responsible for following directions. Read this page carefully.
2. Write your name and other requested information on this page and on the separate answer sheet.
3. CODE your name on the answer sheet using an ordinary (#2) pencil.
4. CODE your correct *10-digit* identification number (PUID) on the answer sheet. THIS IS VERY IMPORTANT!
5. CODE your section number on the answer sheet. Please use all four digits, 0034, 0035, 0036, etc. This is also very important!
6. CODE the test number shown in the upper right-hand corner on the answer sheet in the block labeled "Test/Quiz Number". This is Test 55.
7. Put all calculations on the examination pages. DO NOT PUT ANY EXTRA MARKS ON THE COMPUTER ANSWER SHEET!
8. This exam consists of 24 multiple-choice questions worth 6.25 points each. Choose the one best or correct answer for each question and write it both on your exam paper and on the computer answer sheet. The computer answer sheet is the only one that will be graded!
9. This exam consists of 7 pages plus a page of Useful Information, a Periodic Table and a sheet of scratch paper. Please check to be sure that you have them all!

END OF EXAM

- 1) Please make sure that you have entered 24 answers on your scan sheet.
- 2) Make sure that you have entered your name, ID number, and lab section number (4 digits).
- 3) You MUST turn the scan sheet in to your TA before leaving the exam!

KEEP YOUR ANSWERS AND WORK COVERED TO PROTECT
THE INTEGRITY OF YOUR WORK!!

- _____ 1. What is the formula for phosphoric acid?
- (a) H_2PO_4
 - (b) H_2PO_3
 - (c) H_3PO_4
 - (d) H_3PO_3
 - (e) H_4PO_4
- _____ 2. Calculate the molar mass of $\text{C}_9\text{H}_{13}\text{NO}_2$ (phenylephrine), a decongestant in Sudafed PE™.
- (a) 157.17 g/mol
 - (b) 167.26 g/mol
 - (c) 176.18 g/mol
 - (d) 181.27 g/mol
 - (e) 302.41 g/mol
- _____ 3. Household sugar, sucrose, has the molecular formula $\text{C}_{12}\text{H}_{22}\text{O}_{11}$. What is the percent of carbon in sucrose, by mass?
- (a) 26.7%
 - (b) 33.3%
 - (c) 41.4%
 - (d) 42.1%
 - (e) 52.8%
- _____ 4. Choose the correct formula/name pair.
- (a) MgCO_3 manganese carbonate
 - (b) $\text{Ca}(\text{NO}_3)_2$ calcium nitrite
 - (c) NaNO_3 sodium nitrate
 - (d) NO_2 nitrogen oxide
 - (e) HBr hydrogen monobromide
- _____ 5. The name for FeSO_4 is _____ and the charge on the iron ion in this compound is _____.
- (a) iron sulfate; +4
 - (b) iron sulfate; +2
 - (c) iron(II) sulfate; +2
 - (d) iron(I) sulfate; +1
 - (e) iron(III) sulfate; +3

- _____ 6. What is the mass in grams of 0.250 mol calcium carbonate, CaCO_3 ? (Molar mass = 100.09 g/mol.)
- (a) 4.00×10^2 g
 - (b) 25.0 g
 - (c) 17.0 g
 - (d) 4.00×10^{-2} g
 - (e) 2.50×10^{-3} g
- _____ 7. Calculate the number of oxygen atoms in 29.34 g of sodium sulfate, Na_2SO_4 . (Molar mass = 142.04 g/mol).
- (a) 1.244×10^{23} O atoms
 - (b) 4.976×10^{23} O atoms
 - (c) 2.409×10^{24} O atoms
 - (d) 2.915×10^{24} O atoms
 - (e) 1.166×10^{25} O atoms
- _____ 8. What is the formula for diphosphorous pentaoxide?
- (a) PO_5
 - (b) K_2O_5
 - (c) P_2O_6
 - (d) P_2O_4
 - (e) P_2O_5
- _____ 9. _____ ion is an example of a polyatomic cation.
- (a) Hydroxide
 - (b) Calcium
 - (c) Hydrogen carbonate (bicarbonate)
 - (d) Ammonium
 - (e) Potassium

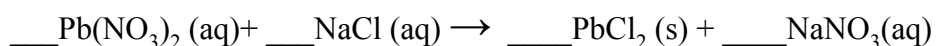
- _____ 10. Calculate the number of moles in 17.8 g of magnesium hydroxide, $\text{Mg}(\text{OH})_2$.
(Molar mass = 58.34 g/mol)
- (a) 3.28 mol
 - (b) 2.32 mol
 - (c) 0.431 mol
 - (d) 0.305 mol
 - (e) 0.200 mol
- _____ 11. What is the mass in grams of 1.12×10^{16} molecules of the pain reliever ibuprofen ($\text{C}_{13}\text{H}_{18}\text{O}_2$, molar mass = 206.3 g/mol)?
- (a) 9.02×10^{-11} g
 - (b) 1.86×10^{-8} g
 - (c) 3.84×10^{-6} g
 - (d) 5.43×10^{13} g
 - (e) 2.31×10^{18} g
- _____ 12. A compound has the empirical formula NO_2 . If its molar mass is approximately 92 g/mol, then what is its molecular formula?
- (a) NO_2
 - (b) N_2O_4
 - (c) N_2O_5
 - (d) NO_3
 - (e) N_3O_6
- _____ 13. Which of the following compounds of nitrogen and oxygen have identical empirical formulas: N_2O , NO , NO_2 , N_2O_3 , N_2O_4 , N_2O_5
- (a) All of them have identical empirical formulas
 - (b) None of them have identical empirical formulas
 - (c) N_2O and NO_2
 - (d) NO_2 and N_2O_4
 - (e) N_2O_3 , N_2O_4 , and N_2O_5

- _____ 14. Molarity is defined as
- (a) moles of solute per liter of solution.
 - (b) moles of solute per liter of solvent.
 - (c) moles of solvent per liter of solute.
 - (d) moles of solvent per liter of solvent.
 - (e) grams of solute per liter of solution.
- _____ 15. What is the molarity of a solution containing 8.0 g of NaOH in 400. mL of NaOH solution? (NaOH = 40.00 g/mol)
- (a) 20.0 M
 - (b) 4.6 M
 - (c) 4.55 M
 - (d) 0.500 M
 - (e) 0.020 M
- _____ 16. Calculate the concentration of a solution prepared by diluting 4.50 mL of an 8.50 M KOH solution to 75.0 mL.
- (a) 0.0600 M
 - (b) 0.481 M
 - (c) 0.510 M
 - (d) 39.7 M
 - (e) 142 M
- _____ 17. In the isolation of fat from chips and oreo cookie lab, how was the solution containing the fat separated from the food (potato chip or oreo cookie)?
- (a) By filtering it.
 - (b) By heating it.
 - (c) By allowing it to sit on the bench top and the fat floated to the top.
 - (d) By adding water.
 - (e) By mashing it.
- _____ 18. The maximum safe level of glyphosate (a pesticide) is 700 $\mu\text{g}/\text{kg}$. Convert this value to ppm.
- (a) 7.00×10^{-7} ppm
 - (b) 0.700 ppm
 - (c) 700 ppm
 - (d) 7.00×10^6 ppm
 - (e) 7.00×10^8 ppm

_____ 19. How many grams of NaOH are required to prepare 500.0 mL of a 0.200 M NaOH solution?
(NaOH = 40.00 g/mol)

- (a) 1.00 g
- (b) 4.00 g
- (c) 16.0 g
- (d) 1.00×10^2 g
- (e) 2.00×10^2 g

_____ 20. Balance the following chemical equation. What is the coefficient in front of NaNO₃?



- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) 5

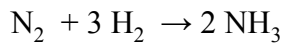
_____ 21. In the density lab you weighed substances and found their volumes then used this data to determine their densities. Imagine you are in lab and have a sample that has a mass of 23.52 g. You place it in a graduated cylinder and the water level rises from 37.5 mL to 42.2 mL. What is the density of the solid?

- (a) 0.200 g/mL
- (b) 0.557 g/mL
- (c) 0.627 g/mL
- (d) 5.00 g/mL
- (e) 111 g/mL

_____ 22. Based upon the laboratory data you collected and analyzed in the Electrolytes and Non-Electrolytes lab, which 0.02M solution below is a *weak electrolyte*?

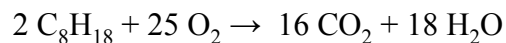
- (a) HNO₃
- (b) KOH
- (c) Acetic acid, CH₃COOH
- (d) HCl
- (e) NaOH

_____ 23. In the chemical equation shown below, what do the coefficients mean?



- (a) 1 atom of nitrogen reacts with 3 atoms of hydrogen to give 2 molecules of ammonia.
- (b) 1 g of nitrogen reacts with 3 g of hydrogen to give 2 g of ammonia.
- (c) 1 molecule of nitrogen reacts with 3 molecules of hydrogen to give 2 molecules of ammonia.
- (d) 1 mole of nitrogen reacts with 3 moles of hydrogen to give 2 moles of ammonia.
- (e) Both C and D are correct.

_____ 24. How many oxygen atoms are on the product side of this chemical reaction?



- (a) 2
- (b) 3
- (c) 18
- (d) 32
- (e) 50

Useful Information

$$\% \text{ Error} = \frac{|\text{Actual} - \text{Theoretical}|}{\text{Theoretical}} \times 100\%$$

$$\% \text{ Recovery} = \frac{\text{mass of material recovered}}{\text{mass of material started with}} \times 100\%$$

$$T_K = T_{oc} + 273.15$$

$$T_{of} = 1.8(T_{oc}) + 32$$

$$M_i V_i = M_f V_f$$

Avogadro's number 1 mole = 6.022×10^{23} formula units

$$1 \text{ ppm} = 1 \text{ g} / 1 \times 10^6 \text{ g} = 1 \text{ mg} / 1 \text{ L}$$

Key

- 1.) C
- 2.) B
- 3.) D
- 4.) C
- 5.) C
- 6.) B
- 7.) B
- 8.) E
- 9.) D
- 10.) D
- 11.) C
- 12.) B
- 13.) D
- 14.) A
- 15.) D
- 16.) C
- 17.) A
- 18.) B
- 19.) B
- 20.) B
- 21.) D
- 22.) C
- 23.) E
- 24.) E