**NAME: ………………………………………………… Admission No: ..…...……….….……………….**

**SCHOOL: ……………………………………………… Candidate’s signature: …………..……………**

**Date: …………………………...……………….**

**233/1**

**CHEMISTRY**

**PAPER 1**

**October / November, 2017**

**(THEORY)**

**TIME: 2 HOURS**

**FORM FOUR ENTRANCE – 2017**

***Kenya Certificate of Secondary Education (K.C.S.E)***

**233/1**

**CHEMISTRY**

**PAPER 1**

**(THEORY)**

**TIME: 2 HOURS**

**INSTRUCTIONS**

1. Write yourName and Admission Numberin the spaces provided above.
2. Answer **all** the questions in the spaces provided
3. Mathematical tables and silent non-programmable calculators may be used.
4. All working **MUST** be clearly shown where necessary.

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| 1 - 27 | 80 MARKS |  |

***This paper consists of 10 printed pages.***

***Candidates should check to ensure that all pages are printed as indicated and no questions are missing.***

1. The table below shows the number of valence electrons in elements D, E and F.

|  |  |  |  |
| --- | --- | --- | --- |
| Element | D | E | F |
| No. of Valence electron | 1 | 2 | 7 |

1. Explain why D andE would not be expected to react together to form a compound. (1 mark)

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1. Write a chemical equation to show the effect of heat on a carbonate of E. (1 mark)

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1. Pieces of blue and red litmus papers were placed into a beaker containing water into which

Aluminum chloride had been dissolved.

1. Is dissolving of Aluminium chloride in water a physical or chemical process? Explain. (1 mark)

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1. State the observations made on the papers. Explain your answer. (2 marks)

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1. A volume of nitrogen gas diffuses through a porous pot in 70 seconds.

How long would it take 400cm3 of Carbon(IV) Oxide to diffuse through the same porous pot?

(C =12, O =16, N = 14) (3 marks)

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1. Lead (II) nitrate was heated strongly for some time.
2. State **two** observations made during heating. (2 marks)

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1. Write an equation for the reaction. (1 marks)

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1. Draw a dot (**)**and cross (**x**) diagram to show bonding in:
2. Ammonium ion (NH4+) (2 marks)

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1. Silane (SiH4) (2 marks)

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1. Chlorine gas was bubbled into a solution of Hydrogen sulphide as shown below.



1. Explain the observations made in the boiling tube. (2 marks)

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1. What precautions should be taken in this experiment? (1 mark)

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1. State **three** properties common to both Ammonia and Calcium hydroxide solutions but

different from solution of Sulphur(IV) oxide in water. (3 marks)

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1. Describe a simple test that can be carried out in the laboratory to distinguish between

Manganese(IV) oxide and Copper (II)oxide. (3 marks)

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1. Write any **three** balanced equations of possible reactions that take place when excess

magnesium metal is burnt in air. (3 marks)

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1. The diagram below is a set up used to investigate the effect of heats on hydrated Copper

(II)sulphate. Study the diagram and answer the questions that follow.



1. Why is boiling tube slanted as shown? (1 mark)

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1. What is observed in the boiling tube? (1 mark)

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1. Identify liquid G. (1 mark)

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1. A hydrated salt has the following composition by mass; iron is 20.2%, oxygen is 23.0%,

sulphur is 11.5%, water is 45.3%. Its relative formula mass is 278.

Determine the formula of the hydrated salt. (3 marks)

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1. In ancient Greece, chewing chalk was used to relieve excess stomach acid.

A patient suffering from duodenal ulcer releases 30cm3 of 1M hydrochloric acid in stomach.

He chewed 5g impure chalk to neutralize the acid released. (Ca = 40, C =12,O=16)

1. Write a well-balanced chemical reaction that took place. (1mark)

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1. Calculate the number of moles of Calcium carbonate used up. (2 marks)

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1. Calculate the percentage impurity in Calcium carbonate, chalk, used. (2 marks)

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1. The table below shows the physical properties of magnesium and calcium.

Use it to answer the questions that follow.

|  |  |  |
| --- | --- | --- |
| Element | Mg | Ca |
| Atomic radius (nm) | 0.16 | 0.20 |
| M.P (OC) | 650 | 838 |
| B.P (OC) | 1110 | 1440 |
| Atomic number | 12 | 20 |

1. Explain why Calcium has a higher M.P than Magnesium. (2 marks)

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1. Write the electron arrangement of Calcium in the following compound:Ca3(PO4)2. (1 mark)

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1. Actal is one of the over-the-counter (O.T.C) drugused to relief indigestion.
2. Write an ionic equation to show how actal really works. (1 mark)

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1. Explain why actal tablet is recommended that you chew first. (1 mark)

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1. Study the diagram below and answer the questions that follow.



1. Give an equation for the reaction taking place in the boiling tube. (1mark)

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1. Explain why it is not advisable to prepare gas P in the laboratory by reacting Calcium

metal with dilute Sulphuric(VI)acid. (1 mark)

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1. Give **one**industrial use of gas P. (1mark)

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1. Name the catalyst used in:-
2. Decomposition of hydrogen peroxide. (1 mark)

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1. Conversion of vegetable oils into margarine. (1mark)

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1. Hydrogen gas is one of the lightest gas known but has not lived to its expectation to

be used in observation balloons. Explain. (2 marks)

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1. The catalytic oxidation of ammonia gas is done as per the set up below.



1. Name the catalyst *X*used in the above reaction. (1 mark)

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1. After sometime, brown fumes are formed in the flask.

Explain briefly how this observation occurs. (2 marks)

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1. Why does the metal catalyst stay red hot for sometime? (1 mark)

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1. The diagram below shows a set – up for preparation of hydrogen chloride gas.



1. Complete the set –up to how a dry sample of hydrogen Chloride can be collected. (2 marks)
2. Write the equation for the reaction that produces hydrogen chlorine gas. (1 mark)

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1. Describe how you would prepare crystals of sodium nitrate with 200cm3 of 2M sodium

hydroxide. (3 marks)

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1. Use the chart below to answer the questions that follow.



Identify:

i) Gas P……………………………………………………………… (1 mark)

ii) Solid R………………………………………………………….… (1 mark)

iii) Solid T……………………………………………………….…… (1 mark)

iv)Liquid S…………………………………………………………… (1 mark)

1. Element A has atomic mass 23 and element B atomic mass 7 and also has 12 neutrons

and 4 neutrons respectively.

1. Write the electron arrangement of A and B. (2 marks)

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1. Which element has higher ionisation energy? Explain. (2 marks)

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1. A compound of Carbon, hydrogen and oxygen contains 71.12 by mass of oxygen,

2.2 hydrogen and the rest is carbon. It has relative molecular mass of 90.

1. Determine the empirical formula of the compound. (2 marks)

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1. Determine the molecular formula of the compound. (2 marks)

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1. State Boyle’s law. (1 mark)

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1. Explain why graphite is preferred to lubricating oil in the moving parts of the machine. (2 marks)

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1. Molten sodium chloride and graphite both conduct electricity.

State their difference in electrical conductivity. (2 marks)

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1. Explain why burning magnesium continues to burn in a gas jar full of carbon(IV) but a

burning splint goes off. (3 marks)

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