**MURANG’A HIGH SCHOOL**

**CHEMISTRY FORM 4 C.A.T. 1 – 2016 TIME: 1 HOUR**

**NAME:………………………………………….ADM.NO…………CLASS………..CL.NO……**

**Answer all the questions in the spaces provided:-**

1. Give the IUPAC names of the following organic compounds. (3 marks)

(i) CH3 – CH2 – CH – CH3

 |

 CH – CH3

 |

 CH3

 O

 ||

(ii) CH3 C – O – CH2 – CH2 CH3

 O

 ||

(iii) CH3CH (CH3) CH2 C O O H

2. When solid calcium carbonate was added to a solution of hydrogen chloride in methyl benzene there was no observable change. On addition of water to the resulting mixture, there was vigorous effervescence. Explain these observations. (3 marks)

3. State two disadvantages of using flower extract as an indicator over the commercial indicators. (2 marks)

4. (i) Draw a dot (•) /cross (*x*) diagram to show bonding in Cl2O. (Cl = 17, 0 = 8). (1 mark)

(ii) In terms of structure and bonding explain why the substance Cl2O has a low melting and boiling point. (2 marks)

5. A piece of magnesium was dropped into 50 cm3 of 1m HCI acid. When the reaction was over, the solution was titrated with 0.2 M NaOH solution and 15 cm3 of the alkali was used. Determine the mass of the magnesium ribbon used. (3 marks)

6. An organic compound has the following composition by mass: Hydrogen 13.5%, oxygen 21.6% and carbon 64.9%.

(i) Determine the empirical formula of the organic compound (C = 12, H = 1, O = 16).

 (2 marks)

(ii) Given that the empirical formula and the molecular formula of the organic compound are the same, draw the structure of the compound. (1 mark)

7. The scheme below was used to prepare a cleansing agent. Study it and answer the questions that follow.

 NaOH(aq)

FAT

Solution of cleansing agent and alcohol

 Solid cleansing agent

 Boil

 Step I

 Step II

(i) Identify the method described above used to prepare the cleansing agent. (1 mark)

(ii) A chemical substance is added in step II, what is its purpose. (1 mark)

(iii) Explain how an aqueous solution of the cleansing agent removes grease from clothes during washing. (2 marks)

8. Explain the following 1M HCI has a pH of 2, while 1M HOCl has a pH of 4. (2 marks)

9. Study the table below and use it to answer the questions that follow:-

|  |  |
| --- | --- |
| solution | pH |
| ABC | 2.5148.5 |

(i) In which of the solution would universal indicator turn

(a) Violet ( ½ mark)

(b) Yellow ( ½ mark)

(ii) Which of the solutions could be used to relieve heartburn? Explain (2 marks)

10. The figure below shows the interaction of carbon and oxygen in `dry ice’.

 O = C = O O = C = O O = C = O

 X Y

Identify the bond types labelled with letters x and y (2 marks)

X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Y \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. The mass of one atom of an element is 2.24 x 10-5g. Determine the relative atomic mass of the element. (L = 6.0 x 1023, molar gas volume at s.t.p = 22.4 dm3) (2 marks)

12. Study the flow chart below and answer the questions that follow:-

**t**

 **Y**

 Step II H2O, 300oC

 60 atm

 H2(g) Step 1

 Step III

Solid **J** + H2O

**X**

CH3CH2CH2COOCH2CH3

 Step IV HCI(g)

**W**

 Step V

  **Z**

(i) Write the equation for the reaction between solid **J** and water. (1 mark)

(ii) Name substances (1 mark)

 ***X* …………………………………………………** t …………………………………………..

(iii) State the conditions and reagents for the reaction in step III. (1 mark)

(iv) Write an equation for the reaction that occurs in step V. (2 marks)

(v)State one advantage and one disadvantage of using substances like W. (2 marks)

Advantage

Disadvantage

13. The diagram below represents part of the structure of a sodium chloride crystal. The position of one of the sodium ions in the crystal is shown as



(i) On the diagram, mark the positions of the 3 sodium ions. (2 marks)

(ii) The melting point of sodium is 98oC while that of potassium is 64oC. Explain this difference. (2 marks)