

Bangladesh Army University of Science and Technology

Department of Computer Science and Engineering

Referred/Backlog/Improvement Examination, Fall 2018

Course Code: CHEM 1201

Time: 03 (Three) hours

Level-1 Term-II

Course Title: Chemistry

Full Marks: 210

N.B. (i) Answer any three questions from each PART

(ii) Use separate answer script for each PART

(iii) Marks allotted are indicated in the margin

(iv) Special Instruction (if any)-----N/A-----

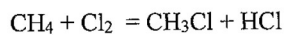
PART A

1.
 - a) Discuss the Rutherford's atomic model with figure and its limitations. 10
 - b) Define quantum number. Explain the azimuthal and magnetic quantum number. 10
 - c) Explain why 19th electron of potassium enters into 4s subshell instead of 3d. 10
 - d) Configure the electrons of followings i) Cr ii) Fe³⁺ iii) Al 5
2.
 - a) What do mean by noble gases? Write down their uses. 10
 - b) What do you mean by chlorination of benzene? Explain its mechanism with example. 15
 - c) Define pH? Calculate the pH of 0.0001 M NaOH solution. 10
3.
 - a) What is chemical equilibrium? Give its graphical representation with explanation. 10
 - b) Write down the law of mass action and explain it. 10
 - c) At 27°C and 2.5 atm 45% PCl₅ reversely decomposes into PCl₃ and Cl₂. Calculate the K_p and K_c for this decomposition. 15
4.
 - a) Write down phase rule and explain it. 10
 - b) Define S_N1 reaction? Give the mechanism of S_N1 reaction with example. 15
 - c) Calculate the amount of oxalic acid (H₂C₂O₄·2H₂O) needed to prepare 100 mL 0.1M solution. 10

PART B

5.
 - a) Differentiate between molecularity and order of a reaction. 10
 - b) Deduce the rate equation of a first order reaction. 10
 - c) What is half-life of a reaction? Prove that for a second order reaction $t_{1/2} \propto 1/a$ 15
6.
 - a) What is ionic bond? Explain its formation with example. 10
 - b) Define covalent compound. Why an ionic compound dissolves in water but covalent compound does not? Explain it. 10
 - c) Write down the name of hybridization present in C-3 of the following compound and explain the hybridization with appropriate example. CH₃-CH₂-CH₂-CH=CH₂ 15

7. a) What do you mean by ionic product of water? 5
- b) Define colligative properties? Write down the Rault's law of lowering of vapour pressure and explain it. 15
- c) Calculate the value of ΔH for the following reaction, given that the C-H, C-Cl, H-Cl and Cl-Cl bond energies are 326, 226, 432 and 278 kJ/mol respectively. State the nature of the reaction also. 15



8. a) Write down Hund's rule with example. 10
- b) Define ionization potential. Explain why it is a periodic property. 15
- c) Define molarity. Explain which one of the molarity or molality affected by temperature. 10