

Final Exam
GENERAL CHEMISTRY
Fall 2024

Points of attention:

- For each question, the maximum earned points are specified in the question.
- Write clearly! Answers that are not readable are not marked and don't earn marks!
- All answers should be written in English using **blue or black pens** only.
- Use the pencil only for diagrams and graphs.
- Show all the calculation steps in the given space.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

Exam Duration: 2 hours

	40
	10

Instructor's Name:

Exam Date: 09/01/2014

Program: PE

Student Information

Name:

ID:

Signature:

Invigilator

Initials:

Student ID checked

Time received:

Section A:**[15 marks]**

Choose the correct options from the answers given below for each question.

1) The reaction $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{ZnCl}_{2(aq)} + \text{H}_{2(g)}$ is classified as:

- a. Non-oxidation-reduction reaction
- b. Single replacement reaction
- c. Combustion reaction
- d. Precipitation reaction

2) Find the volume of a 0.750 M H_2SO_4 solution that contains 20.0 g of H_2SO_4 .

- a. 0.180 L
- b. 1.20 L
- c. 0.260 L
- d. 0.360 L

3) Identify the statement that is false about electrolytes in chemistry.

- a. Non-electrolytes produce ions when dissolved in water.
- b. Electrolytes affect the conductivity of solutions
- c.
- d. Strong electrolytes completely ionize in water
- e. Weak electrolytes partially ionize in water

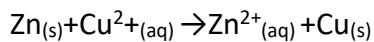
4) The purpose of a titration experiment is as follows:

- a. To determine the pH of an acidic or basic solution.
- b. To calculate the molar mass of an unknown compound.
- c. To analyze the thermal stability of a substance.
- d. To determine the concentration of an unknown solution.

5) In the reaction $\text{NaCl}_{(\text{aq})} + \text{AgNO}_{3(\text{aq})} \rightarrow \text{AgCl}_{(\text{s})} + \text{NaNO}_{3(\text{aq})}$, the spectator ions are:

- a. Na^+ and NO_3^-
- b. Na^+ and Cl^-
- c. Ag^+ and NO_3^-
- d. Ag^+ and Cl^-

6) The reducing agent in the following redox reaction is:



- a. $\text{Zn}_{(\text{s})}$
- b. $\text{Cu}_{(\text{s})}$
- c. $\text{Zn}^{2+}_{(\text{aq})}$
- d. $\text{Cu}^{2+}_{(\text{aq})}$

7) Identify the strong electrolyte from the following options:

- a. HF (Hydrofluoric acid)
- b. H_3PO_4 (Phosphoric acid)
- c. $\text{CH}_3\text{CO}_2\text{H}$ (Acetic acid)
- d. HClO_4 (Perchloric acid)

8) Identify the compound that is insoluble in water:

- a. BaSO_4
- b. KCl
- c. NaNO_3
- d. $(\text{NH}_4)_2\text{CO}_3$

9) When 2.00 L of a solution of NaCl is diluted to 3.80 L, what are the changes in the solution?

- a. Molarity and Volume
- b. Number of moles only
- c. Number of moles and Volume
- d. Molarity and Number of moles

10) Saturated hydrocarbons are also known as:

- a. Alkanes
- b. Alkenes
- c. Alkynes
- d. Alkaloids

Section B:**[25 marks]**

Answer all questions in the answer space provided below for each question:

1) Bromochloropropane, a compound used as an intermediate in chemical synthesis, contains carbon, hydrogen, bromine, and chlorine. It has a molar mass of 175.0 g/mol. Analysis of a sample shows that it contains 13.7% carbon, 3.1%hydrogen, 45.6% bromine, and the remaining percentage is chlorine. Determine the molecular formula of Bromochloropropane.

a) Determine the molecular formula of Bromochloropropane. (7)

b) Another sample of Bromochloropropane was found to have a molar mass of 262.5g/mol. Assuming the same percentages of carbon, hydrogen, bromine, and chlorine, determine the molecular formula of this sample. (2)

2) In a laboratory experiment, a student dissolves 0.10 mol of $\text{Pb}(\text{NO}_3)_2$ in 500 mL of water and 0.20 mol of KI in 250 mL of water. The two solutions are mixed, resulting in the formation of a bright yellow precipitate.

a. Identify the type of reaction. (2)

b. Write the balanced chemical equation for the reaction and identify the yellow precipitate formed. (3)

c. Write the ionic equation for this reaction, showing all the ions involved. (2)

d. Identify the spectator ions in this reaction. (1)

e. Calculate the molarity of each solution $\text{Pb}(\text{NO}_3)_2$ and KI before mixing. (2)

3) Draw all the 3 structural isomers of C_6H_{14} and provide their IUPAC names. (6)

Periodic Table of the Elements

1	H Hydrogen 1.008	2	He Helium 4.003
3	Li Lithium 6.941	4	Be Beryllium 9.012
11	Na Sodium 22.990	12	Mg Magnesium 24.305
19	K Potassium 39.098	20	Ca Calcium 40.078
37	Rb Rubidium 84.468	38	Sr Strontium 87.62
55	Cs Cesium 132.905	56	Ba Barium 137.327
87	Fr Francium 223.020	88	Ra Radium 226.025
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Reference:

McMurry, John E., Fay Robert C., and Robinson Jill K. (2016) "Chemistry, 7th Edition," USA, Pearson Education, Inc.

Heaton, A. (1996) (Ed.) An Introduction to Industrial Chemistry. New York: Blackie Academic and Professional.

MLO and Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	1,2	Analyze, Apply	15	
2	2,3	Analyze, evaluate	9	
3	3	Analyze	10	
4	2	Apply	6	