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CHEMISTRY**PAPER 1**
(50 marks)

Wednesday **22 MAY 2024** 12:00 NOON–1:15 P.M.
(1 hr. 15 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 in 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 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 18 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																		
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											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											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											204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86	
Fr Francium 87	Ra Radium 88																	

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 Pa Protactinium 91	238 U Uranium 92	244 Pu Plutonium 94	244 Am Americium 95	244 Cm Curium 96	247 Bk Berkelium 97	251 Cf Californium 98	252 Es Einsteinium 99	257 Fm Fermium 100	261 Md Mendelevium 101	265 No Nobelium 102	269 Lr Lawrencium 103

a

X

b

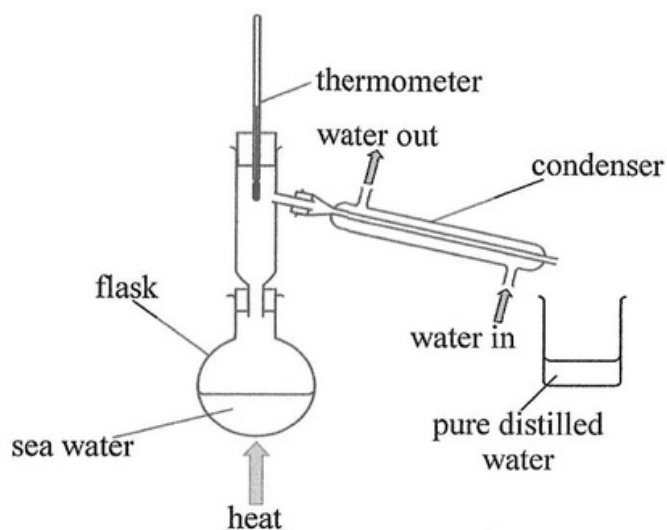
a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

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

1. Which statement is correct?
 - A. An electron and a neutron are the same size.
 - B. The mass of a proton is $\frac{1}{1840}$ of the mass of an electron.
 - C. The mass of a proton is equal to the mass of a neutron.
 - D. The mass of an atom is dependent on the number of electrons and neutrons.

2. Which mixture does a centrifuge separate?
 - A. alcohol and water
 - B. dissolved coffee powder from a coffee and water mixture
 - C. colours in a marker pen
 - D. red blood cells from the blood

3. The diagram represents a simple distillation process.



What would be the temperature reading in the thermometer?

- A. 0 °C
- B. 90 °C
- C. 100 °C
- D. 150 °C

4. Which describes the particles in a gas?

- A. are attracted to each other by weak forces
- B. have small spaces between them
- C. have very little kinetic energy
- D. vibrate in a fixed position

5. The diagram shows a cup of tea.



Which row describes the water particles in the air above the cup compared with the water particles in the cup?

	Moving faster	Closer together
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

6. Which statement about the numbers of protons, electrons and neutrons in an atom is always correct?

- A. The number of neutrons equals the number of protons.
- B. The number of neutrons minus the number of electrons is zero.
- C. The number of protons equals the number of electrons.
- D. The number of protons plus the number of neutrons equals the number of electrons.



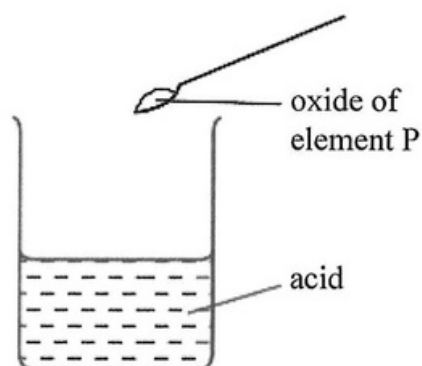
7. Which quantities are the same for all atoms of carbon?
- I number of protons
 - II number of neutrons
 - III number of electrons
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
8. What would happen when atoms with atomic numbers 12 and 17 come together?
- A. They bond to form a covalent compound.
 - B. They bond to form a metallic lattice.
 - C. They bond to form an ionic compound.
 - D. They do not bond with each other.
9. Which statement explains why solids maintain a definite shape and volume?
- A Their particles are ions.
 - B. Their particles have no kinetic energy.
 - C. Their particles have strong attractive forces.
 - D. Their particles have weak attractive forces.



10. A student was provided with a thermometer, a stopwatch and a beaker only. What could the student measure?
- A. 10.5 g of solid and 24.8 cm^3 of liquid
 - B. 10.5 g of solid and 25°C
 - C. 24.8 cm^3 of liquid and 45 seconds
 - D. 25°C and 45 seconds
11. What is the reason for the positive symbol in a sodium ion Na^+ ?
- A. It gains an electron.
 - B. It gains a proton.
 - C. It loses an electron.
 - D. It loses a proton.
12. Which pair of elements forms an ionic bond so that each ion formed has a full outer shell of 8 electrons?
- A. carbon and oxygen
 - B. hydrogen and chlorine
 - C. lithium and neon
 - D. sodium and fluorine
13. Which number indicates the number of moles in 1.17 g of NaCl ?
- A. 0.02 mol
 - B. 0.50 mol
 - C. 20 mol
 - D. 67 mol



14. The oxide of element P was added to an acid. It reacted to form a salt and water.



What is the pH of the acid before the reaction, and what type of element is P?

	pH	type of element P
A	greater than 7	metal
B	greater than 7	non-metal
C	less than 7	metal
D	less than 7	non-metal

15. Which statement best explains the Law of Conservation of Mass?

- A. Mass can be both created and destroyed.
- B. Mass can be created but not destroyed.
- C. Mass can be destroyed but not created.
- D. Mass cannot be created or destroyed.

16. Ammonium chloride and sodium hydroxide react over a warm water bath to produce ammonia gas.

Which test and result correctly identify ammonia gas?

	test	result
A	glowing splint	relights
B	limewater	turns milky white
C	moist red litmus	no change
D	moist red litmus	turns blue

17. Which metal shown is found in the Earth's crust in the elemental state?

- A. calcium
- B. iron
- C. silver
- D. zinc

18. When a flame test is conducted on substance M, an apple green flame is produced.

Which of the following contains substance M?

- A. barium chloride
- B. copper(II) chloride
- C. lithium chloride
- D. potassium chloride



19. When substance Q reacts with iron(II) chloride, a green precipitate is formed.

What is substance Q?

- A. $\text{AgNO}_{3(\text{aq})}$
- B. $\text{Ca}(\text{OH})_{2(\text{aq})}$
- C. $\text{NH}_{3(\text{g})}$
- D. $\text{NaOH}_{(\text{aq})}$

20. Which statement shows the definition of reduction?

- A. gain of electrons
- B. loss of electrons
- C. sharing electrons
- D. transfer of protons

21. The reaction between iron(III) oxide and carbon monoxide is shown in the equation below:



Which substance is oxidized in this reaction?

- A. carbon dioxide
- B. carbon monoxide
- C. iron
- D. iron(III) oxide

22. Which metal could **not** be used for electroplating by using an aqueous solution?

- A. chromium
- B. copper
- C. silver
- D. sodium

23. Which particles carry the electrical charge through the electrolyte?
- A. atoms
 - B. electrons
 - C. elements
 - D. ions
24. When ammonium nitrate is added to water, an endothermic reaction occurs.
- Which observation confirms this?
- A. colour change
 - B. decrease in temperature
 - C. increase in temperature
 - D. no change
25. When ΔH is negative, which kind of reaction is being described?
- A. decomposition
 - B. endothermic
 - C. exothermic
 - D. oxidation
26. Which change does **not** increase the rate of a reaction between zinc powder and dilute hydrochloric acid?
- A. adding a catalyst
 - B. increasing the temperature
 - C. using more concentrated acid
 - D. using zinc pellets



27. Which is the most reactive element?

- A. Cs
- B. K
- C. Li
- D. Na

28. Which compound is an amphoteric oxide?

- A. calcium oxide
- B. lead(II) oxide
- C. magnesium oxide
- D. sulphur dioxide

Questions 29 to 30 refer to a section of Periodic Table shown. Five elements V, W, X, Y and Z are shown in the Periodic Table. The letters are not the chemical symbols of the five elements.

A blank periodic table grid is shown. The grid is composed of several rows and columns of squares. The following elements are labeled in the grid:

- W** is located in the top-left corner, in the first row and second column.
- X** is located in the second row and first column.
- Y** is located in the third row and eighth column.
- Z** is located in the top-right corner, in the first row and tenth column.
- V** is located in the top-right corner, in the first row and eleventh column.

There is an empty square box located above the grid, centered between the first and eighth columns.

29. Which letter represents the element that would undergo similar chemical reactions as calcium?
- A. W
B. X
C. Y
D. Z
30. Which letter represents the element that would be the most electronegative element?
- A. W
B. X
C. Y
D. Z



31. The diagrams show the labels of four bottles.

Which label is **not** correct?

A	B	C	D
Bromine Br_2 Harmful liquid Do not spill	Iodine I_2 Danger Avoid breathing vapour given off	Potassium K Danger Store under water	Sodium Na Danger Store under oil

32. Which row correctly identifies a metal?

	charge on element ion	electrical conductivity
A	negative	high
B	negative	low
C	positive	high
D	positive	low

33. Aluminium is the most common metal in the Earth's crust.

Which is **not** a property of aluminium?

- A. corrosion resistant
- B. good conductor of electricity
- C. low density
- D. magnetic

34. Which metal does **not** produce hydrogen gas if it is added to cold water?

- A. calcium
- B. magnesium
- C. potassium
- D. zinc



35. Which properties correctly describe oxygen gas?

- I. It is pale yellow and odourless.
- II. It will relight a glowing splint.
- III. It promotes the combustion of materials.

- A. I and III only
- B. II only
- C. II and III only
- D. I and II only

36. Water is treated at The Bahamas Water & Sewerage Corporation to make it fit to drink.

What is present in the water after the treatment?

- A. bacteria only
- B. bacteria and insoluble substances
- C. chlorine only
- D. chlorine and soluble substances

37. Which kind of ions are found in hard water?

- A. ammonium
- B. calcium
- C. potassium
- D. sodium

38. Which is a simple covalent molecule?

	conducts electricity		volatile
	when solid	when molten	
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓



39. A compound with the formula TF_2 has a relative molecular mass of 78.

What is element T?

- A. argon
 - B. calcium
 - C. neon
 - D. zirconium
40. Which process is used to prepare sulphuric acid?
- A. distillation
 - B. Contact
 - C. fermentation
 - D. Haber
41. What are the three products of the electrolysis of brine?
- A. chlorine gas, hydrogen gas, sodium hydroxide
 - B. hydrogen gas, sodium chloride, oxygen gas
 - C. sodium metal, hydrogen gas, sodium chloride
 - D. sodium hydroxide, oxygen gas, chlorine gas
42. Which characteristic is the same for isotopes?
- A. physical properties
 - B. chemical properties
 - C. number of neutrons
 - D. mass number



43. Which statement about an alkane molecule is correct?
- A. It burns in oxygen.
 - B. It contains carbon, hydrogen and oxygen atoms.
 - C. It contains a double bond.
 - D. It contains an ionic bond.
44. What are the products of the decomposition of calcium carbonate?
- A. calcium and carbon monoxide
 - B. carbon and oxygen gas
 - C. carbon monoxide and carbon dioxide
 - D. carbon dioxide and calcium oxide
45. Which is the main substance found in natural gas?
- A. carbon dioxide
 - B. ethane
 - C. hydrogen
 - D. methane
46. Which substance is formed when a metal reacts with cold water?
- A. a hydroxide
 - B. an oxide
 - C. a salt
 - D. oxygen

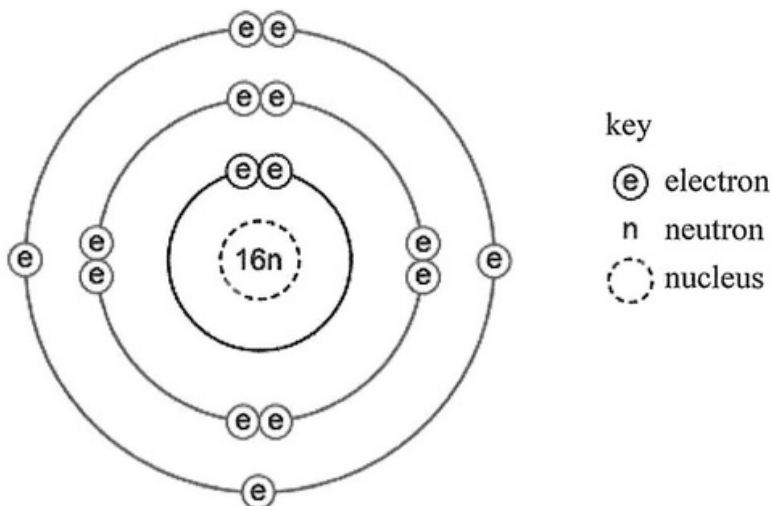


47. Four steel paper clips are treated as described before being placed in a beaker of water.

Which treatment process results in the paper clip rusting most quickly?

- A. coated with grease
- B. dipped in paint and allowed to dry
- C. electroplated with zinc
- D. washed with soap and rinsed

48. Which element has the atomic structure shown in the diagram?



- A. Al
 - B. P
 - C. S
 - D. Si
49. Which substance is defined as a painkiller?

- A. analgesic
- B. antacid
- C. drug
- D. medicine



50. Which organ is most often damaged by regularly drinking too much alcohol?
- A. heart
 - B. liver
 - C. pancreas
 - D. stomach



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