NAME……………………………………………………………………ADM.NO:………………

SIGN…………………DATE………..

CHEMISTRY

FORM 2

TIME: 2 HOURS

## INSTRUCTIONS TO STUDENTS

 1. Answer all questions in this question paper.

 2. All your answers must be written in the spaces provided in this question paper.

|  |  |  |
| --- | --- | --- |
| Question | Maximum score | Candidates score |
| 1-19 | 70 |  |

1. Define the following terms:

1. Atomic Number (1mk)

*No. of protons in the nucleus of an atom*

1. Mass Number (1mk)

*Sum of proton and neutrons in the nucleus*

1. The Isotopes (1mk)

*Element with same atomic no. but different mass number*

1. Oxygen is obtained on large scale by the fractional distillation of air as shown on the flow chart below.

 a) Explain why air is considered as a mixture (1mk)

*- Various components can be separated using a physical means / method.*

*- Components in air are not in fixed proportions.*

*It contains several gases which are not chemically combined*

 b) Identify the substance that is removed at the filtration stage (1mk)

*Dust particles ✓1*

c) Explain why Carbon (IV) oxide and water are removed before liquefaction of air. (1mk)

*- They would readily solidify✓ ½ and block the pipes ✓ ½*

 d) Identify the component that is collected at -186°C (1mk)

*Argon ✓1*

1. Study the table below and answer the questions that follow:-

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Substance Melting Point (oC )Boiling point (oC)  | A | B | C | D | E | F |
| 801 | 113 OR 119 | -39 | 5 | -101 | 1356 |
| 1410 | 445 | 457 | 54 | -36 | 2860 |
| ElectricalConductivity  | Solid | Poor | Poor  | Good  | Poor  | Poor  | Poor |
| liquid  | Good  | Poor | Good | Poor | Poor | Poor  |

Identify with reasons the substances that:

 (i) Have a metallic structure (2mks)

*C ✓1 Good conductor of electricity ✓1 in both solid and liquid state due to delocalized*

(ii) Have a molecular structure (2mks)

 *D or E ✓1 Are poor conducts in both solid / liquid state.*

 *Have relatively low M.P and B.P due to molecular structure.*

(iii) Substances A and C conduct electric current in the liquid state. State how the two

 substances differ as conductors of electric current (2mks)

***A –*** *mobile/free ions*

***B –*** *Delocalized electrons*

1. Atoms of element X exists as $\begin{matrix}14\\6\end{matrix} X $and $\begin{matrix}12\\6\end{matrix} X $

 (a) What name is given to the two types of atoms? (1mk)

 *isotopes*

 (b) Use dot (∙) and cross (x) diagrams to illustrate the atomic structure of $ \begin{matrix}14\\6\end{matrix} X $ (2mks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Give 2 reasons why most laboratory apparatus are made of glass. (2mk)

*Glass can be used for heating*

*Glass cannot react with chemicals*

6. Define the following terms:

1. A saturated solution. (1mk)

*A solution that cannot take any more solute at any given temperature*

1. Crystallization. (1mk)

*Formation of crystals from a saturated solution*

1. Describe how copper (II) sulphate crystals can be obtained from copper (II) sulphate solution. (3mks)

*Heat copper (ii)sulphate solution to evaporate excess water /to obtain a saturated solution*

*Cool the saturated solution to obtain copper (ii) sulphate crystals.*

*Dry the crystals between filter papers.*

1. Study the table below and use it to answer the questions that follows. Letters are not the actual symbols of the elements

|  |  |
| --- | --- |
| Ion | Electronic configuration |
| L- | 2,8,8 |
| M2+ |  2,8 |
| N3+ | 2,8,8 |

1. Which elements belong to the same period of the periodic table? (1 mark)

 *L and M*

1. What is the formula of the compound formed by L and N.? (1 mark)

 *NL3*

1. Compare the atomic and ionic radii of element L. (1 mark)

*The ion of L has a larger radius than the atom of L.*

1. Wright the correct formula of the following compounds. 3mks
2. Sodium sulphate

 *Na2SO4*

1. Magnesium hydroxide

 *Mg (OH)2*

1. Calcium nitrate.

 *Ca (NO3)2*

1. State the reason why carbon ( iv) oxide is used by ice cream venders instead of ordinary ice. (1mks)

 *Dry carbon (IV) oxide evaporates leaving no wetness.*

 *Carbon (IV) oxide is a better coolant*

1. A student set-up the apparatus below in order to determine the percentage by volume of oxygen in air.

 

AT END

AT BEGINING

 a) Why did water rise when the reaction had stopped? (1mk)

 *To occupy the space that was initially occupied by oxygen gas*

 b) The student wrote the expression for the percentage by volume of oxygen in air as

 

 Why the volume of oxygen was calculated using the above expression incorrect? (1mk)

* Because oxides of phosphorous formed still occupy space enviously occupied by oxygen.

 (P2O5, P2O3) ✓01

 c) What should have been done after the reaction had stopped in order to get a correct volume.

 (1mk)

* Let all the fumes dissolve in water before final reading is taken ✓01

12. Explain how you would obtain solid lead carbonate from a mixture of lead carbonate and sodium chloride. (3mks)

*Add water to the mixture and stir to dissolve sodium chloride*

*Filter to obtain sodium chloride as a filtrate and lead carbonate as a residue*

*Wash the residue and dry it between filter paper*

13. Aluminium metal is a good conductor and is used for overhead cables. State any other two properties that make aluminium suitable for this use. (2mks)

*Al does not rust*

*Al has more delocalized electrons hence a better conductor of electricity.*

14. In an experiment, a test tube of chlorine gas was inverted in water as shown in the diagram. It was then left to stand in sunlight for one day.

 Chlorine water

 sunlight

 Gas M

 Test tube

After one day, a gas M was found to have collected in the test tube as shown above.

(i). identify gas M. (1mk)

*Oxygen gas*

(ii). Suggest whether the PH of the solution the beaker would increase or decrease after one day. Give an explanation. (2nks)

* *PH would decrease.*
* *Chloric (i) acid (unstable) decompose to hydrochloric acid, which is a strong acid.*

(iii). The colour of chlorine water was observed to have changed from pale yellow to colourless after one day. Explain. (2mks)

*Chloric (i) acid is yellow in colour. When exposed to sun light it decomposes to HCl acid and oxygen gas. HCl acid is colourless.*

(iv) Write an equation to support your answer in (iii) above. (1mk)

*2HOCl 2 HCl (aq) +O2 (g)*

(v). State and explain the observation made when a moist blue litmus paper was placed at the mouth of the test tube containing chlorine gas. (3mks)

*The litmus paper turned red then white. It turned red because of the presence of hydrogen ions then white/ breached by chloric (i) acid though oxidation*.

(vi). Write an equation to show how the process in 3(v) above occurs. (1mk)

 **HClO(aq) + Dye HCl (aq) + (dye + O)**

 **(coloured) colourless**

(vii). Give two uses of chlorine gas. (2mks)

*Used in the manufacture of hydrochloric acid*

*Used in making breaches*

*Used to make plastics (pvc)*

*Used to kill microorganism in water treatment*

 15. A student set up the experiment bellow to collect gas K. the glass wool was heated before heating the magnesium coil.

 Gas K

Cotton wool soaked in water magnesium coil

 heat heat

(a). Explain why it was necessary to heat the moist cotton wool before heating the magnesium. (2mks)

*To produce steam this will react with magnesium. Heating magnesium first will make magnesium to react with oxygen.*

(b).Identify gas K. (1mk)

*Hydrogen gas*

(c). What property of gas K makes it possible to be collected by the method shown? (1mk)

 *It’s lighter than air*

(d). Write a chemical equation for the reaction that produced gas K. (1mk)

Mg +H2O MgO + H2

16. The diagram represents two methods of gas collection in the laboratory.

Gas

 (a) (b)

Gas

(i). Name the methods of gas collection above. (2mks)

*(a) Upward delivery*

*(b) Downward delivery*

(ii). Which method is suitable for collecting dry carbon (IV) oxide gas? Give a reason. (2mks)

*Downward delivery*

*Carbon (iv) oxide is denser than air.*

17. The curves bellow represent the variation of temperature with time when pure and impure samples of a solid were heated separately.

 A

 B

 Temperature

(a). Which curve represents the variation in temperature for pure solid? Explain. (2mks)

*B, has sharp melting and boiling point*

(b)State the effect of an impurity on the melting and boiling points of a pure substance.(2mks)

*Impurity lowers the melting point and raises the boiling point*

18. Cars in Mombasa are found to rust faster than cars in Nairobi. Explain. (2mks)

*Mombasa is salty. Salt accelerates rusting.*

 (iii). State one disadvantage of rusting. (1mk)

*Causes wear and tare.*

19. The PH of a soil sample in a given area was found to be 5.5. An Agricultural officer the addition of lime (calcium oxide). State the function of lime in the soil. (1mk)

*Neutralizes the soil.*

*Adds calcium to the soil.*