**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Adm. No\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**233**

**CHEMISTRY FORM 3**

**2 HOURS**

**END OF TERM II 2019**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SECONDARY SCHOOL**

**Instructions to Candidates**

* **Write your name and Admission Number in the spaces provided above.**
* **Sign and write date of examination in the spaces provided above.**
* **Answer ALL the questions in the spaces provided.**
* **Mathematical tables and silent electronic calculators may be used.**
* **All working MUST be clearly shown where necessary.**
* **Candidates should check the question paper and ascertain no question is missing.**

**For Examiner’s use only**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum Score** | **Candidate’s Score** |
| **1 – 33** | **100** |  |

1. 2.5g of hydrated copper(II) sulphate was heated in an open cruscible. After cooling, it was weighed again and found vto be 1.6g. Calculate the simplest formula of hydrated copper(II) sulphate .(Cu = 63.5, S=32, O=16, H=1) (3mks)
2. Use the information below and answer the questions that follow.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Solution | X | Y | Z | K | L |
| pH value | 7 | 10 | 6 | 1 | 13 |

a) Which solution is likely to have

i) highest concentration of hydrogen ions? (1mk)

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ii) Highest concentration of hydroxide ions? (1mk)

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b) Identify the substance which is likely to be distilled water. (1mk)

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1. Element C has an atomic number 12 and D has atomic number 8

a) write down the electronic configuration for the ion of: (2mks)

i) C­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii) D \_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) Draw a dot (.) and cross(x) diagram to show the compound formed between C and D (2mks)

1. Four athletes M, N, O, and P were suspencted to have used illegal drug x during a competition. Their blood and the illegal drug samples were put on a paper chromatogram. The chromatogram below was obtained

x

x

x

x

x

X

M

N

O

P

a) Indicate the solvent front on the chromatogram above. (1mk)

b) If the athlete(s) who had used the illegal drug were to be banned for two years identify who they were (2mks)

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1. 50.0cm3 of sodium hydroxide solution reacted with 50.0cm3of 1M sulphuric(VI) acid. Calculate the mass of sodium hydroxide that would be dissolved in 200cm3 of solution to prepare the sodium hydroxide solution that reacted with the acid. (Na=23, H=1, O=16) (4mks)
2. Name the following compounds

c

c

c

c

c

c

H

H

H

H

H

H

H

H

H

H

H

H

H

H

a)

b) CH3CH2CHCH3CH2CH3

c) CH3CClCHCH3

1. When magnesium is burnt in air in an open crucible two products are formed.

i)Name the two products.

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ii) write two chemical equations to show how the products in (i) above are formed.

1. A stream of dry hydrogen gas was passed over heated copper(II) oxide in a combustion tube. One of the products formed is gaseous and when cooled formed a colourless liquid.

i) Write an equation to show the reaction that took place in the combustion tube. (1mk)

ii) Describe a chemical test to identify the gaseous product.(2mks)

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1. The ggrid below represents part of the periodic table. Use it to answer the questions that follow

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
| I |  |  |  |  |  |  | M |  |
| J | K |  | L |  |  |  | O |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

i) name the chemical familyinto which the element K belong. (1mk)

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ii) compare the melting points of J and K. Explain your answer. (2mks)

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1. i) state two disadvantages of using luminous flame for heating in the laboratory. (2mks)

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ii) state how luminous flame is produced. (1mk)

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1. Under pressure of 1 atmospheres a certain gas occupies a volume of 60L, when the temperature is 200c. If the pressure is increased to 2.5 atmospheres and the temperature increased to 400ccalculate the volume of the gas.
2. State Boyles law. (1mk)

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1. State why galvanizing is a better method of preventing rusting than painting. (2mks)

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1. Two metal carbonates x and y were heated in an open cruscible. The mass of y remained the same after heating while that of x reduced. Wich carbonate is likely to be of calcium? Explain. (3mks)
2. 2.34g of sodium chloride was reacted with excess lead(II) nitrate solution. Determine the mass of the precipitate formed. (Pb=208, Na=23, Cl=35.5) (3mks)
3. Helium replaced hydrogen in weather balloons. Explain. (1mk)

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1. Dilute hydrochloric acid reacted with zinc metal.(Zn=65.2, MGV= 24000cm3)

a) write the chemical equation for the reaction.(1mk)

b) If 3.92g of Zinc reacted with 100cm3 of 0.4M hydrochloric acid

i) determine the reagent that was in excess(3mks)

ii) calculate the total volume of hydrogen gas liberated at r.t.p. (2mks)

1. Aluminium chloride is added to water and forms a solution. A litmus paper was put into the solution formed. Explain the observations made on the litmus paper. (3mks)

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1. Molten lead(II) iodide was electrolysed using carbon electrodes

a) write down the half equations at the:

i)Anode(1mk)

ii) Cathode (1mk)

b) State the product formed at the cathode. (1mk)

1. Name two substances that are recycled in the solvay process. (2mks)

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1. Explain the observation made when concentrated sulphuric(VI) acid is added to sugar. (2mks)

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1. Name two allotropes of carbon. (2mks)

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1. The apparatus below was a set-up to show the catalytic oxidation of ammonia

a) Write the equation for the reaction that takes place in the gas jar? (1mk)

b) Why is it necessary to have hot nichrome wire in the gas jar? (1mk)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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c) State two uses of ammonia (2mks)

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1. To determine percentage of zinc metal in a mixture of zinc metal and zinc oxide, the mixture was reacted with excess hydrochloric acid and the volume of gas evolved was measured. The volume of the gas collected was used to calculate the amount of zinc in the mixture.

i) Name the gas liberated. (1mk)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii) Write two equations to show the reactions that took place(2mks)

iii) State why dilute nitric(V) acid is not suitable for this reaction. (1mk)

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1. An element P has an atomic number of 3, R.A.M 6.94 and has two isotopes of mass numbers 6 and 7.

a) Define the term isotopes. (1mk)

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b) What is the mass number of the most abundant isotope of P. Give a reason. (2mks)

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c) Determine the percentage of the most abundant isotope. (2mks)

1. The process below was used to prepare Lead(II) sulphate

Leadmetal

ReagentX

SolutionA

Sodiumsulphatesolution

MixtureB

ResidueC

a) Name the type of reactionbetween solution A and sodium sulphate solution.(1mk)

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b) write an ionic equation for the reaction in (a) above. (1mk)

c) explain why it is not possible to prepare residue C using lead metal and dilute sulphuric(IV) acid. (1mk)

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1. Using calculations show the better fertilizer between ammonium nitrate (NH4NO3) and urea (CO(NH2)2). Both are nitrogenous fertilizers.

(C=12, N=14, H=1, O=16) (3mks)

1. State two uses of argon (2mks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. a) what is vulcanization of rubber? (1mk)

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b) state two properties that vulcanized rubber possesses. (2mks)

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1. use the diagram below to answer the questions that follow.

M

N

O

P

Q

Temp

Time

a) State whether the diagram shows a cooling curve or a heating curve(1mk)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) i) In which regions do we have two states of matter existing? (1mk)

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ii) Identify the two states (2mks)

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1. Carbon has two allotropes.

a) Define the term allotropes

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b) Name the two allotropes of carbon. (2mks)

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c) Identify which allotrope of carbon can be used as an electrode. Give a reason. (2mks)

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1. During fractional distillation of air, explain how the following substances are removed from air.

i) Carbon (IV) oxide (1mk)

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ii) Dust particals(1mk)

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ii) Water vapour. (1mk)

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1. A few drops of aqueous ammonia were added to a solution containing copper (II) ions.

a) State what was observed (1mk)

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b) Write an ionic equation for the reaction that took place (1mk)