

CITY CAMPUS, OFF ALARA STREET, YABA, LAGOS, NIGERIA.

TITLE OF EXAMINATION: B.Sc Examination

FACULTY: Science

DEPARTMENT: Chemistry

SESSION: 2018/2019

COURSE TITLE: General Chemistry II

COURSE CODE: CHM 121

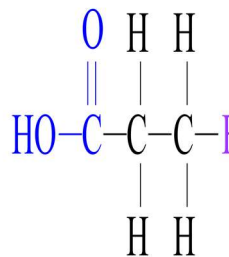
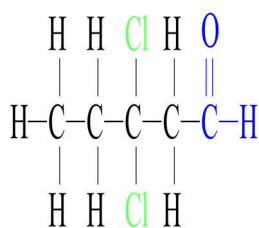
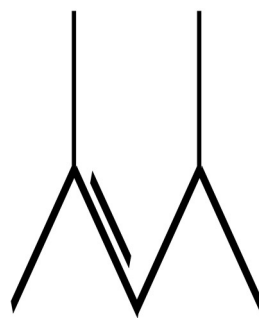
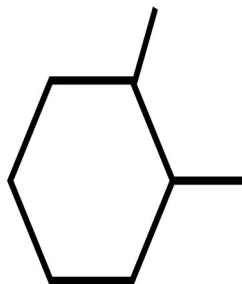
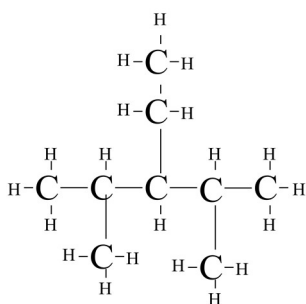
INSTRUCTION: Answer Question One (1) & any other three (3) Questions

SEMESTER: Second

CREDIT UNIT: 3

TIME: 1 ½ Hours

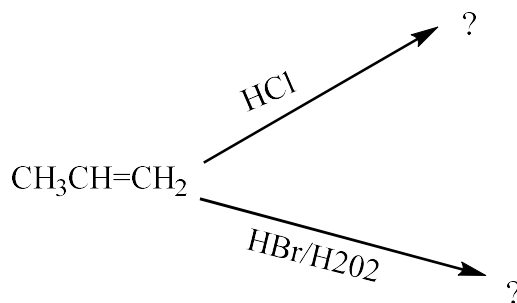
1. (a) (i) Give the IUPAC name for each of the following compounds.



(5 marks)

- (ii) Describe 2 methods for the laboratory preparation of Alkanes. (4 marks)
- (iii) Explain the following reactions of alkanes; (a) Pyrolysis (b) Combustion (c) Halogenation (6 marks)
- (b) (i) With the aid of structural examples, differentiate between terminal and internal alkenes. (2 marks)
- (ii) State the **Markovnikov's Rule**. (2 marks)

(iii) Give the product for the reaction below:



(3 marks)

2. (a) (i) Explain the 3 classes of alcohol, stating an example of each. (3 marks)

Alcohol readily oxidizes to form ketone, aldehyde or carboxylic acids.

(ii) Which class of alcohol will oxidize to ketone. Write an equation to show this reaction. (1 mark)

(iii) Which class of alcohol will give a carboxylic acid on oxidation. Give an equation. (1 mark)

(iv) The reaction in (ii) above can be stopped at an aldehyde, give a reagent used to limit the reaction. (1 mark)

(b) (i) List 3 methods used for preparation of Alkynes in the laboratory. (3 marks)

(ii) State 3 properties of Alkynes (3 marks)

(iii) With the aid of equations, explain the following reactions of alkynes.

(a) Catalytic hydrogenation (b) Chlorohydrogenation (c) Polymerization (3 marks)

3. (a) (i) What are Oxides? (1 mark)

(ii) What are the 3 types of Oxides formed by elements. Give an example each. (5 marks)

(iii) Phosphorus forms 2 oxides: **P₄O₁₀** and **P₄O₆**. Which of these oxides of phosphorus is more acidic. Give a reason for your answer (2 marks)

(b) (i) Give 3 properties each of covalent and ionic oxides. (3 marks)

(ii) What is a disproportionation reaction. (1 mark)

(iii) Give an example of reaction in (ii) above. (1 mark)

(iv) Complete the table below: (2 marks)

4. (a) (i) Give 4 properties of Group one metals. (2 marks)

| | Na_2O | MgO | SiO_2 | P_4O_{10} |
|------------------|-----------------------|--------------|----------------|---------------------------|
| T_m / K | 1548 | 3125 | 1883 | 573 |
| Bonding | Ionic | - | Covalent | - |
| Structure | - | - | Giant lattice | - |

(ii) Describe the Downs cell electrolytic method for the production of sodium. (2 marks)

(iii) Give 3 advantages of this method over other methods of sodium purification. (1 mark)

(iv) Write an equation for the reaction of each of the following Group 1 metals with water: Na, Li and K. (3 marks)

(b) (i) Give 3 differences between Lithium and other Group 1 elements. (3 marks)

(ii) Explain the term **diagonal relationship**. (1 mark)

(iii) Give 3 examples of diagonal pairs. (3 marks)

(5) (a) (i) What is a transition metal. (1 mark)

(ii) Give 4 properties of Transition metals (2 marks)

(iii) Give the electronic configuration of the following transition metals:

Vanadium.

Chromium.

Copper.

Titanium.

(4 marks)

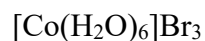
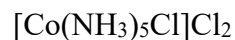
(iv) Give an example each of the following:

A monodentate ligand

A bidentate ligand

A polydentate ligand.

b (i) Name the following coordination compounds:



(3 marks)

(ii) Briefly Explain the term **Nanochemistry** (1.5 marks)

(iii) Give 4 applications of Nanochemistry (2 marks)

6. (a) (i) Name the following complex compounds: (3 marks)
- $K_3[FeCN_6]$
- $[Fe(NH_3)_6]Cl_2$
- $[Co(NH_3)_4(SO_4)_2]Cl$
- (ii) Indicate the coordination number of the metal and the possible shape in each of the complexes in question 6a (i). (3 marks)
- (iii) How does the structure of graphite account for its use as:
- (1) A lubricant.
- (2) The design of graphite electrodes. (2 marks)
- (iv) Mention two greenhouse gases and state their respective sources. (2 marks)
- b (i) List the names along with symbols of Group 14 elements. (2 marks)
- (ii) Classify the elements in terms of metallic, semi-metallic or non-metallic behavior. (3 marks)