

Name.....

Index No. ....

School .....

**233/1**  
**CHEMISTRY**  
**PAPER 1**  
**(THEORY)**  
**TIME: 2 HOURS**

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

**Instructions to Candidates:**

- Answer ALL questions in the spaces provided
- Mathematical tables or electronic calculators may be used.
- All working must be clearly shown where necessary.

**For examiner's use only.**

<b>QUESTION</b>	<b>MAXIMUM</b>	<b>SCORE</b>
<b>1 – 28</b>	<b>80</b>	

*This paper consists of 12 printed pages.  
Candidates should check the question paper to ensure that all pages are printed as indicated  
and no questions are missing*

1. In the process of separating / extracting oil from castrol oil seeds in the laboratory, Kwamboka, first crushed the seeds and then added propanone (acelone) instead of water.

(i) Why were the seeds first crushed? (1mk)

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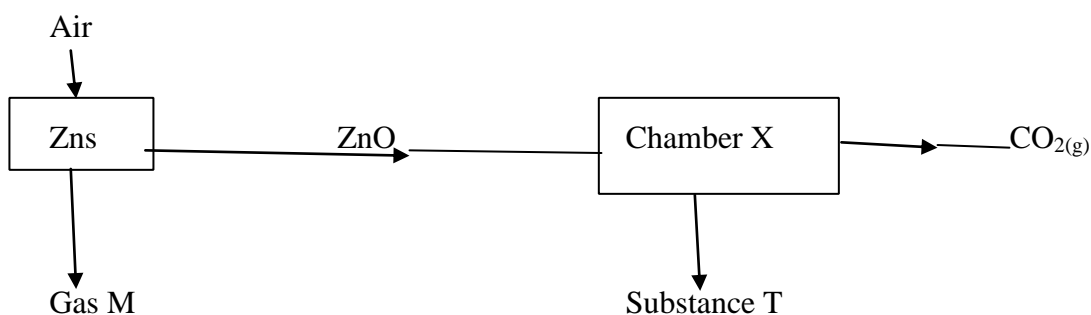
(ii) Explain how the oil can be separated from propane? (1mk)

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(iii) Explain why propanone was added and not water. (1mk)

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2. Zinc blende is impure zinc sulphide, the ore from which zinc is extracted. The flow chart below illustrates the extraction of zinc. Study it and answer the questions that follow.



(i) Which is the major chemical process taking place in chamber x. (1mk)

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(ii) Give the identity of substance T. (1mk)

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(iii) State the environmental hazard that is associated with this production. (1mk)

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3. Omwenga did an experiment to determine the empirical formula of an oxide of metal R. The oxide was heated in a stream of dry hydrogen gas. When it appeared there was no further change, the boat was cooled with hydrogen still passing over it and then it was reweighed. It was re-heated in hydrogen, cooled and reweighed until a constant mass was attained for boat and metal R.

Mass of boat = 10.2g

Mass of boat + metal R = 17.37g

Final mass of boat + metal R = 16.41g

(i) Why was the boat cooled with hydrogen still passing over it? (1mk)

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(ii) Work out the empirical formula of the formula of the oxide from the above results

(R=207.0 O=16.0) (2mks)

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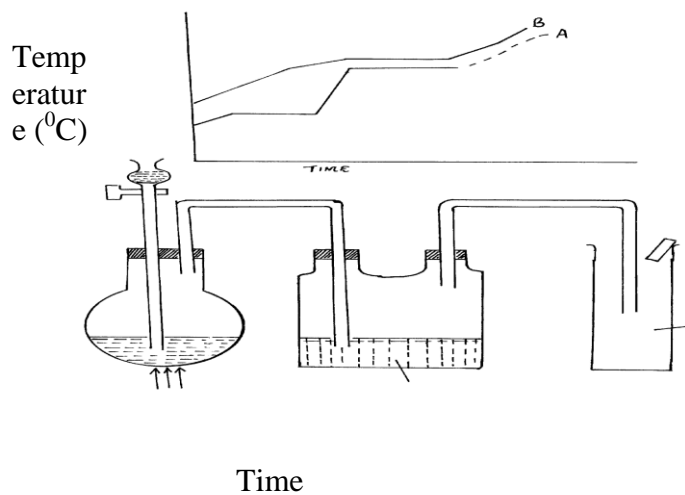
4. Differentiate between the bleaching action of chlorine and sulphur (IV) oxide gas. (2mks)

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5. Ethanol is a liquid at room temperature, but does not conduct electricity. Explain. (2mks)

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6. The figure below shows the temperature curve of two substances.



Which curve represents a pure substance. Explain. (2mks)

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7. Pure chromatograph of a plant extract gave the following results.

Solvent	Number of pigments
A <sub>1</sub>	4
B <sub>1</sub>	1
C <sub>1</sub>	2

Which solvent is the most suitable for purifying the extract. Explain. (2mks)

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8. An aqueous potassium sulphate solution was electrolysed using platinum electrodes in a cell.

a) Name the products formed at the

(i) Cathode (½ mk)

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(ii) Anode (½ mk)

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b) How does the concentration of the electrolyte change during electrolysis. (1mk)

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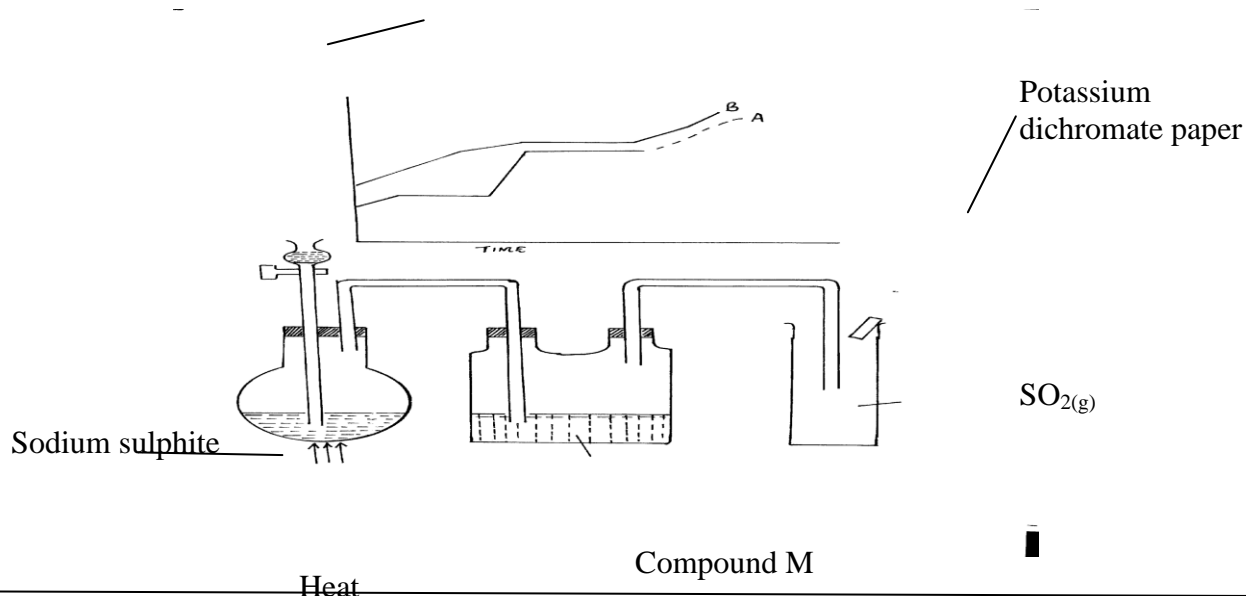
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(c) Write the equation for the reaction that takes place at the anode. (1mk)

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9.



The set up above shows the laboratory preparation of sulphur (IV) oxide. Study it and answer the question.

(i) Identify compound M and state its functions. (2mks)

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(ii) What is observed on wet potassium dichromate paper? (1mk)

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10. Consider the following operations:

A. A spatula full of sulphur is put into a beaker and a spatula full of iron filings is added to it and shaken

B. A spatula full of sulphur and iron filings is heated in a soluble for some few minutes

(i) What is the difference between the two operations? (1mk)

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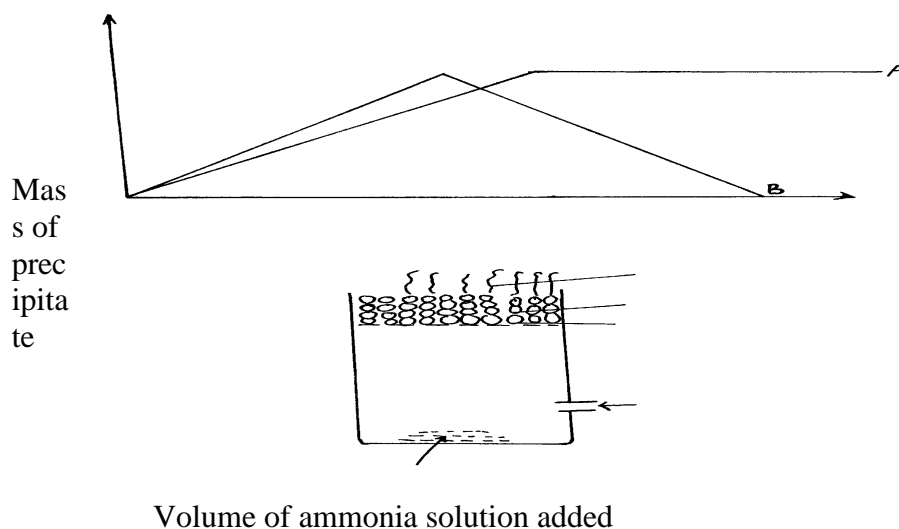
(ii) How would you separate sulphur from the mixture of sulphur and iron? (2mks)

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11. An experiment was carried out to determine the amount of precipitates formed when ammonia solution was added separately to equal volumes of copper (II) nitrate and magnesium nitrate solution. The solution had some concentrations. The graphs below shows mass of precipitate against volume of ammonia solution added.



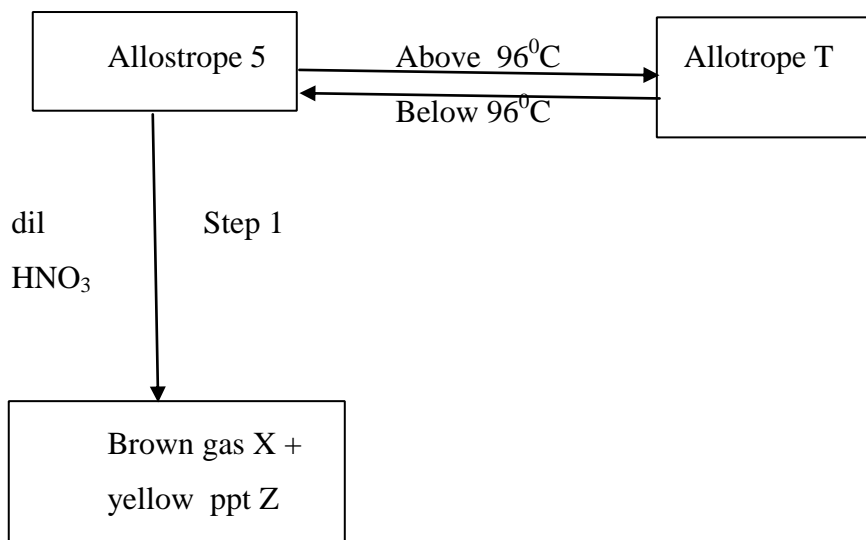
- a) Which curve corresponds to
- (i) Magnesium nitrate ..... (1mk)
- (ii) Copper (ii) nitrate ..... (1mk)
- (iii) Explain the shape of curve B. (1mk)
- .....
- .....

12. A compound Y reacts with Bromine to form hydrogen bromide gas and another compound Z with the molecular formula  $C_3H_7Br$ .

- a) Draw the structural formula of Y. (1mk)
- .....
- .....

- b) State one condition necessary for the above reaction to occur. (1mk)
- .....
- .....

13. Study the diagram below and answer the questions that follow:



- a) Identify (2mks)

S .....

T .....

X .....

Z .....

- b) State the observation made when allotrope S is mixed with iron fillings and then heated.

(1mk)

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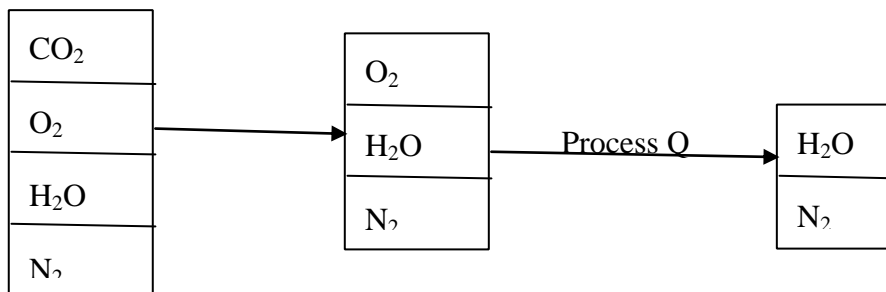
c) Write a balanced equation for the reaction in (b) above. (1mk)

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14. The chart below shows the process of obtaining nitrogen gas by fractional distillation.



(i) What is the purpose of process P and Q? (1mk)

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(ii) Identify the reagents used in process P. (1mk)

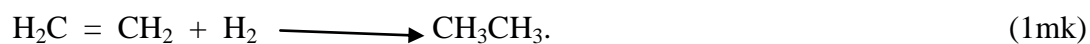
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15. Study the information in the table below and answer the questions that follow.

Bond	H – H	C – H	C=C	C – C
Bond energy KJmol <sup>-1</sup>	432	413	612	347

(a) Identify the bonds broken in the reaction:-



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(b) Calculate the enthalpy change,  $\Delta H$ , of the reaction above.

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16. An isotope R has a mass number 34 and 18 electrons.

(a) State its electron arrangement. (1mk)

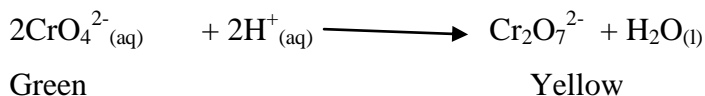
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(b) To which period and group does R belong. (1mk)

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(c) How does R form its ions? Explain. (1mk)  
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17. Consider the chromate (IV) / Chromate (VI) equilibrium system described by the ionic equation.



(a) What is meant by a chemical equilibrium? (1mk)  
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(b) Explain the observation that would be when ammonia solution is added to the mixture above. (2mks)  
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18. A piece of burning sulphur in a defragrating spoon is lowered into a gas jar of oxygen.

a) State the observation made. (1mk)  
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b) What name is given to the reaction that takes place? (1mk)  
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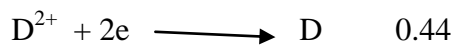
c) Write down equation for the reaction. (1mk)  
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II. Using equation explain how a solution of chlorine in dilute sodium hydroxide acts as a bleaching agent. (2mks)  
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19. The following are standard electrode potentials (E).

Element



Calculate the value of the smallest e.m.f produced when two half cells are combined.(2mks)

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20. a) Both oxygen and nitrogen (I) oxide re-lights a glowing splint. How can they be distinguished? (2mks)

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b) Give one use of nitrogen (I) oxide gas. (1mk)

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21. a) Concentrated sulphuric acid and anhydrous calcium chloride are not used to dry ammonia. Explain. (2mks)

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b) Name the substance which is used to dry ammonia gas. (1mk)

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22. The ability of temporary hard water to conduct electricity falls when water is boiled but it is not much affected when temporary hardness is converted by addition of washing soda.  
Explain. (2mks)

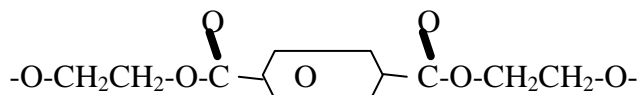
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23. The structure below is part of a structure of a polymer



- a) Deduce the structures of the monomers. (1mk)

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- b) Name the type of polymerization process through which the polymer was formed.

(1mk)

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24. The table below gives the rate of decay for a sample of a radioactive element W.

Mass of W <sub>(g)</sub>	Number of days
48	0
18	90
6	18

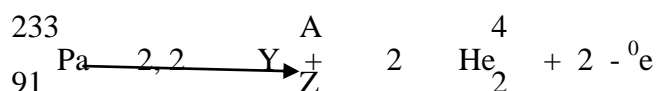
- a) Determine the half-life of element W. (2mks)

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- b) Given that



determine the value of

Z ..... (1mk)

A ..... (1mk)

25. You are provided with dilute sulphuric (VI) acid, Nitric (V) acid and lead (II) oxide. Explain how you would prepare a sample of lead (II) sulphate. (3mks)

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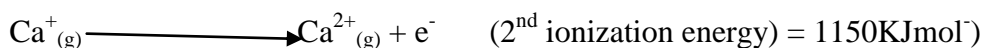
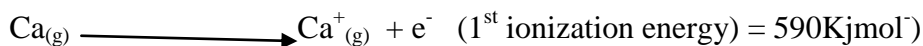
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26. Study ionization energies of calcium



a) What is ionization energy. (1mk)

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b) Explain why the second ionization energy in calcium is almost double the first. (2mks)

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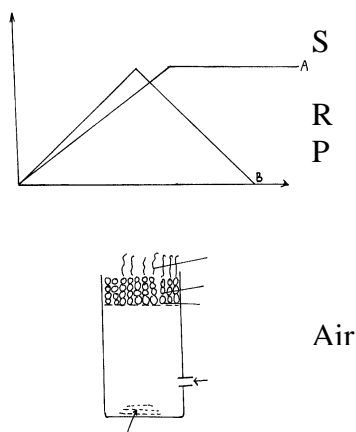
27. Burning magnesium continues to burn inside a gas jar full of carbon (IV) oxide. Explain (2mks)

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28. The diagram below represent a charcoal jiko burning.



(i) Write the equation for the reaction that occurs in regions P and R. (2mks)

P

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R

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(ii) State one precaution to be taken when burning charcoal in our homes? (1mk)

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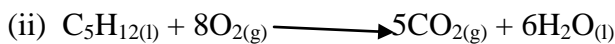
29. State the main difference between an addition and esterification reactions. (2mks)

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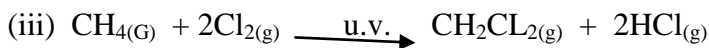
30. Alkanes are unreactive and only take part in three main types of reactions. Use the equations below to name the three types of reactions.



Type of reaction ..... (1mk)



Type of reaction ..... (1mk)



Type of reaction ..... (1mk)