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SIGNATURE

DATE

233

CHEMISTRY
TIME: 2 HRS
OCTOBER 2016

EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

CHEMISTRY

October 2016

Time: 2 hours

INSTRUCTIONS TO CANDIDATES

- Write your name and admission number in the spaces provided above.
- Answer **all** questions in the spaces provided.
- All** working must be clearly shown where necessary.

Examiner's use:

Question	Maximum Score	Candidates Score
1- 19	100	

1. Hydrogen reacts with lead (II) oxide as shown in the following equation.
 Lead (II) oxide + hydrogen \rightarrow lead + water

Which substance is

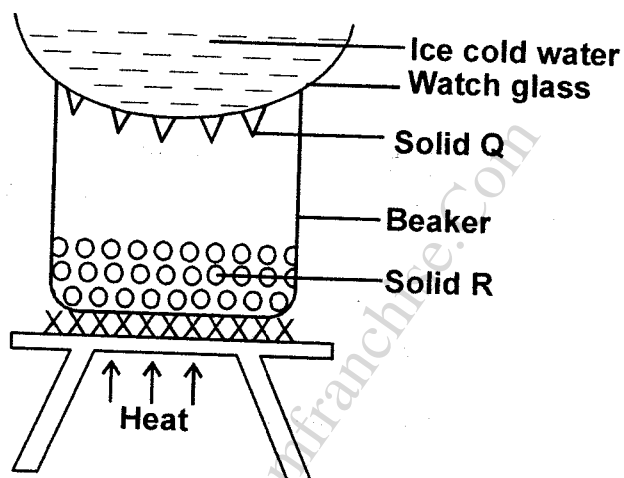
a) Reduced - (1 mark)

b) Oxidised (1 mark)

c) The reducing agent (1 mark)

d) The oxidising agent (1 mark)

2. A mixture of two salts (calcium chloride and iron (III) chloride) was heated strongly in a glass beaker covered with a watch glass containing ice-cold water. Study the set-up shown below and answer the questions that follow.



a) Identify substance Q and R. (2 marks)

Q

R

b) Why is Q collected as shown above? (1 mark)

.....

c) What is the purpose of the ice-cold water in the watch glass? (1 mark)

.....

3. Classify the following processes as either chemical or physical. (3 marks)

Process	Type of change
a) Heating copper (II) sulphate crystals	
b) Obtaining kerosene from crude oil	
c) Souring of milk	

4. Use the information in the table below to answer the questions that follow. The letters do not represent the actual symbols of the elements.

Element	B	C	D	E	F
Atomic number	18	5	3	5	20
Mass number	40	10	7	11	40

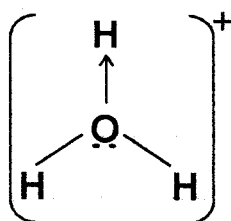
- a) Which two letters represent the same element? Give a reason. (2 marks)

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- b) Give the number of neutrons in an atom of element D. (1 mark)

.....

5. The structure of hydroxonium ion is shown below.

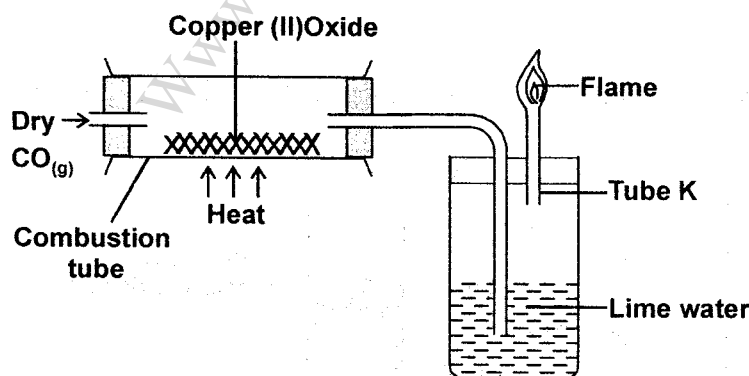


Name the type of bond represented by

- a) O - H (1 mark)

- b) O → H (1 mark)

6. The apparatus shown below was used to investigate the effect of carbon (II) oxide on copper (II) oxide.



- a) State the observations made in the combustion tube at the end of the experiment. (1 mark)

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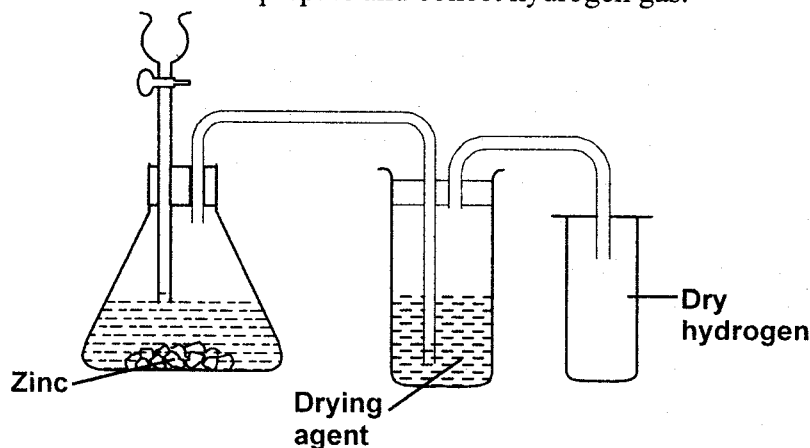
- b) Write an equation for the reaction that took place in the combustion tube. (1 mark)

.....

- c) Why is it necessary to burn the gas coming out of tube K? (1 mark)

.....

7. The set up below was used to prepare and collect hydrogen gas.



a) Identify one mistake in the set-up. (1 mark)

.....

b) Name a suitable substance that can be used as a drying agent. (1 mark)

.....

c) Write two chemicals that can be reacted with zinc above. (2 marks)

.....

.....

d) Write a chemical equation for the reaction of zinc with one of the chemicals you have mentioned in (c) above. (1 mark)

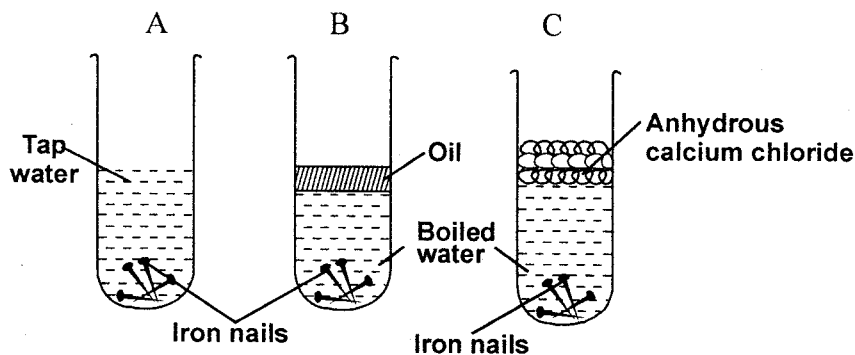
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e) State two commercial uses of hydrogen gas. (2 marks)

.....

.....

8. The following set-up of three test-tube was used to investigate rusting of iron. Study it and answer the questions that follow.



a) Give a reason why rusting did not occur in test tube B and C. (1 mark)

.....

b) Give two conditions necessary for rusting to occur. (1 mark)

.....

.....

c) State two conditions that accelerate the rusting process.

(1 mark)

.....
.....

9. The following table shows the pH values of solutions A, B, C and D.

Solutions	pH values
A	9.0
B	2.0
C	5.5
D	13.0

Which one of the solutions, sodium hydroxide, ethanoic acid, hydrochloric acid and ammonia solutions corresponds to solutions; A, B, C and D. (4 marks)

A

B

C

D

10. Below is a list of oxides. Study them and answer the question that follows.

NO, Na₂O, ZnO, SO₂

Select

a) A highly soluble basic oxide.

(1 mark)

.....

b) An oxide which can react with both dilute hydrochloric acid and sodium hydroxide solution.

(1 mark)

.....

c) A highly soluble acidic oxide.

(1 mark)

.....

d) A neutral oxide

(1 mark)

.....

11. Two elements X and Y have atomic number 12 and 8 respectively.

a) Write an equation to show the compound that is formed when X and Y react.

(1 mark)

.....

b) Name the type of bond that exist between the two elements; Give a reason.

(1 mark)

.....

c) Using dot (.) and the cross (x) to represent electrons, illustrate how the bonds in (b) above. (2 marks)

12. Magnesium chloride can be prepared by the action of Magnesium metal with dilute hydrochloric acid. a) Write the equation for the reaction. (1 mark)

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b) Why is it not advisable to prepare potassium chloride and copper (II) chloride using this method? (1 mark)

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c) Why is it not possible to prepare silver chloride and copper (II) chloride using this method? (1 mark)

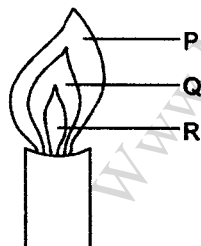
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d) The reaction between lead metal and dilute hydrochloric acid stops immediately. Explain (1 mark)

.....

.....

13. The diagram below represents a type of Bunsen burner flame.



a) Name the type of flame above. (1 mark)

b) Under which condition is the above flame produced in a bunsen burner. (1 mark)

.....

c) Which of the parts labelled P, Q and R in the hottest? Explain. (1 mark)

.....

.....

d) Which region is least hot? Give a reason. (2 marks)

.....

.....

14. i) Define the following terms;

a) electrolyte

(1 mark)

.....

b) Non-electrolyte

(1 mark)

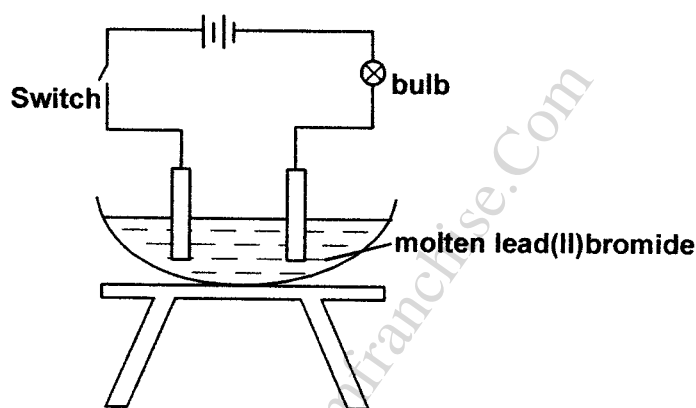
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c) Conductor

(1 mark)

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ii) The diagram below shows a set-up used by a form two student to investigate the effect of an electric current on molten lead (II) bromide. Use it to answer the questions that follow.



a) Why is it advisable to use molten lead (II) bromide and not solid lead (II) bromide.

(2 marks)

.....
.....
.....

b) The experiment should be performed in a fume chamber. Why?

(1 mark)

.....

c) Write equations to show the reaction taking place at the;
Anode;

(1 mark)

.....

Cathode:

(1 mark)

.....

15. The grid given below represents part of the periodic table. Study it and answer the questions that follow. (The letters do not represent the actual symbols of the elements)

							A
	C			B			
	F		D		E		

i) What name is given to the group of elements to which C and F belong? (1 mark)

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ii) Which letter represents the least reactive element. Explain. (2 marks)

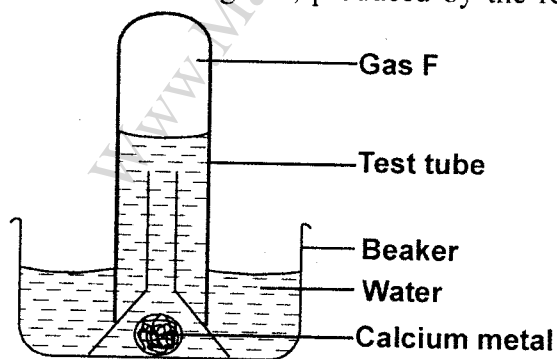
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iii) What type of bond is formed when B and E react? Explain. (2 marks)

.....

iv) On the grid indicate the position of element G which is in the third period and forms G^{3-} ions. (1 mark)

16. The set-up below was used to collect gas F, produced by the reaction between calcium metal and water.



a) Name gas F (1 mark)

b) At the end of the experiment, the solution formed was found to be a weak base. Explain. (2 marks)

.....

.....

c) Give one laboratory use of the solution formed in the beaker. (1 mark)

.....

d) Write an equation for the reaction taking place in the beaker.

(1 mark)

17. The table below gives information about elements A₁, A₂, A₃ and A₄.

Element	Atomic number	Atomic radius (nm)	Ionic radius (nm)
A ₁	3	0.134	0.074
A ₂	5	0.090	0.012
A ₃	13	0.143	0.050
A ₄	17	0.099	0.181

a) In which period of the periodic table is element A₂? Give a reason.

(2 marks)

b) Explain why the atomic radius of

i) A₁ is greater than that of A₂

(2 marks)

ii) A₄ is smaller than its ionic radius.

(2 marks)

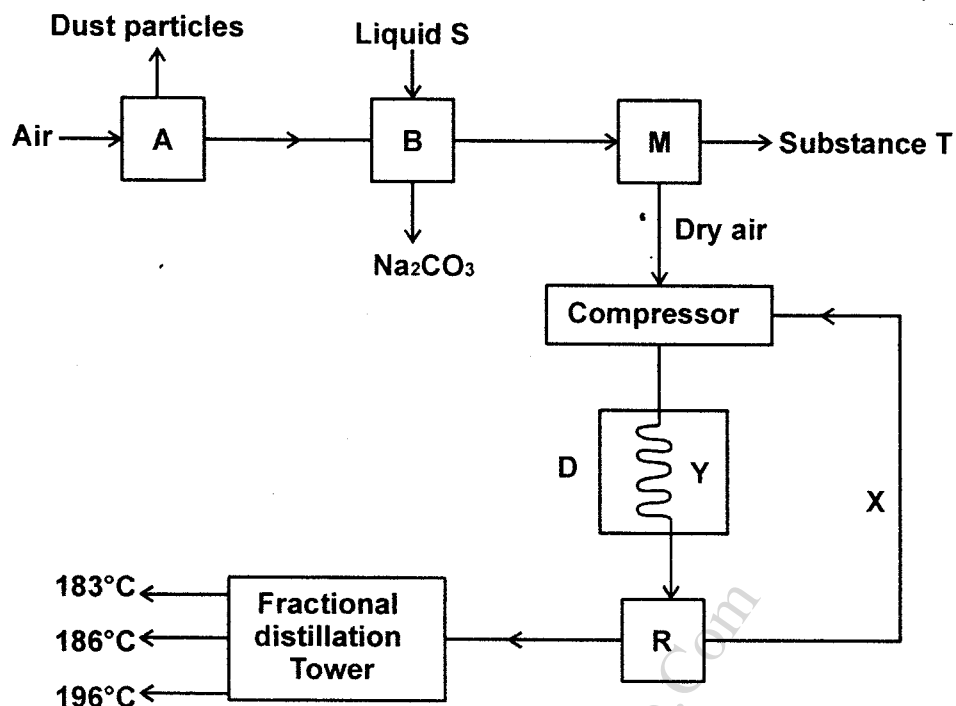
c) Select an element which is in the same group as A₃. Explain

(2 marks)

d) Using dots (.) and crosses (x) to represent outermost electrons, draw a diagram to show the bonding in the compound formed when A₁ and A₄ react.

(1 mark)

19. The flow chart below illustrates the process of fractional distillation of liquid air. Study it and answer the questions that follow.



a) What process takes place in chambers. (4 marks)

A

B

M

D

b) Name:
Liquid S

Substance T

c) Explain why part Y in chamber D is curved? (1 mark)

.....
.....

d) Name the products obtained at the following temperatures. (3 marks)

-186°C

-196°C

-183°C

e) Give two large scale uses of oxygen gas. (2 marks)

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