

Name Index No.

233/1

Candidates signature

CHEMISTRY

Paper 1 (Theory)

Date

July 2018

Time : 2 Hours

FORM 4 END OF TERM 2 EXAM

CHEMISTRY

Paper 1

July 2018

Time : 2 Hours

INSTRUCTIONS TO CANDIDATES

- * Write your name and index number in the spaces provided.
- * Sign and write the date of examination in the spaces provided.
- * Answer **ALL** questions in the spaces provided in the question paper.
- * Mathematical tables and silent calculators may be used.
- * All working must be clearly shown where necessary.
- * Use English when answering the questions.
- * Candidates should check the question paper to ascertain that all pages are printed.

For Examiner's Use Only

Question	Maximum score	Candidate's Score
1 - 29	80	

1. The relative atomic mass of an element is 10.28. It has two isotopes ${}^{10}_5\text{R}$ and ${}^{11}_5\text{R}$. Calculate the relative percentage abundance of each isotope. (2 marks)

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2. Describe how solid ammonium chloride can be obtained from a solid mixture of calcium chloride and ammonium chloride. (3 marks)

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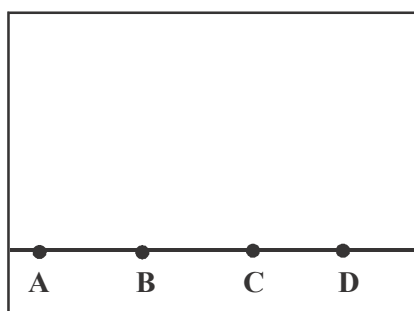
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3. The diagram below shows spot of pure substances A, B and C on a chromatography paper. Spot D is that of a mixture. After development A, B and C were found to have moved 9cm, 4cm and 7cm respectively while D separated into two spots 7cm and 9cm.

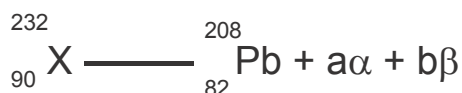
- a) On the diagram below show the position of all the spots after development. (2 marks)



- b) Identify the substances present in mixture D. (1 mark)

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4. A radioactive element X decays as shown below. (2 marks)



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5. A student was asked to prepare lead (II) chloride salt using the following ingredients. Nitric (V) acid, lead (II) oxide and hydrochloric acid. Using ionic equations. Explain how the salt can be prepared. (3 marks)

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6. Carbon (IV) oxide gas reacts with hydrogen to form methanol and oxygen under certain conditions. The reaction is represented by the equation below.



What would be the effect on the yield of methanol if the temperature of the reaction of the mixture is increased. (2 marks)

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7. Explain the change in mass that occurs when following substances are separately heated in open crucibles.

a) Copper metal (1½ marks)

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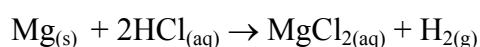
b) Copper (II) nitrate (1½ marks)

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8. The equation below represents a redox reaction.



a) Write down the equation for the reduction process. (1 mark)

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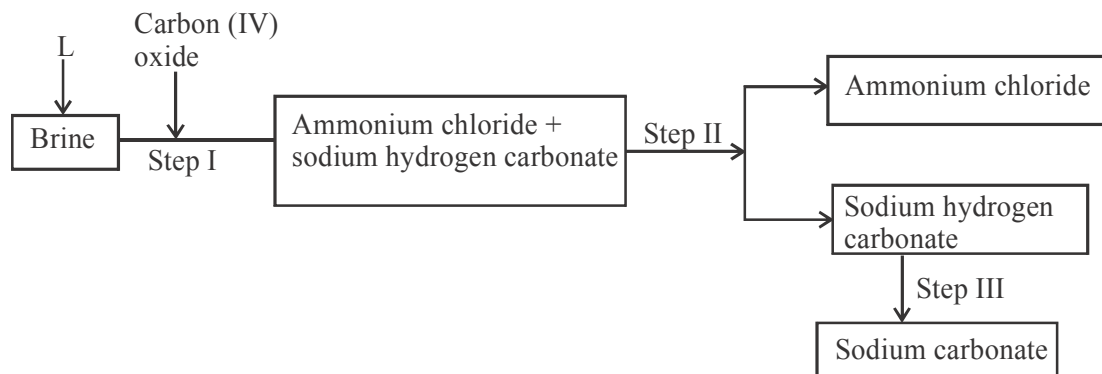
- b) Identify**
 i) reducing agent

(1 mark)

- ii) oxidising agent

(1 mark)

- 9.** The simplified flow chart shows some of the steps in the manufacture of sodium carbonate by Solvay process.



- a) Identify substance L**

(1 mark)

- b) Name process taking place in step II**

(1 mark)

- c) Write an equation for the reaction which takes place in step III**

(1 mark)

- 10.** When ammonium chloride solid is heated, a moist red litmus paper turns blue then red when placed near the mouth of test tube. Explain ?

(3 marks)

- 11.** The atomic numbers of the first four noble gases are 2, 10, 18 and 36. Use this information to deduce the group and the period of the elements whose atomic numbers are 15 and 37.

(2 marks)

Atomic number	Group	Period
15		
37		

12. An organic compound contains 40.0% carbon, 6.7% hydrogen and the rest is oxygen. The molecular mass of the compound is 60. (C = 12.0, O = 16.0, H = 1.0)

a) Determine the :

i) Empirical formula of the compound (2 marks)

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ii) molecular formula (1 mark)

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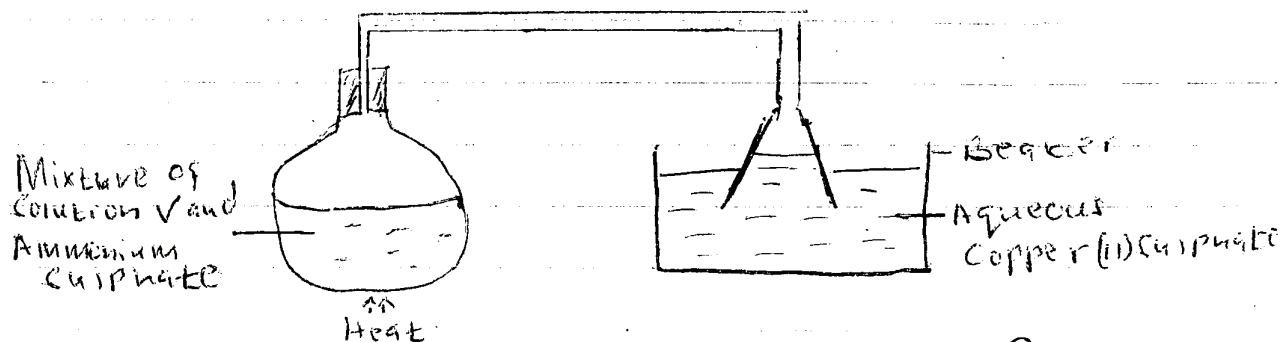
13. When 0.7g of element D were completely burnt in oxygen and all the heat evolved used to heat 500cm³ of water, the temperature rose from 23°C to 32°C. Work out the relative atomic mass of element D given that the specific heat capacity of water is 4.2KJkg⁻¹, density of water = 1.0g/cm³ and molar heat of combustion of D is 380kJmol⁻¹. (3 marks)

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14. A solution of hydrogen bromide in benzene does not react with sodium carbonate while an aqueous solution of hydrogen bromide reacts with carbonates. Explain the observation. (2 marks)

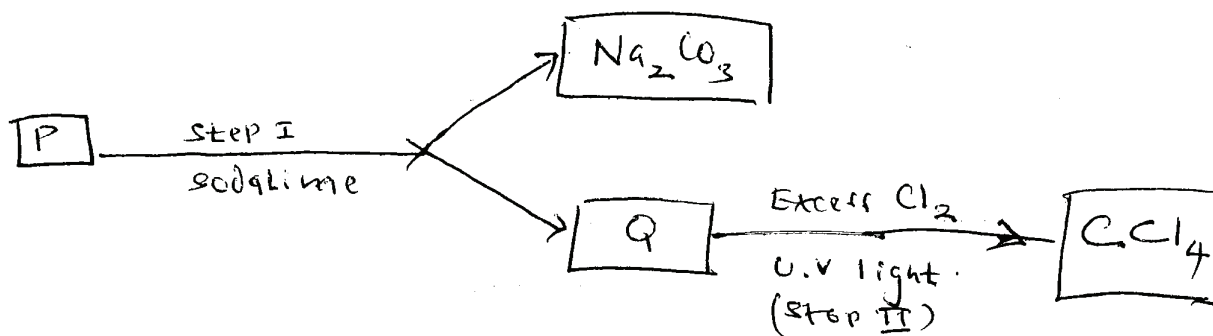
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15. A student set up the apparatus as shown below to prepare ammonia gas and react it with copper (II) sulphate solution.



- a) Identify solution V. (1 mark)
- b) State the observations which were made in the beaker. (1 mark)
16. The electronic configuration of an ion P^{2-} is 2.8.8. Draw the energy level diagram of the atom just above element P in the periodic table. (2 marks)

17. Study the flow chart below and answer the question that follow.

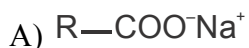


- a) Identify (2 marks)
- i) P
- ii) Q

b) What name is given to the type of reaction in step 2. (1 mark)

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18. The structure below represents two cleansing agents.



a) In the table below, give one advantage and one disadvantage of using each of them. (2 marks)

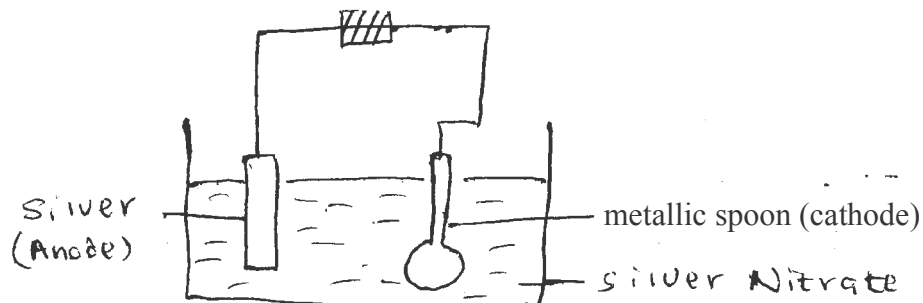
	Advantage	Disadvantage
$R-COO^-Na^+$		
$R-OSO_3^-Na^+$		

b) Which of the following two cleansing agent is the best for washing. Explain. (1 mark)

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19. The set up below was used to electroplate a metallic spoon. Study it and answer the question that follow.



a) Write an equation for the reaction that occurred at the cathode. (1 mark)

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b) State and explain what happened at the anode. (2 marks)

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20. The table below shows the observations made on tests carried out on a colourless liquid sample.

Experiment	Test	Observation
(i)	Addition of excess $\text{NH}_3(\text{aq})$	white precipitate
(ii)	Addition of dilute $\text{H}_2\text{SO}_4(\text{aq})$	white precipitate
(iii)	Addition of $\text{AgNO}_3(\text{aq})$	white precipitate

a) Identify:

i) Cation in the sample (1 mark)

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ii) Anion in the sample (1 mark)

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b) Write the ionic equation for the reaction taking place in experiment (iii) (1 mark)

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21. a) Explain why its not advisable to use wood ash for cleaning aluminium utensils. (1 mark)

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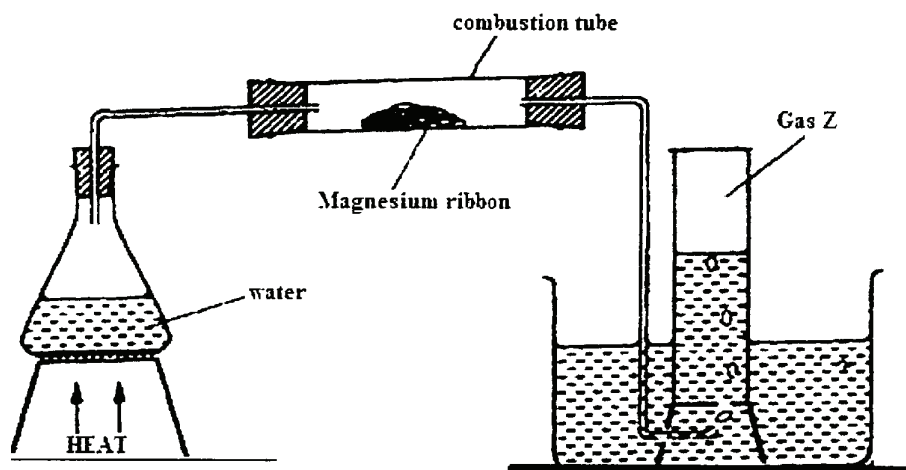
b) Aluminium metal is a good conductor and its used for overhead cables. State any other two properties that make aluminium suitable for this use.

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22. State any three differences between luminous and non-luminous flames. (3 marks)

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23. Study the set up below and answer the questions that follow.



a) Write an equation for the reaction which take place in the combustion tube. (1 mark)

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b) What property of gas Z allow it to be collected as shown in the diagram. (1 mark)

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c) State two uses of gas Z. (1 mark)

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24. a) Give Bronsted and lowry definition of an acid. (1 mark)

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b) Differentiate between a strong and a concentrated acid. (2 marks)

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25. The following table shows PH 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. (1 mark)

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b) Identify the solution in which a sample of aluminium chloride is likely to dissolve. Explain. (2 marks)

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26. Study the reaction scheme below.



i) Write the formula of :

i) Alkanol R (1 mark)

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ii) Compound S (1 mark)

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iii) Name process T (1 mark)

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27. Below are properties of some elements in period 3 of the periodic table.

Element	Na	Mg	Al
Atomic radius (nm)	0.152	0.136	0.125
Melting points (°C)	97.8	650	660

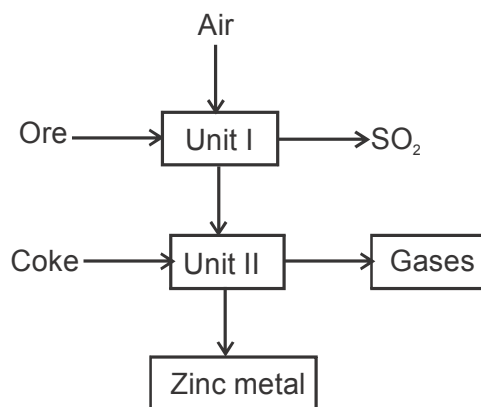
a) Explain the trend in melting points. (2 marks)

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b) Why is there a decrease in size of the atoms from Na to Al. (1 mark)

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28. The flow chart below shows some processes involved in the industrial extraction of zinc metal.



a) Name one ore from which zinc is extracted. (1 mark)

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b) Write the equation of the reaction that occur in unit II. (1 mark)

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c) Name two uses of zinc metal. (1 mark)

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29. Exhaust fumes of some cars contain carbon (II) oxide and other gases.

a) Explain how carbon (II) oxide is formed in the internal combustion engines. (1 mark)

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b) Name two gases other than carbon (II) oxide that are contained in exhaust fumes and are pollutants. (2 marks)

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