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CHEMISTRY

PAPER 2
(80 marks)

Wednesday 22 MAY 2024 1:30 P.M.–3:00 P.M.
(1 hr. 30 mins)

Additional materials:
Calculator

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS
--

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided above.

Answer **ALL** the questions on this paper.

Read each question carefully and make sure you know what you have been asked to do before starting your answer.

The instruction **NAME** . . . requires an answer in words **NOT** chemical symbols.

Show **ALL** your working when answering numerical questions. Lines are provided on the question paper for your answers. You should write your answers on these lines only.

The mark for each part question is given in brackets [].

Relative atomic masses are given in the Periodic Table printed on page 2

The volume of one mole of gas at room temperature and pressure (r.t.p) is 24 dm³.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This question paper consists of 14 printed pages and 2 blank pages.



The Periodic Table of the Elements

Group																																													
I	II											III	IV	V	VI	VII	0																												
1 H Hydrogen 1																																													
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon																												
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulphur	17 Cl Chlorine	18 Ar Argon																												
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton																												
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon																												
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon																												
87 Fr Francium	88 Ra Radium	89 Ac Actinium																																											
*58-71 Lanthanoid series †90-103 Actinoid series																																													
a X b a = relative atomic mass X = atomic symbol b = proton (atomic) number																																													
140 Ce Cerium 141 Pr Praseodymium 144 Nd Neodymium 150 Sm Samarium 152 Eu Europium 157 Gd Gadolinium 159 Tb Terbium 162 Dy Dysprosium 165 Ho Holmium 167 Er Erbium 169 Tm Thulium 173 Yb Ytterbium 175 Lu Lutetium 232 Th Thorium 238 U Uranium 238 Np Neptunium 238 Pu Plutonium 238 Am Americium 238 Cm Curium 238 Bk Berkelium 238 Cf Californium 238 Es Einsteium 238 Fm Fermium 238 Md Mendelevium 238 No Nobelium 238 Lr Lawrencium																																													

1. Sodium chloride is an important compound in Chemistry.

(a) Draw a dot and cross diagram to show the bonding between sodium and chlorine.

[2]

(b) Complete the table for sodium ions and chloride ions.

Ion	Symbol of ion	Number of		
		protons	neutrons	electrons
sodium		11	12	
chloride		17	18	

[4]

(c) Calculate the molar mass of sodium chloride NaCl. (Include the units in your answer.)

[2]

(d) Identify **two** properties of ionically bonded compounds.

1 _____

2 _____

[2]

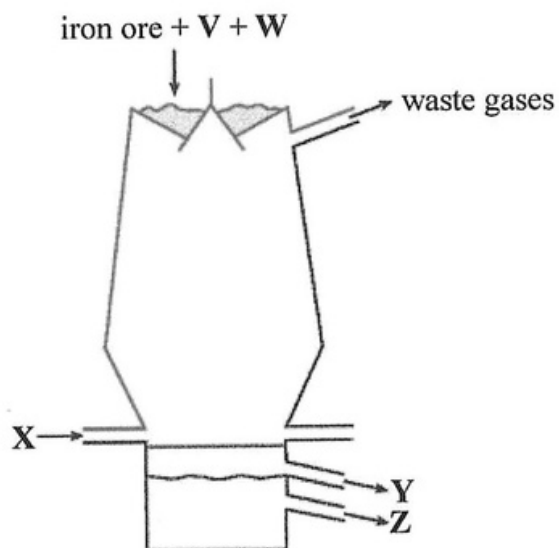
TOTAL MARKS [10]

[Turn over



2. The blast furnace is used to convert iron ore into impure iron.

The diagram shows a simple outline of the blast furnace.



- (a) Name the **three** raw materials, **V**, **W** and **X**.

V _____

W _____

X _____

[3]

- (b) Name the **two** products, **Y** and **Z**.

Y _____

Z _____

[2]

- (c) Another name for iron ore is haematite.

Write the chemical formula for haematite.

_____ [1]



- (d) Steel is an alloy of iron.

State **two** ways in which steel is different from iron.

1 _____

2 _____

[2]

- (e) Suggest **two** reasons why iron should be recycled.

[2]

TOTAL MARKS [10]



- (d) Steel is an alloy of iron.

State **two** ways in which steel is different from iron.

1 _____

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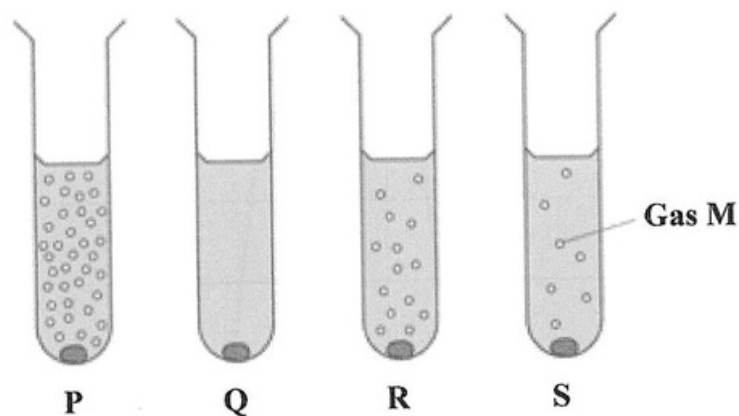
[2]

TOTAL MARKS [10]



3. The diagram shows four test tubes containing hydrochloric acid.

A different metal is placed in each test tube and the test tubes are labelled **P**, **Q**, **R** and **S**.



- (a) Complete the table using the reactivity series to state which metal is present in each test tube in the diagram.

Metal name	Reaction Letter
Copper	
Magnesium	
Zinc	
Iron	

[2]

- (b) (i) Gas **M** is produced in test tubes **P**, **R** and **S**.

Name gas **M**.

_____ [1]

- (ii) Describe the test that can be conducted to test for gas **M**.

 _____ [1]

- (iii) Explain why no gas is given off in test tube **M**.

 _____ [1]



- (c) Dilute hydrochloric acid is added to calcium carbonate.

Name the products of the reaction.

calcium carbonate + hydrochloric acid $\rightarrow$ _____ 1 _____ + _____ 2 _____ + _____ 3 _____

Product 1 _____

Product 2 _____

Product 3 _____

[1]

- (d) Lithium, sodium and potassium are all in Group I of the Modern Periodic Table.

Explain why.

[2]

- (e) Neon is an unreactive noble gas.

- (i) Explain why neon is unreactive.

[1]

- (ii) Give **one** use of neon.

[1]

TOTAL MARKS [10]

4. Ammonia is made in the laboratory when ammonium chloride and calcium hydroxide react together.

(a) Name the other **two** products formed in this reaction.

1 _____

2 _____ [2]

(b) Ammonia is made industrially by the Haber process. This is a reversible reaction.

(i) Give the meaning of the term reversible reaction.

_____ [2]

(ii) Describe the conditions necessary for the Haber process to occur.

_____ [3]

(c) Identify **two** properties of ammonia.

1 _____

2 _____ [2]

(d) Give **one** use of ammonia.

_____ [1]

TOTAL MARKS [10]



5. Acids and bases are useful in everyday life. One property of acids and bases is that when they react together a salt is formed.

(a) State **two** other properties of a base.

1 _____

2 _____

[2]

(b) Precipitation is a method used to prepare a salt.

State when precipitation is used to prepare a salt.

Give a brief outline of this method.

When used: _____

Outline method: _____

[3]

(c) Sulphuric acid contains the sulphate ion.

(i) Describe a test and positive result for sulphate ions, SO_4^{2-} .

test: _____

positive result: _____

[2]

(ii) Give the basicity of sulphuric acid. _____ [1]

(d) A carbonate is an example of a salt that can exist as a normal salt and as an acid salt.

Sodium carbonate is a normal carbonate salt and sodium hydrogen carbonate is an acidic carbonate salt.

Write the correct chemical formulae for sodium carbonate and sodium hydrogen carbonate.

sodium carbonate _____

sodium hydrogen carbonate _____

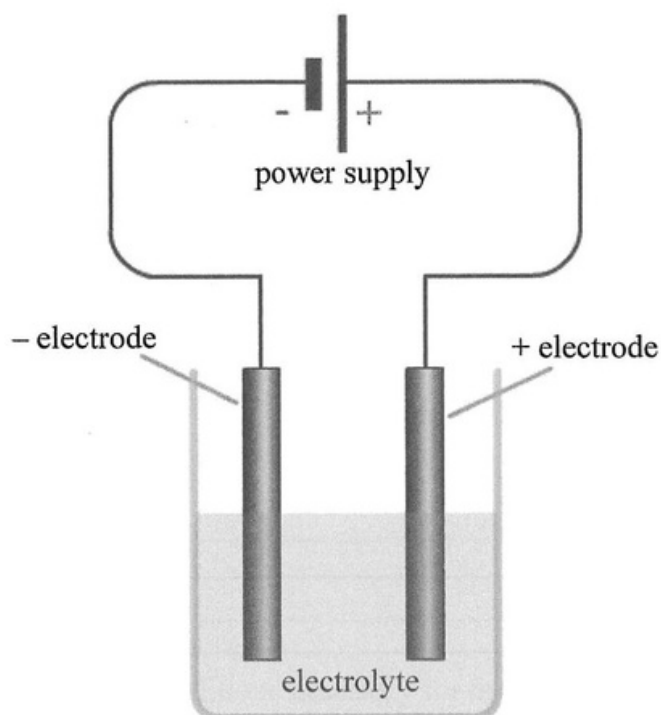
[2]

TOTAL MARKS [10]

[Turn over]

6. This question is about electrolysis.

The diagram shows the apparatus used by a student to conduct an electrolysis experiment.



- (a) Indicate the name of the:
- positive (+) electrode: _____
- negative (-) electrode: _____ [1]
- (b) Give a definition of the term electrolyte.
- _____
- _____ [2]
- (c) Aluminium ions move to the negative electrode.
- Explain why.
- _____
- _____ [2]



(d) Aluminium is obtained by the electrolysis of purified aluminium oxide dissolved in molten cryolite.

(i) Impure aluminium oxide is mined as an ore.

Name the aluminium oxide ore.

_____ [1]

(ii) Explain why aluminium oxide is dissolved in cryolite.

_____ [2]

(iii) Discuss why aluminium is resistant to corrosion.

_____ [1]

(iv) Give **one** use of aluminium.

_____ [1]

TOTAL MARKS [10]



7. Pollution is the contamination of land, air, water due to the production of harmful substances.

(a) Name **two** agricultural products that can cause water pollution.

1 _____

2 _____

[2]

(b) Identify **one** way in which oil spills can negatively affect:

- the environment

- living organisms.

[2]

(c) Plastics can be considered a form of land pollution. When they enter the water they can be damaging to marine animals like fish and turtles.

State how plastics in water can result in the death of marine organisms.

_____ [1]

(d) Vehicle emissions and the burning of fuels produce air pollution.

Identify **two** alternative sources of energy that can result in lower emissions, reducing air pollution.

1 _____

2 _____

[2]



- (e) (i) State why the ozone layer is important to living organisms.

[1]

- (ii) Identify **one** substance that causes ozone depletion.

[1]

- (f) Plastics can be biodegradable or non-biodegradable.

Describe the difference between the two forms of plastics.

[1]

TOTAL MARKS [10]



[1]
[10] 2004
[10]

[Turn over]

8. Alcohols form an homologous series.

(a) State **two** characteristics of an homologous series.

- 1 _____
- 2 _____ [2]

(b) Draw the structural formula of ethanol, showing all the bonds.

[2]

(c) Ethanol can be produced from sugar solution by adding yeast.

(i) Name this process.

_____ [1]

(ii) State **one** condition required for this reaction to take place.

_____ [1]

(iii) When ethanol is made using the process in (c)(i), the concentration of ethanol does not increase beyond 12%.

Suggest a reason for this.

_____ [1]

(iv) Beer and wine contain ethanol. When they are left exposed to the air, they eventually turn sour.

Name the reaction occurring and the new substance formed.

Reaction _____

New substance formed _____ [2]

(v) One use of ethanol is in alcohol drinks.

Give **one** other use of ethanol.

_____ [1]

TOTAL MARKS [10]

End]



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