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| **DEPARTMENT OF CHEMISTRY**  **FOURAH BAY COLLEGE – UNIVERSITY OF SIERRA LEONE** CHEM 123ORGANIC CHEMISTRY II – MECHANISMS, AROMATIC AND NATURALLY OCCURRING COMPOUNDS**Unit 1 – Organic Mechanisms** **CONTINUOUS ASSESSMENT**  **ASSIGNMENT**  **Deadline: 3.00 pm Friday 16th August**  Work Submitted after the deadline will lose the punctuality bonus  Work submitted after the publication of the mark scheme will not be marked  Photocopied work will not be marked, even if it has been written over manually This cover sheet must be handed in as the front page of your assignment Name: ……………………………………………………  Adm/Reg No. ………………..    Unit 1 Continuous Assessment is worth 15% of the total marks for CHEM 123  Your score will be divided into three parts:  Lecture and Tutorial Attendance 10%  Assignment 40%  Test 50% |

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| **1.** | (a) | Explain the meaning of the terms ‘electrophile’ and ‘nucleophile’. |
|  | (b) | Explain why alkenes tend to undergo electrophilic addition reactions but haloalkanes tend to undergo nucleophilic substitution reactions.  [5] |
| **2.** | (a) | Outline the mechanism for the reaction between but-1-ene and hydrogen bromide to form 2-bromobutane. |
|  | (b) | Explain how 1-bromobutane can also be made during this reaction and explain why it is produced in smaller amounts than 2-bromobutane.  [5] |
| **3.** | (a) | Outline the mechanism for the nucleophilic substitution reaction between chloroethane and excess ammonia and name the main product of the reaction. |
|  | (b) | Outline the mechanism for the nucleophilic substitution reaction between 2-bromomethylpropane and potassium cyanide and name the product of the reaction.  [5] |
| **4.** | A student wishes to investigate the mechanism of the reaction between a single optical isomer of 2-bromobutane and hydroxide ions to form butan-2-ol. | |
|  | (a) | Suggest two experimental methods to determine whether the mechanism is SN1 or SN2. |
|  | (b) | The student also investigates the reaction of 2-chlorobutane with hydroxide ions. State and explain whether this reaction will be faster or slower than the reaction of 2-bromobutane with hydroxide ions.  [5] |
| **5.** | When 1-iodopropane reacts with hydroxide ions, a substitution reaction and an elimination can both take place. | |
|  | (a) | Write an equation for the elimination reaction which takes place when 1-iodopropane reacts with hydroxide ions and outline the mechanism for the reaction. |
|  | (b) | Suggest two conditions which would favour the elimination reaction over the substitution reaction. |
|  | (c) | Explain the difference in the role of the hydroxide ion in both reactions.  [5] |
| **6.** | Pentan-2-ol can be dehydrated using concentrated sulphuric acid. | |
|  | (a) | Outline the mechanism of this reaction to produce pent-1-ene and state the role of the sulphuric acid in the reaction. |
|  | (b) | Draw and name two other organic products which could be produced during this reaction.  [5] |
| **7.** | In the presence of UV light, methane reacts with chlorine to produce chloromethane. | |
|  | (a) | Write an equation for the reaction. |
|  | (b) | Outline the mechanism for the reaction and state the role of the UV light. |
|  | (b) | Identify an organic product other than chloromethane which could be produced in a termination step and write an equation to show its formation.  [5] |
| **8.** | Free radical substitution reactions often result in a large number of products. | |
|  | (a) | Write an equation for the reaction taking place when propane reacts with chlorine to make C3H6Cl2. |
|  | (b) | Draw and name all of the isomers of C3H6Cl2 which could be formed during this reaction. |
| **9.** | (a) | Explain the difference between homolytic and heterolytic fission, giving a suitable example in each case. |
|  | (b) | Explain the difference between a transition state and an intermediate, giving a suitable example in each case.  [5] |