SUNSHINE SECONDARY SCHOOL

NAME----------CLASS ----------

ADM NO ----------

SIGNATURE ----------

DATE ----------

233/1
FORM 4
CHEMISTRY
PAPER 1
PRE MOCK 1 2017
TIME: 2 HOURS

PRE MOCK 1
MARCH 2017

INSTRUCTIONS

- 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

For examiners use only

80

1. a) Explain why hydrogen has oxidation states of +1 and -1 in its compounds. (1mark)

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b) A piece of cover slip was weighted before and after a student made a mark on it using a pencil like of pure graphite. The masses were as shown below.

Mass of cover slip before the mark = 1.804g

Mass of cover slip after the mark was made = 1.9053g

Determine the number of carbon atoms used to draw the circle. (C = 12, L = 6.02×10^{23})

(2 marks)

2.a) State the conditions under which copper reacts with sulphuric (VI) acid and give one equation for the reaction. **(2 marks)**

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b) When zinc granules are dropped into two separate solutions of dilute sulphuric (VI) and concentrated sulphuric (VI) acid, effervescence of a colourless gas occurs in each case. Give equations to represent the reactions that take place. **(2 marks)**

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3. The symbols for two isotopes of iron are shown below

$^{54}_{26}Fe$ and $^{57}_{26}Fe$

i) How do this two isotopes differ in their atomic structure (1mk)

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ii) Determine the number of neutrons present in one atom of $^{57}_{26}Fe$ (1mk)

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iii) Determine the number of electrons in one atom of Fe^{3+} (1mk)

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4. (i) Distinguish between a weak acid and a strong acid giving an example of each. (2 marks)

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(ii) Identify an acid in the forward reaction given by the equation below: (1 mark)

$HSO_{4\,(aq)}^{-} + H_2O_{(l)} \leftrightharpoons H_2SO_{4\,(aq)} + OH_{(aq)}^{-}$

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5 During the electrolysis of dilute sulphuric (VI) acid the volume of hydrogen gas collected is twice the volume of oxygen gas. Using half equations justify the above statement. (2mks)

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6. The following table gives the melting points of oxides of elements in period 3. Study it and answer the questions that follow:-

Formula of oxide	Na_2O	MgO	Al_2O_3	SiO_2	P_4O_{10}	SO_3
Melting point (^oC)	1190	3080	2050	1730	560	-73

(i) Explain the difference in melting points of MgO and P_4O_{10} (2mks)

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(ii) Name the compound in the above table that will dissolve both in dilute hydrochloride acid and dilute sodium hydroxide. (1mk)

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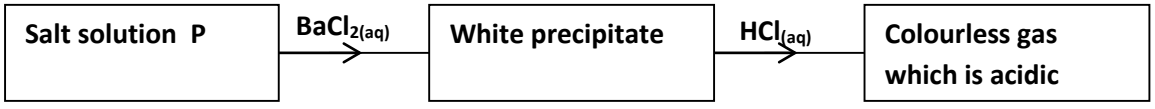
7 . Study the scheme below and use it to answer the questions that follows.



Write down the formulae of two possible anions present in salt solution **P**. (2mks)

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8. Hydrogen sulphide is a highly toxic and flammable gas and is usually prepared in the fume chamber.

a) Name any two reagents that can be used to prepare hydrogen sulphide in the laboratory. (1mk)

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b) Hydrogen sulphide could be used to produced sulphur as shown in the equation below:

$2H_2S_{(g)} + SO_{2(g)} \longrightarrow 3S_{(s)} + 2H_2O_{(l)}$

In the equation above, identify the reducing agent and give a reason for your answer. (1mk)

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c) Other than Vulcanisation of rubber, identify any other uses of Sulphur. (1mk)

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9. Dry powdered sodium hydrogen carbonate can be used to extinguish electrical fires.
With aid of equations, explain how sodium hydrogen carbonate plays this role. (2 marks)

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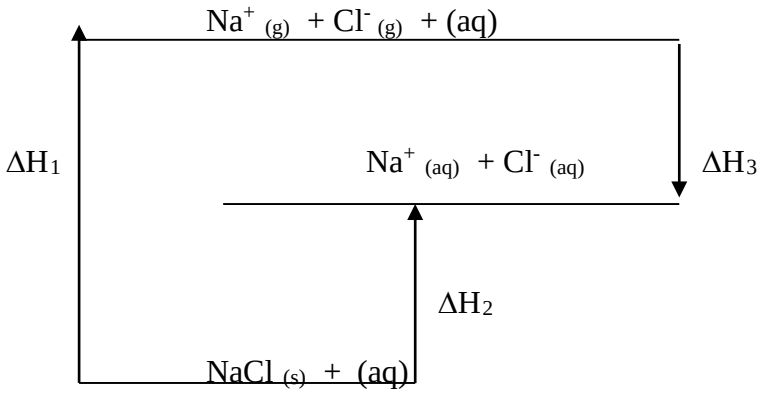
10. The diagram below represents the energy relationship when sodium chloride is dissolved in water.



(a) Write an expression to show how ΔH_1, ΔH_2 and ΔH_3 are related. (1 mark)

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(b) State the name of enthalpy change represented by

I) ΔH_3 …… (1 mark)

II) ΔH_1 …… (1 mark)

11. Describe how a dry sample of barium sulphate could be prepared in the laboratory starting with sodium sulphate solution, barium carbonate and 50% dilute nitric (V) acid. (3 marks)

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12. Study the bond energies given below to answer the question that follows.

Bond	Bond energy ($kJmol^{-1}$)
H – H	432
C = C	610
C – C	346
C – H	413

Butene can be converted into butane in the equation:

$CH_3 CH_2 CH = CH_2 + H_2 \longrightarrow CH_3 CH_2 CH_2 CH_3$

Determine the enthalpy change in the reaction. (3marks)

13. The following table shows the P^H values of solutions **A B** and **C**

Solution	**A**	**B**	**C**
pH	2	**7**	11

(a) Which solution is likely to be magnesium chloride. Give a reason. (1mk)

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(b) Identify the solution in which a sample of aluminium chloride is likely to be when dissolved in water. Explain (2mks)

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14. The structure below represents two cleansing agents, L_1 and L_2.

$L_1 \rightarrow$ $R - CH_2 - CH_3$ with $OSO_3^- Na^+$

$L_2 \rightarrow R - COO^- Na^+$

(i) Identify each of the two cleansing agents, L_1 and L_2.

L_1 ……. (1mark)

L_2 ……. (1mark)

(ii) State a disadvantage of each of the above cleansing agents.

L_1 ……. (1mk)

L_2 …….. (1mk)

15. A volume of $15cm^3$ of ethane gas (C_2H_4) was exploded with $50cm^3$ of oxygen. If both volumes were measured at the same temperature and pressure, calculate the volume of the resulting gaseous mixture.

(i) Write the equation of the reaction for the combustion of ethane. (1mk)

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(ii) Calculate the volume of gaseous mixture. (2mks)

16. Two papers **A** and **B** were placed at different levels of a non-luminous flame. Paper **A** was placed at the lowest part of the flame while **B** was placed at the tip.

(a) Indicate **below** the observations made on each paper. (2 marks)

Paper **A**

Paper **B**

(b) Explain the observations made on paper **A**. (1 mark)

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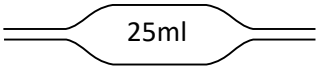
17. (a) Name the apparatus shown **below**. (1 mark)



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(b) Sate **one** safety measure to be taken while using the apparatus shown. (1 mark)

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(c) State the use of this apparatus in the laboratory. (1 mark)

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18. A 25cm^3 bubble of methane gas was trapped at the bottom of the North Sea bed at a temperature of -13^{o}C under a pressure of 1100kPa. The bubble was dislodged and rose to the surface at a pressure of 100kPa and a temperature of 15^{o}C. Calculate the volume of the bubble at the surface. (2 marks)

19. Water gas and producer gas are collectively known as fuel gases. Producer gas is a mixture of carbon (II) oxide and nitrogen gas.

a) Name the components of water gas. (1 mark)

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b) State one advantage of using water gas over producer gas. (1 mark)

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c) Write the overall equation for the combustion of water gas. (1mark)

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20. One of the ways ice is removed from the road surface to improve road safety during severe winters in Europe etc. is by spreading salts on the frozen surfaces.
(a) How does this work? (1 mark)

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(b) Name an application of the above in the Chemical Industry. (1 mark)

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21. State why one feels colder when ethanol is put on one's skin than when it is water put (1mk)

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22. (i) What is a fume chamber. (1mk)

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(ii) State 2 uses of fume chamber in a school laboratory (2mks)

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23. Lithium burns in oxygen to form the ionic compound lithium oxide.

(i) State the colour of the flame when lithium burns. (1mk)

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(ii) Write the formula of each of the ions in lithium oxide. (2mks)

Lithium ion .....

Oxide ion .....

24. In industry, ethene is converted to ethanol by reacting it with steam in the presence of a catalyst.
(i) Name the catalyst used. (1mk)

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(ii) Ethanol can also be made by fermentation. Describe how this is done. (2mks)

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(iii). Ethanol is converted to ethyl ethanoate by warming it with ethanoic acid in the presence of a catalyst. How can a student detect the formation of ethyl ethanoate in this reaction? (1mk)

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25. Sodium hydroxide reacts with both iron(II) chloride and with iron(III) chloride. Describe how you could use sodium hydroxide solution to distinguish between solid samples of iron(II) chloride and iron(III) chloride. Give brief details of what you would do and what you would observe in each case (3mks)

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26. When chlorine is added during the water purification process, the water becomes acidic.

i) Why is chlorine added during water purification process (1mk)

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ii) Sugest why lime water is added after chlorination (1mk)

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27. Describe how hydrochloric acid and lime water can be used to test for the presence of carbonate ions in an unknown solution. (2mks)

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28. In a class experiment, a student prepared Nitrogen (IV) oxide gas in order to investigate its properties.

a) Name the reagents used in the preparation of Nitrogen (IV) oxide gas. (2mks)

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b) State one property of Nitrogen (IV) oxide gas that facilitates its transportation to industries. (lmk)

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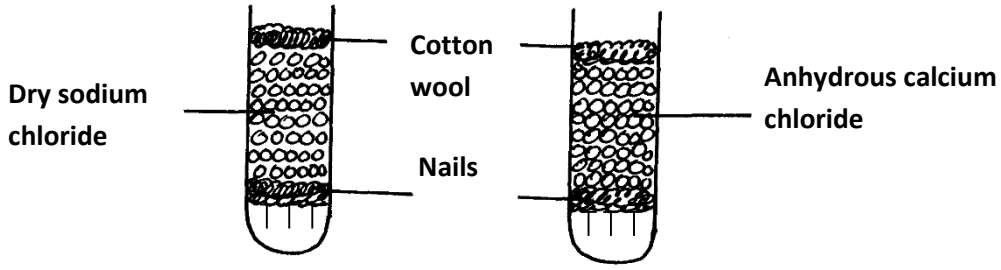
29. Study the diagram below and answer the questions that follow.



a)State and explain the observations made after two weeks. (2mks)

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b) Give **one** reason for Silver plating an Iron spoon (1mk)

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