233/1
CHEMISTRY
PAPER 1
THEORY
JULY / AUGUST 2009
2 HOURS

JOINT INTERSCHOOLS EVALUATION TESTS
JISET 2009

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

1. Bronze is an alloy of Tin and Copper. **Give one** use of Bronze (1mk)

2. The following setup was used to investigate some properties of two gases G and H
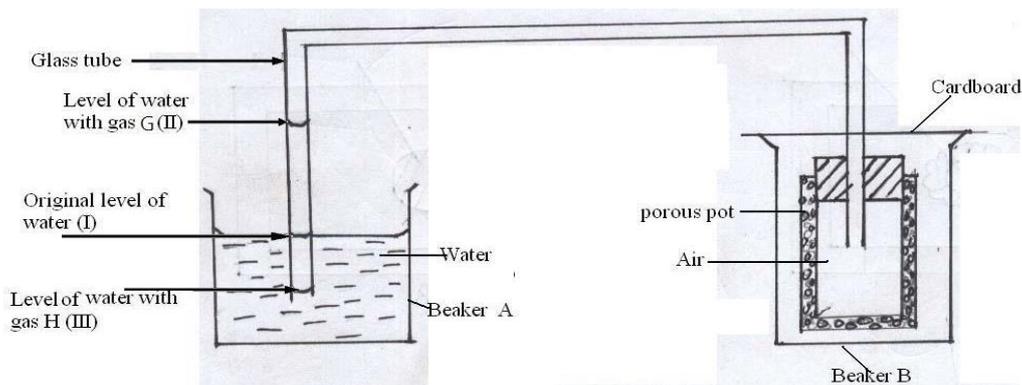
   When beaker B was filled with gas G the level of water in the glass tube rose to point II. When the experiment was repeated using gas H, the level of water dropped to point III. **Explain** these observations (3mks)

3. **State** the oxidation number of Manganese in

   (i) MnO_2 (1mk)

   (ii) MnO_4^- (1mk)

4. Chlorine can be prepared by using the following three reagents; Solid Sodium Chloride, Concentrated Sulphuric (VI) acid and Potassium permanganate.
   (i) What is the role of each of the following in the reaction?
   I. Concentrated Sulphuric (IV) acid (1mk)
   II. Potassium permanganate (1mk)

5. The following is a flow chart representing the manufacture of a fertilizer.
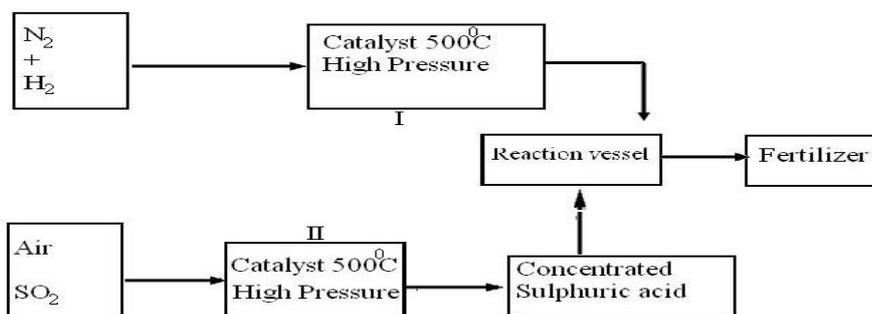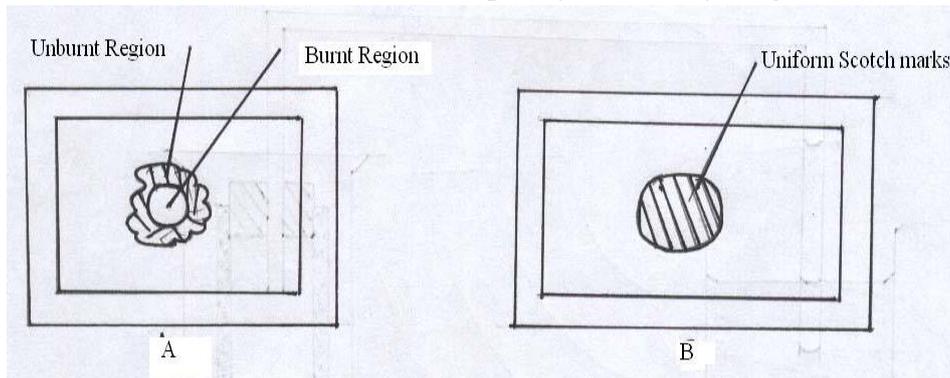

   (i) **Write** an equation for the reaction in chamber I (1mk)

(ii) **Name** the catalyst in chamber II (1mk)

(iii) **Name** the fertilizer produced. (1mk)

6. The diagram below shows the appearance of two pieces of paper placed in different parts of a non-luminous flame of a Bunsen burner and removed quickly before they caught fire.

(a) **State** and **Explain** the observation made in a diagram A (2mks)

(b) Which diagram is as a result of the paper having been put at the part of the flame which is better for heating? **Explain**. (2mks)

7. The set up below was used to electroplate a metallic door handle. Study it and answer the questions that follows.
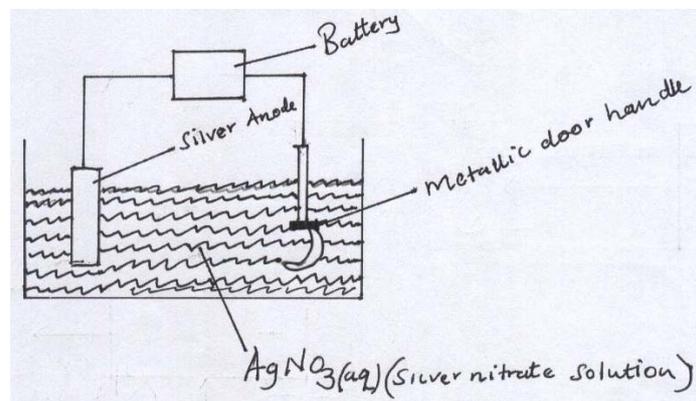
(a) **Write** an ionic equation for the reaction that occurred at the cathode. (1mk)

(b) **State** and **explain** what happens to the anode. (1mk)

8. Timothy Wafula of form II at Makini school set up the following experiment with the help of the two laboratory assistants. Metal rods S, T, U and V were cleaned with sand paper and placed in a beaker containing water. A second set was put in a container of steam and a third set was placed in a beaker containing dilute acid. Bubbles of gas and reaction was observed around some of the rods as shown in the diagram s below.
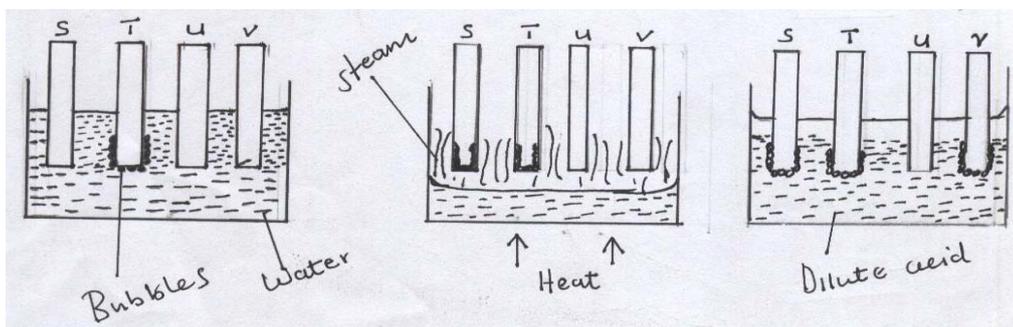
(a) It was very necessary to clean the rods with sand paper before dipping them. **Explain**.

(1mk)

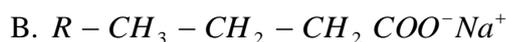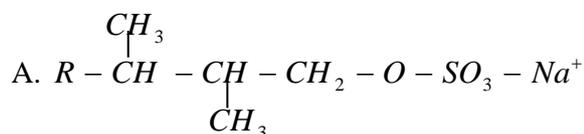(b) Arrange the four metals in order of their reactivity starting with the most reactive.

(1mk)

9. Describe how a solid sample of Lead(II) Chloride can be prepared using the following reagents: Dilute Nitric Acid, Dilute Hydrochloric Acid and Lead Carbonate. (3mks)

10. The following structures shows three detergents A, B and C

A. $R - CH - CH - CH_2 - O - SO_3 - Na^+$ with CH_3 on the second carbon and CH_3 below

B. $R - CH_3 - CH_2 - CH_2 COO^- Na^+$

C. $RCH_2CH_2CH_2 - O - SO_3^- Na^+$

(i) Which of these detergents is the worst pollutant? **Explain**. (2mks)

(ii) **Explain** how soap molecules remove grease stains from the clothes. (2mks)

11. An element "X" forms a bromide that is a liquid at room temperature and has a formula XBr_3. Neither the element nor its bromide conducts electricity.

(a) In which group of the periodic table is "X" likely to be found. (1mk)

(b) Predict the likely structure of the compound formed above. (1mk)

(c) Show bonding in hydroxonium ion (H_3O+) (H = 1, O = 8) (1mk)

12. Using Brownsted and Lowry theory, **define** the terms:

(i) A base (1mk)

(ii) An acid (1mk)

13. When excess Carbon(II) Oxide is passed over Lead (II) Oxide in a combustion tube, Lead(II) Oxide is reduced.

a) **Write** an equation for the reaction which took place. (1mk)

b) **What** observation was made in the combustion tube when the reaction was complete? (1mk)

c) **Name** another gas which should be used to reduce Lead(II) Oxide. (1mk)

14. In an experiment it was found that 8.40g of Lead combined with 1.31g of Oxygen. **Calculate** the empirical formula of Lead Oxide. (Pb = 207, O = 16) (2mks)

15. Study the energy level diagram below and answer the questions that follow
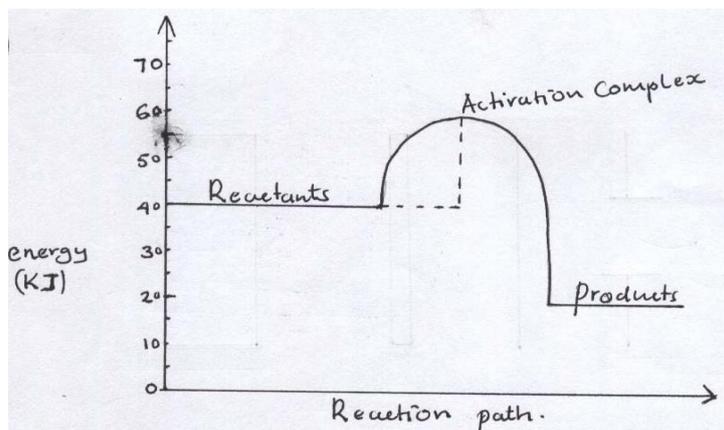
(i) **State** and **explain** whether the reaction represented in the diagram is endothermic or exothermic.
(2mks)

(ii) From the diagram, **determine**

I. The activation energy. (1mk)
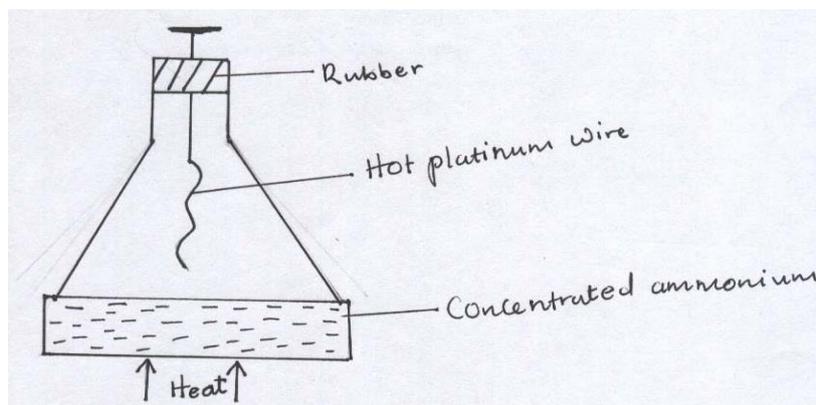
II. Enthalpy of reaction (1mk)

16. **Explain** why the reaction between 1.0g of Calcium Carbonate and 1M Hydrochloric acid is faster than the reaction between 1.0g Calcium Carbonate and 1M at Butanoic acid. (2mks)

17. Water is known to be pure by two criteria. **State** the two criteria

(i) (1mk)

(ii) (1mk)

18. The diagram below shows an investigation on a property of ammonia gas.

(a) The platinum wire is observed to glow. **Explain** the cause of that observation.
(2mks)

(b) **State** the observations made when the rubber bang is removed. (1mk)

19. Water and petrol are immiscible liquids.
(a) **Draw** the apparatus used in the laboratory to separate immiscible liquids and label the layers. (2mks)
(b) **Name** the apparatus. (1mk)

20. A form four student wanted to determine the solubility of PotassiumNitrate. He obtained the following results as shown below.

Mass of evaporating dish   15.13g

Mass of evaporating dish and solution   36.51g

Mass of evaporating dish and salt   19.41g

Use the information above to calculate the solubility of Potassium Nitrate.   (3mks)

21. **State two** factors that should be considered when choosing fuel for cooking.   (2mks)

22. Polyvinyl Chloride (PVC) is an example of addition polymer.
    (a) **What** is meant by addition polymerization.   (1mk)
    (b) **Draw** the structure of part of the polymer chain in Polyvinyl Chloride. (PVC)   (1mk)

23. A sealed glass tube containing air at s.t.p was immersed in water at 80^0c. Assuming there was no increase in the volume of the glass tube due to expansion of the glass, **calculate** the pressure of the air inside the tube.   (3mks)

    (standard pressure = 760mmHg, Standard Temperature = 273k)

24. Using dots (.) and crosses (x) to represent electrons. **Draw** a diagram to show bonding in Sulphur (IV) Oxide. (S = 16, O = 8)   (2mks)

25. During electrolysis of aqueous Zinc Sulphate solution, a current of 0.6 A was passed through the electrolyte for 18 minutes. **Calculate** the volume of gas produced at the anode. (1 Faraday = 96500 coulombs, Molar gas volume is $24000cm^3$ at room temperature)   (3mks)

26. The table below gives three experiments on the reaction of excess Hydrochloric acid and 1.0g of Magnesium done under different conditions. In each case the volume of gas was recorded at different time intervals.

Experiment	Terms of Magnesium	Conclusion of Sulphuric VI acid
I	Powder	0.8m
II	Powder	1.0m
III	Powder	0.8m

On the same axis sketch and label the three curves that could be obtained from such results. (3mks)
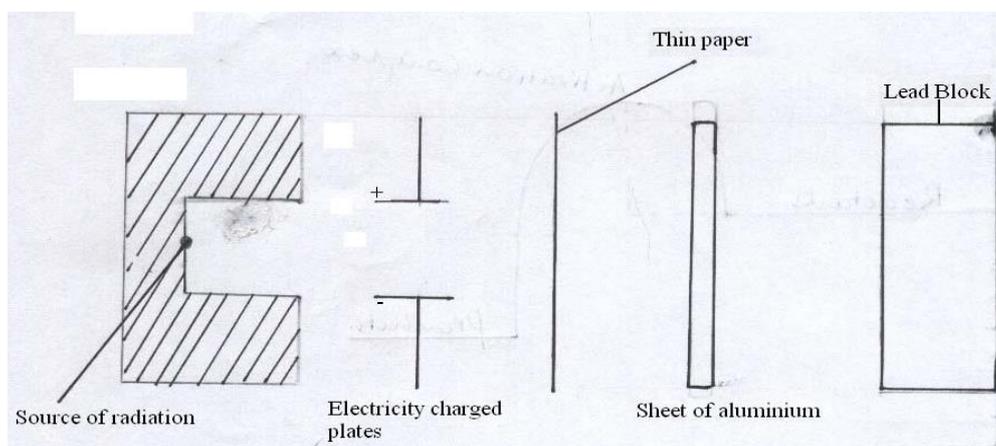
GRAPH PAPER

27. The elements shown in the table belong to a certain metallic group in the periodic table. Study the information and answer the questions that follow.
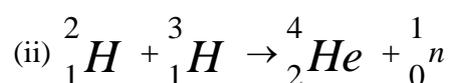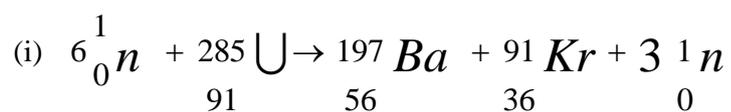
Element	Atomic size (nm)
S	0.160
T	0.180
V	0.193

Define the term

(i) Ionisation energy.   (1mk)

(ii) **Which** element is likely to have most ionization energy? **Explain**   (2mks)

28. **Complete** the diagram below to show how Alpha and Beta particles from radioactive source can be distinguished from each other. **Label** your diagram clearly.   (2mks)

Thin paper   Lead Block

Source of radiation   Electricity charged plates   Sheet of aluminium

(b) The following are nuclear equations

(i) $6{}_{0}^{1}n + 285{}_{91}U \rightarrow {}_{56}^{197}Ba + {}_{36}^{91}Kr + 3{}_{0}^{1}n$

(ii) ${}_{1}^{2}H + {}_{1}^{3}H \rightarrow {}_{2}^{4}He + {}_{0}^{1}n$

Identify the nuclear fission reaction. (1mk)

29. When carbon is reacted with concentrated Nitric acid, a brown gas is formed as one of the products.

(a) **What** property of Carbon leads to the production of a brown gas? (1mk)

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

30. A weighed sample of crystalline Sodium Carbonate. ($Na_2CO_3.nH_2O$) was heated in a crucible until there was no further change in mass. The mass of the sample reduced by 25.0g. **Calculate** the number of moles (n) of the water of crystallization. (3mks)