

3051/1

BGCSE

School Number	Candidate Number
Surname and Initials	

CHEMISTRY

PAPER 1 3051/1

Wednesday **18 MAY 2016** 12:00 NOON–1:15 P.M.

Additional materials:
None

**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.

For each question in this paper, **four** suggested answers A, B, C and D are given.

Circle the letter of the response which you consider to be correct.

Attempt **ALL** the questions. Marks will **NOT** be deducted for wrong answers. Your total score on this test will be the number of correct answers given.

Relative atomic masses are given in the Periodic Table of elements provided on page 2.

The volume of one mole of gas at room temperature and pressure (r.t.p.) is 24 000 cm³ and at standard temperature and pressure (s.t.p.) is 22 400 cm³.

For Examiner's Use	
TOTAL MARKS	

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



The Periodic Table of the Elements

		Group														
		II	III	IV	V	VI	VII	0								
			1 H Hydrogen 1					4 He Helium 2								
	9 Be Beryllium 4							20 Ne Neon 10								
	24 Mg Magnesium 12							32 O Oxygen 8	16 S Sulphur 16	17 Cl Chlorine 35.5	18 Ar Argon					
	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	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	115 In Indium 49	112 Cd Cadmium 48	119 Sn Tin 50	122 Sb Antimony 51	127 I Iodine 53	131 Xe Xenon 54
	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	204 Tl Thallium 81	201 Hg Mercury 80	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 Rn Radon 85
	226 Ra Radium 88	227 Ac Actinium 89														
1 Lanthanoid series																
33 Actinoid series																
a	X											a	X			
b												b				

a = relative atomic mass
 X = atomic symbol
 b = proton (atomic) number

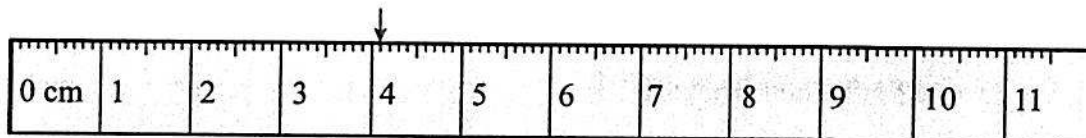
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	
232 Th Thorium 90	238 U Uranium 92	238 Pa Protactinium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

1. What is the name of a group of chemicals that speed up a chemical reaction?

- A catalysts
- B galvanizers
- C oxidising agents
- D reducing agents

2. The diagram represents a scale found on a centimetre rule.

What is the value indicated by the arrow?



- A 0.41 cm
- B 0.42 cm
- C 4.10 cm
- D 4.20 cm

3. The reading on a thermometer indicates the temperature of a boiling liquid is 101°C.

Which liquid could the thermometer have been placed in?

	liquid	purity
A	ethanol	pure
B	methane	pure
C	propane	impure
D	water	impure

4. A sample of water is heated from -10°C to 110°C in a 15 minute period.

How many single states of matter and how many mixed states of matter will the water undergo?

	single states	mixed states
A	2	5
B	2	3
C	3	2
D	3	0

5. How is the number of neutrons determined for any atom?
- A adding the number of protons to the mass number
 - B doubling the atomic number
 - C equals the number of electrons
 - D subtracting the number of protons from the mass number
6. Where on the Periodic Table would the element with the electronic configuration 2, 8, 3 be found?
- A Group II
 - B Group VIII/0
 - C Period 3
 - D Second Period and Group III
7. In the Bohr model of an atom, how many orbits are needed to hold silicon's 14 electrons?
- A 1
 - B 2
 - C 3
 - D 4
8. Carbon dioxide molecules with slightly different masses have been found.
- Which factor accounts for this mass variation?
- A allotropes
 - B isomers
 - C isotopes
 - D states of matter
9. What is the **total number** of electrons found in a water molecule?
- A 2
 - B 8
 - C 10
 - D 18

The list below contains the names of the four different types of chemical bonds. Use this information to answer questions 10 to 12. The choices may be used once, more than once or not at all.

- A covalent
- B dative
- C ionic
- D metallic

Which type of bond is formed when

10. hydrogen and oxygen bond to form water; A. B C D
11. the lattice structure of NaCl is formed; A. B C D
12. ammonia bonds with a fourth hydrogen
to form the ammonium ion? A B C D
13. What is the amount in moles, of NaOH, found in 32 g of NaOH?
- A 0.80 moles
 - B 1.25 moles
 - C 40 moles
 - D 1 280 moles
14. What is the relative molecular mass of H_2SO_4 ?
- A 3
 - B 7
 - C 48
 - D 98
15. Which element can be found in the form of a diamond?
- A carbon
 - B krypton
 - C potassium
 - D silver

16. What is the molecular formula of a compound with the structural formula $\text{CH}_3\text{CH}_2\text{CH}_3$?

- A CH
- B $3\text{C}_8\text{H}$
- C C_3H_8
- D $(\text{CH}_3)_2\text{CH}_2$

17. How many moles of oxygen gas are needed to balance the combustion reaction of one mole of butane?



- A $\frac{1}{2}$
- B 5
- C $6\frac{1}{2}$
- D 9

18. What is the molecular formula of a hydrocarbon with an empirical formula of CH_3 and an M_r of 30?

- A CH_3
- B C_2H_6
- C C_3H_8
- D C_4H_{10}

19. Hydrogen bromide gas dissolves in a liquid and ionises to produce hydrogen ions as the only positive ions in a liquid.

Which liquid causes hydrogen bromide gas to ionise?

- A acetone
- B methylbenzene
- C toluene
- D water

20. Which statement about an acid is **true**?

- A forms water with an alkali
- B pH is >7
- C forms negatively charged hydronium ions in water
- D is a non-electrolyte

21. When copper reacts with hot concentrated sulfuric acid it produces copper sulfate.

Which other products are formed?

- A hydrogen gas only
- B water only
- C water and sulfur dioxide gas
- D water and hydrogen gas

22. Which salt remains when a solution of H_2SO_4 is titrated with a solution of $\text{Ca}(\text{OH})_2$?

- A calcium hydroxide
- B calcium oxide
- C calcium sulfate
- D calcium sulfite

23. The table shows the colours that Universal Indicator becomes when added to four different solutions.

Which row in the table correctly matches the colour of the indicator and the solution?

	name of solution	colour of Universal Indicator
A	nitric acid	blue
B	potassium nitrate	green
C	sodium hydroxide	yellow
D	ammonia solution	red

24. Which ion is indicated by a blue-green colour in a firework display?

- A Cu^{2+}
- B Ba^{2+}
- C Na^+
- D Ca^{2+}

31. What is a change in concentration of either a reactant or product over a period of time called?

- A reaction rate
- B reactant concentration
- C product concentration
- D state change

32. Zinc is less reactive than magnesium.

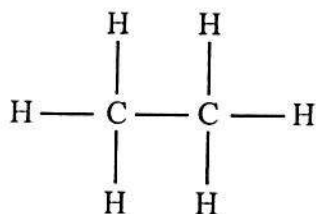
What is the reactivity relationship between zinc and magnesium?

- A Magnesium can displace zinc ions from zinc compounds.
- B Zinc can displace magnesium from magnesium compounds.
- C Magnesium is lower than zinc in the reactivity series.
- D Zinc is a stronger reducing agent than magnesium.

33. Which of these statements does **not** describe what happens during a redox oxidation?

- A a decrease in oxidation number
- B a loss of protons
- C a gain of oxygen
- D a loss of hydrogen by a covalent molecule

38. The diagram shows the structural formula of ethane.



The electronic configuration of C is 2, 4 and H is 1.

How many covalently bonded electrons surround each carbon atom in the above structure?

- A 2
B 4
C 6
D 8
39. What is the correct order of the following hydrocarbons in terms of increasing boiling points?

propane C_3H_8 methane CH_4 and ethane C_2H_6

- A methane, propane, ethane
B ethane, methane, propane
C methane, ethane, propane
D ethane, propane, methane
40. Which name is given to a series of compounds that differ from each other by a fixed repeating unit?
- A heterogeneous series
B homologous series
C homogeneous series
D hydrocarbon series

41. Dilute acetic acid, commonly known as vinegar, is the second smallest carboxylic acid.

Which choice correctly matches the correct formula and name for this acid?

	acid name	formula
A	ethanoic	CH_3COOH
B	hydrochloric	HCl
C	methanoic	CHOOH
D	methanoic	CHO_2H

42. Which pair shows two elements which are liquids at room temperature and pressure?

- A bromine and mercury
- B chlorine and water
- C fluorine and silver
- D oxygen and zinc

43. Which element in the Periodic Table has an allotrope that is capable of conducting electricity?

- A carbon
- B chlorine
- C oxygen
- D sulfur

Questions 44 and 45 are about the refining of petroleum.

44. Which method is used to obtain lubricating oil from crude oil?

- A centrifugation
- B chromatography
- C filtration
- D fractional distillation

45. Lubricating oils undergoes additional processing to obtain larger amounts of the more valuable hydrocarbons.

What is the name of this process?

- A cracking
- B esterification
- C hydrolysis
- D polymerisation

46. Which compound is an unsaturated hydrocarbon?

- A ethane
- B ethene
- C ethanoic acid
- D ethyl methanoate

47. Blanco Bleach is a Bahamian company.

Which element is needed in large quantities by Blanco to make bleach?

- A bromine
- B chlorine
- C fluorine
- D iodine

48. Carbon dioxide emissions have steadily increased since the start of the industrial age. As a result, the carbon dioxide in the Earth's air has increased by approximately 20%.

What are the effects of this change?

- A acid rain
- B global warming
- C both of the above
- D none of the above

49. Which ore is aluminum metal extracted from?

- A aragonite
- B bauxite
- C galena
- D haematite

50. Iron is extracted from its ore using a blast furnace.

Which form of iron is extracted from the blast furnace?

- A impure pig iron
- B pure liquid iron
- C solid iron nuggets
- D stainless steel iron

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