Exam 4

Part I: Multiple Choice (2 points each)

Directions: Please circle the *best* answer for each of the following questions.

Question 1. You have a large amount of 7.00 M stock solution. You need 1.80 L of 2.00 M solution for an experiment. To prepare the desired solution without wasting any stock solution

1. Start with 0.514 L of the stock solution. Add water until you reach a total volume of 1.80 L.
2. Start with 1.80 L of the stock solution. Add water until you reach a total volume of 6.30 L.
3. Start with 1.80 L of water. Add stock solution until you reach a total volume of 2.52 L.
4. Mix 0.900 L of each stock solution and water.
5. none of the above

Question 2. Acetic acid can be classified as a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. solid
2. ionic compound
3. weak electrolyte
4. strong electrolyte
5. gas

Question 3. What is the net ionic equation for the reaction:

2 HNO3 (aq) + Ba(OH)2 (aq) 🡪 2 H2O (l) + Ba(NO3)2 (aq)

1. 2 HNO3 (aq) + Ba(OH)2 (aq) 🡪 2 H2O (l) + Ba(NO3)2 (aq)
2. 2 H+ (aq) + 2 NO3- (aq) + Ba2+ (aq) + 2 OH- (aq) 🡪 2 H2O (l) + Ba2+ (aq) + 2 NO3- (aq)
3. H+ (aq) + OH- (aq) 🡪 H2O (l)
4. all spectators
5. none of the above

Question 4. Which of the following liquids will be miscible in one another?

1. water and ethanol, CH3CH2OH
2. hexane, C6H14, and water
3. acetic acid, HC2H3O­2 and toluene, C7H8
4. all of the above
5. none of the above

Question 5. What acid and base was neutralized to produce the salt sodium bromide, NaBr?

1. HBrO (aq) + NaOH (aq)
2. HBr (aq) + Na2O2 (aq)
3. HBr (aq) + NaOH (aq)
4. all of the above
5. none of the above

Question 6. What is the name of the alkyl group CH3-CH2-CH2-

1. methyl
2. ethyl
3. propyl
4. ethane
5. propane

Question 7. Which compound is not an unsaturated hydrocarbon?

1. 1-butyne
2. cycloheptene
3. 3- methylheptane
4. 2-heptyne
5. all of the above

Question 8. Which is NOT a ways to minimize your exposure to radiation?

1. Wearing a lead apron.
2. Standing behind a thick concrete wall.
3. Keeping a good distance.
4. Wearing lead-lined gloves.
5. Staying a longer time.

Question 9. Incidents in the laboratory can be virtually eliminated if

1. scientists take only known risks.
2. scientists eliminate all possible hazards in a laboratory while still performing necessary experiments.
3. risk assessment and risk management processes are carefully considered in all activities in the laboratory.
4. scientists take only unknown risks.
5. all of the above

Question 10. In an enzyme, the polypeptide chain folds into a compact shape known as the \_\_\_\_\_\_\_\_\_\_\_\_\_.

1. pleated
2. primary
3. secondary
4. tertiary
5. quaternary

Part II: Short Answer

Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work.

Question 1. Identify each of the following molecules as a carbohydrate, a protein, or a lipid (4 points).

* 1.  b.

lipid protein

c.  d.

lipid/steroid carbohydrate

Question 2. Explain what happens when potassium chloride, KCl, dissolves in water (4 points).

The K+ ions are attracted to the partially negative oxygen atoms of the water molecules. The Cl- ions are attracted to the partially positive hydrogen atoms of the water molecules.

Question Name the following compounds using the IUPAC method (8 points):

* 1. CH3-CH-CH2-CH=CH-CH2 –CH3 6-methyl-3-nonene

|

CH2-CH2-CH3

* 1. CH3-CH2-CH2-OH 1-propanol
  2. Br-CH2-CH2-CH3 1-bromopropane
  3. H-C≡C-CH2-CH3 1-butyne

Question 4. Which organic compounds contain a carbonyl group (C=O) (5 points)?

Aldehyde, ketone, carboxylic acid, ester, amide

Question 5. Write the condensation reaction for the esterification of propanoic acid (CH3CH2COOH) and methanol (CH3OH) (5 points):



Question 6. The isotope gallium-68 has a half-life of 68 minutes (12 points).

If a diagnostic test is begun with 15 mCi of this isotope, how much is left after a test that runs approximately 2 hours and 15 minutes?

Gallium-68 decays by electron capture. Write the nuclear equation.

Gallium-68 decays by positron emission. Write the nuclear equation.

Question 7. Identify the following statements as true or false (6 points):

|  |  |  |
| --- | --- | --- |
| True |  | Exposure to radiation is unavoidable because some radioactive elements occur naturally. |
| False |  | One symptom of radiation sickness is an increased production of red blood cells. |
| False |  | If the half-life of hydrogen-3 is 11.8 years, after two half-lives the radioactivity of a sample will be reduced to one-half the original amount. |
| True |  | One mCi of a radioactive substance emits more radiation that one µCi of the same substance. |
| False |  | X-rays are generated by the nucleus during radioactive decay. |
| False |  | A nuclear equation is balanced when the masses of the reactants equal the masses of the products. |

Question 8. Calculate the mass in grams of K2SO4 needed to prepare 125 grams of a 2.50% solution (5 points)?

Question 9. What is the pH of a solution that has a [OH-] of 3.1 x 10-5 M (8 points)?

Question 10. A stock solution of 18 M hydrochloric acid is diluted from 10.00 mL to 500.00 mL, what is the new molarity (6 points)?

M1 = 18 M

V1 = 10.00 mL

V2 = 500.0 mL

M2 = ?

Question 11. Given the following reaction answer the questions (10 points):

3 Na2CO3 (aq) + 2 AlCl3 (aq) 🡪 Al2(CO3)3 (s) + 6 NaCl (aq)

* 1. What volume of 0.5343 M sodium carbonate is required to completely react with 53.12 mL of a 0.9255 M solution of aluminum chloride?
  2. How many grams of aluminum carbonate will be produced by the reaction of 74.2 mL of a 2.49 M solution of sodium carbonate with excess aluminum chloride?

Question 12. Circle the correct answer relating to glucose, which is given below (3 points):

O

|| a. aldose or ketose

H-C

| b. hexose or pentose

HO-C-H

| c. monosaccharide or polysaccharide

H-C-OH

|

H-C-OH

|

CH2OH

Question 13. The sweetener aspartame is made from two amino acids: aspartic acid and phenylalanine. Identify the functional groups in aspartame (4 points).

