School Number	Candidate Number
Surname and Initials	

CHEMISTRY

PAPER 2 3051/2

Wednesday 23 May 2007 1.50 – 3.20 P.M.

No additional materials required

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 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 [ ].

A copy of the Periodic Table is printed on page 2.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This question paper consists of 18 printed pages and 2 blank pages.

The Periodic Table of the Elements

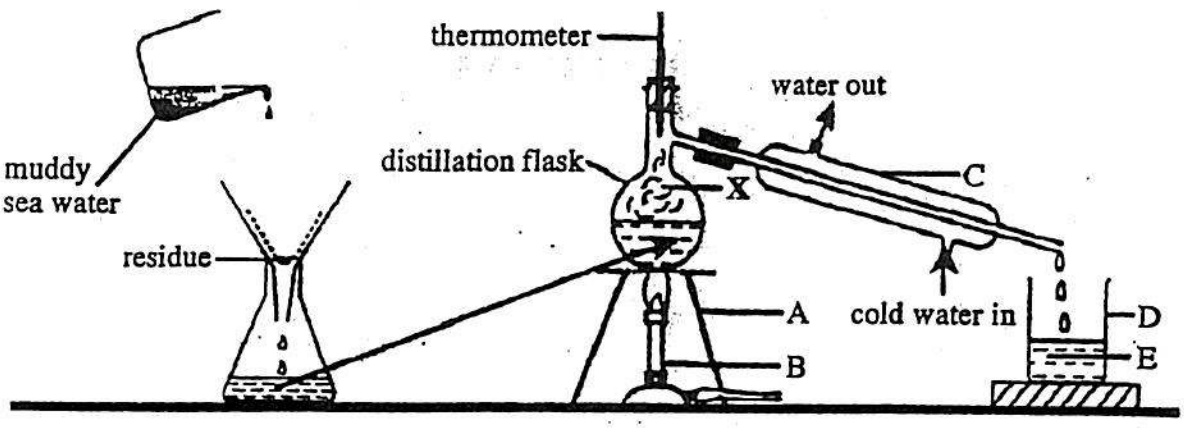
Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group 0
											1 H Hydrogen 1						4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key: a / X / b — a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

1. The diagram shows the processes of filtration and distillation.



(a) Label the apparatus indicated.

(i) A _____

(ii) B _____

(iii) C _____

(iv) D _____ [4]

(b) Name a substance in the residue.

_____ [1]

(c) Name a substance which will remain in the distillation flask when all the filtrate has evaporated.

_____ [1]

(d) (i) State the reading on the thermometer.

thermometer reading _____ [1]

(ii) Briefly explain what this shows about the substance at point X.

_____ [1]

(e) Briefly explain the purpose of the cold water.

_____ [1]

(f) Name the natural cycle that is similar to the process of distillation.

_____ [1]

Total marks [10]

2. (a) Use the Periodic Table to help you answer this question.

Here are the symbols of four elements in the Periodic Table.

Na Ar As Rb

(i) Give the names of **two** of these elements that have similar chemical properties.

_____ [1]

(ii) Give a reason for your answer to part (i).

_____ [1]

(iii) Draw a diagram to show the electronic structure of the Na atom.

[1]

(iv) State the numbers of particles in the nucleus of the Na atom.

_____ [1]

(b) Information about **FOUR** elements is given in the table. The letters are **NOT** the symbols of the elements.

element	W	X	Y	Z
atomic number	9	14	18	19

(i) Write the electronic configuration of the atom for the elements W and Y.

W _____

Y _____ [2]

(ii) Identify the element which is most likely to be the least chemically reactive.

_____ [1]

(iii) Draw a diagram using only the outer electrons to show the bonding between element **Z** and chlorine.

[2]

(c) State the valency of phosphorus in the molecule, P_2O_3.

_____ [1]

Total marks [10]

3. Antacids can be used to neutralize excess stomach acid. **Brand A** antacid contains the neutralizing agent magnesium hydroxide, $Mg(OH)_2$.

Brand *A* antacid reacts with $HCl(aq)$ in the stomach

$$xHCl(aq) + Mg(OH)_2(s) \rightarrow MgCl_2(aq) + 2H_2O\ (l)$$

(a) (i) Name the substance in the equation that is in the form of molecules.

_____ [1]

(ii) Give the value of x which balances the equation.

_____ [1]

(iii) Name the chemical classification given to the magnesium compound formed during the reaction.

_____ [1]

The relative atomic masses of the elements in the equation above are as follows: *Cl*, 35.5; H, 1; Mg, 24; O, 16.

(iv) Calculate the molar mass of the magnesium compound formed during the reaction.

[2]

(v) Use the data in (iv) to calculate the r.m.m. of $Mg(OH)_2$.

[1]

(b) **Brand *B*** antacid contains the acid neutralizing agent sodium hydrogen carbonate.

(i) Write the chemical formula for sodium hydrogencarbonate.

_____ [1]

(ii) Name the **THREE** products formed when this brand of antacid reacts with stomach (hydrochloric) acid.

1 _____

2 _____

3 _____ [3]

Total marks [10]

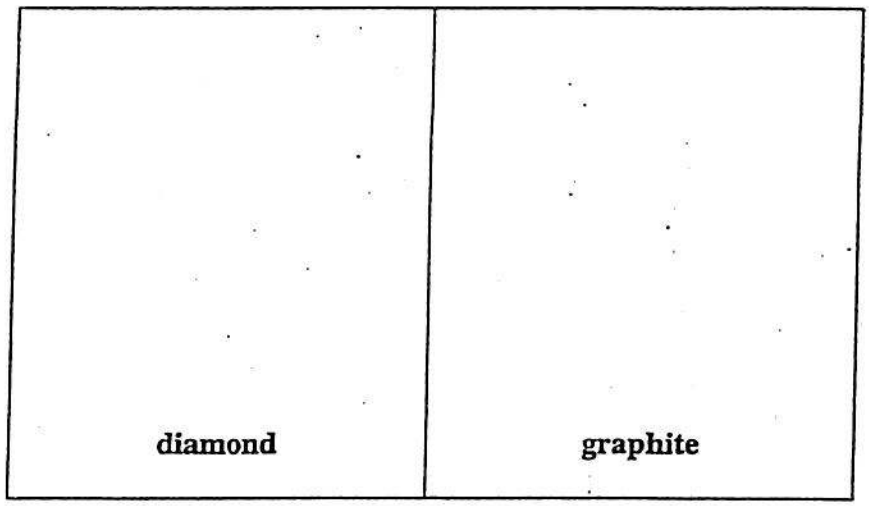
4. Carbon is an important element in our lives and in industry. There are two crystalline allotropes of carbon.

(a) Explain the meaning of the term **allotrope**.

_____

_____ [2]

(b) (i) Draw the unit structure of both diamond and graphite showing all the bonds in each crystal.



[2]

(ii) Name a material a jeweller would use to cut a diamond.

_____ [1]

(iii) Name the kind of bonding which exists in both crystals.

_____ [1]

(iv) State **ONE** use of graphite.

_____ [1]

(v) Name the physical property of graphite which makes it useful for your answer.

_____ [1]

(c) (i) Name **ONE** fossil fuel.

_____ [1]

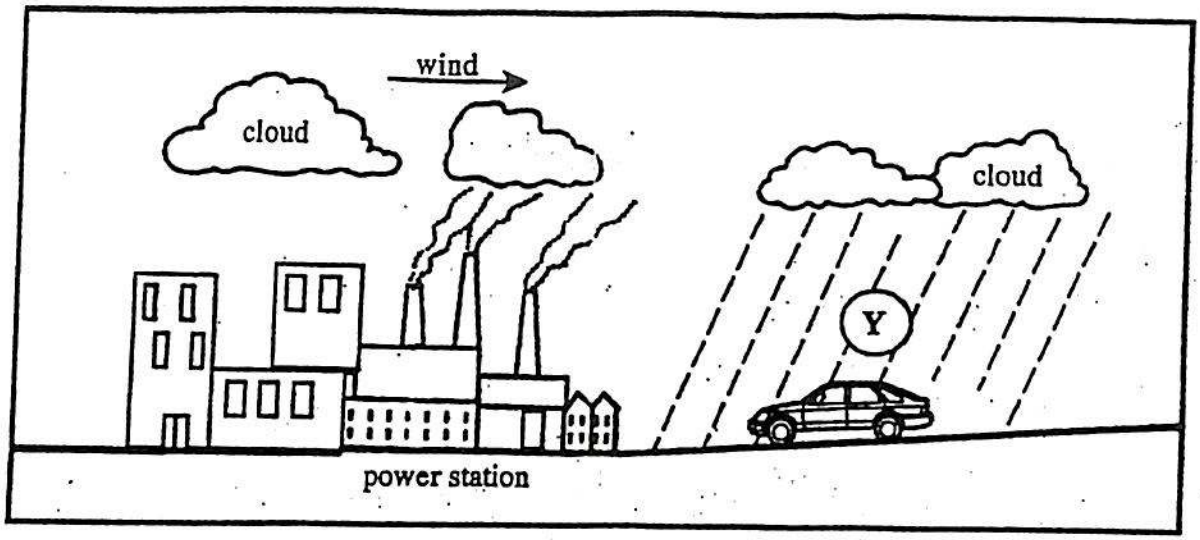
(ii) Name and write the formula of the poisonous gas produced by the incomplete combustion of carbon.

name _____

formula _____ [1]

Total marks [10]

5. The diagram shows a power station emitting the gaseous waste product of the burning of coal.



(a) Name a pollutant produced by the power station.

_____ [1]

(b) The automobile's exhaust pipe is not fitted with a catalytic converter.

Name a pollutant emitted by the automobile that is soluble in water.

_____ [1]

(c) Name the physical process that changes water vapour in the air into clouds.

_____ [1]

(d) Name the pollutant, **Y**, released by the clouds onto the earth.

_____ [1]

(e) Give the common name of the substance produced when the iron of the automobile corrodes.

_____ [1]

(f) Write a word equation for the corrosion of the iron of the automobile.

_____ [2]

(g) Name **ONE** other effect **pollutant Y** has on the environment.

_____ [1]

(h) Some parts of the automobile are made with aluminium.

(i) Explain why the aluminium parts are not affected by the pollutant found in **Y** as readily as the iron in the automobile.

_____ [1]

(ii) State one method of preventing the hulls of steel ships being corroded by sea water.

_____ [1]

Total marks [10]