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CHEMISTRY

PAPER 1

Tuesday **19 May 2020** 12:00 NOON–1:15 P.M.

Additional materials:
None

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS
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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 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 15 printed pages and 1 blank page.



The Periodic Table of the Elements

Group																	
I	II	1 H Hydrogen 1										III	IV	V	VI	VII	0
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	101 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 Cesium 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	207 Po Polonium 84	209 At Astatine 85	210 Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

*58-71 Lanthanoid series

†90-103 Actinoid series

a

X

b

Key

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 Pa Protactinium 91	238 U Uranium 92	238 Pu Plutonium 94	238 Np Neptunium 93	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. Which state(s) of matter **cannot** be compressed?

- A solid, liquid and gas
- B solid and gas
- C solid and liquid
- D solid only

2. Which statement about particles in a liquid is correct?

- A They are freely moving but maintain weak attractions with each other.
- B They are tightly packed together.
- C They are arranged in a regular pattern.
- D They vibrate.

3. Which method is **best** suited for a student to demonstrate that there are salts present in well water?

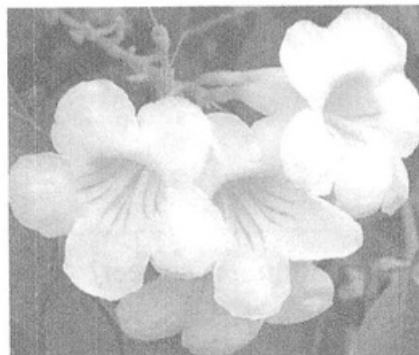
- A chromatography
- B crystallisation
- C distillation
- D filtration

4. A student measured 200 cm^3 of water using a measuring cylinder.

What will be the equivalent measurement in dm^3 ?

- A 0.02 dm^3
- B 0.2 dm^3
- C 2 dm^3
- D 200 dm^3

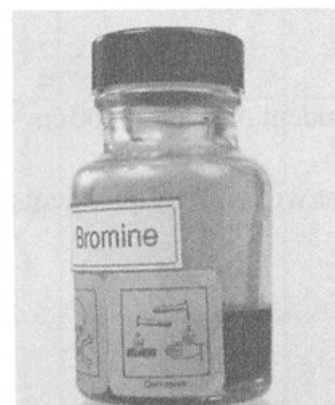
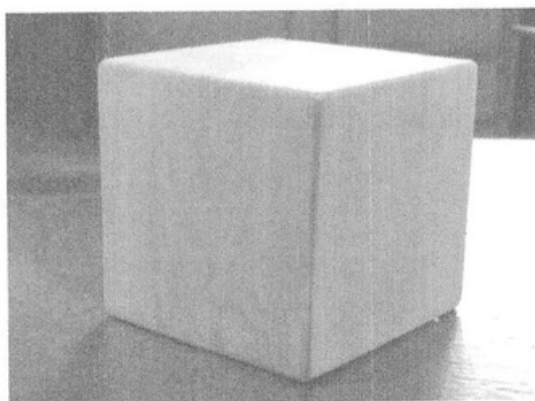
5. The Yellow Elder flower is the national flower of The Bahamas.



Which method may be used by a chemistry student to separate the pigments in this flower?

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

Questions 6 and 7 are about the pictures below.



6. Which apparatus is best suited to measure the volume of a block of wood and the volume of bromine solution?

	block of wood	bromine solution
A	metre ruler	measuring cylinder
B	measuring cylinder	metre ruler
C	beam balance	conical flask
D	clock	gas syringe



7. What is the correct unit to record the volume of the substances in question 6?

- A g
- B mol/dm³
- C s
- D cm³

8. Solution X turns litmus blue. Solution Y turns litmus red.
A student adds equal volumes of solution X to solution Y to produce solution Z.

What is the colour change of red and blue litmus in solution Z?

	blue litmus	red litmus
A	no change	no change
B	turns red	turns blue
C	no change	turns blue
D	turns red	no change

9. A solution contains a high concentration of hydrogen ions (H⁺). What will be the pH of the solution?

- A 1
- B 7
- C 9
- D 11

10. Mr. Rolle noticed that a substance feels slippery, has a bitter taste and turns pink in phenolphthalein.

Which term best describes this substance?

- A aluminium oxide
- B ethanoic acid
- C sodium hydroxide solution
- D water

11. A student adds a small amount of zinc powder to a solution of sulfuric acid. Part of the word equation for this reaction is shown.



Which row of the table shows the correct products for this reaction?

	Gas X	Salt Y
A	carbon dioxide	zinc chloride
B	hydrogen	zinc sulfate
C	oxygen	zinc sulfate
D	nitrogen	zinc nitrate

Element **A** belongs to Group II of the Periodic Table and Element **B** belongs to Group VII of the Periodic Table. Use this information to answer questions **12–13**.

12. What is the correct chemical formula for the compound formed between **A** and **B**?

- A AB
- B AB₂
- C A₂B
- D A₂B₂

13. Which type of chemical bonding is present in a compound of elements **A** and **B**?

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

14. Calculate the number of moles present in 5 g of potassium oxide (K₂O).

- A 0.053 mol
- B 18.8 mol
- C 0.091 mol
- D 11 mol



15. 12 g of carbon and 32 g of oxygen react to form 44 g of carbon dioxide.



What would be the mass of carbon dioxide produced from 0.3 g of carbon and 0.8 g of oxygen?

- A 1.1 g
- B 0.11 g
- C 0.011 g
- D 0.022 g

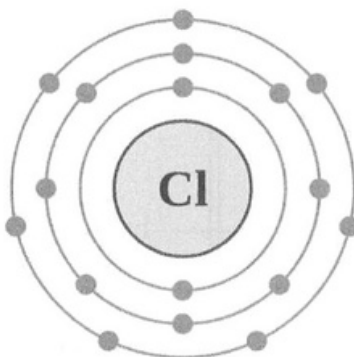
16. An equation for a chemical reaction is shown.



How many moles of oxygen will be produced if 4 moles of mercury oxide (HgO) is decomposed by heat?

- A 2 moles
- B 4 moles
- C 6 moles
- D 1 mole

Question 17 is based on the diagram of the electronic structure of chlorine.



17. When an atom of chlorine becomes an ion, it will have the same electronic structure as which other element?

- A argon
- B helium
- C neon
- D fluorine

18. The equation for a reaction is shown.

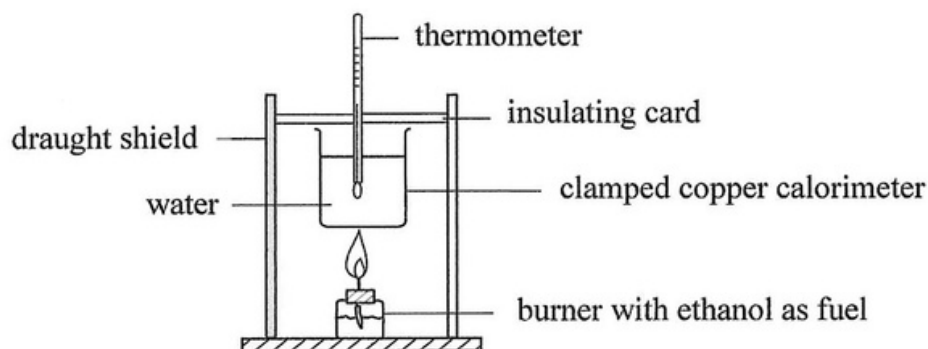


Which statement about what happens to potassium in this reaction is correct?

- A it is oxidised only
 - B it is reduced only
 - C it is neither oxidised nor reduced
 - D it is both oxidised and reduced
19. A strip of zinc metal is placed in a blue solution of copper sulfate. After several minutes the blue colour of the solution fades and brown copper metal begins to coat the zinc strip.

Which of the following explains the observation?

- A copper is oxidised and zinc is reduced
 - B copper is reduced and zinc is oxidised
 - C copper is reduced **ONLY**
 - D copper is oxidised **ONLY**
20. The diagram represents a calorimeter. Use the diagram to answer questions **20** and **21**.



Which statement explains why copper is used as a calorimeter?

- A it is good conductor of heat
- B it is a good conductor of electricity
- C it is a reactive metal.
- D it produces ions in solution



21. The mass of the burner and its contents is measured before and after the experiment. The thermometer is read before and after the experiment.

What are the expected results?

	mass of burner and contents	reading on thermometer
A	decreases	increases
B	decreases	stays the same
C	increases	increases
D	increases	stays the same

22. When a sample of ammonium thiocyanate, NH_4SCN , is mixed with solid barium hydroxide, $\text{Ba}(\text{OH})_2$, the mixture changes to a liquid and the temperature drops sufficiently to freeze the beaker to the table.

Which statement is true about the reaction?

- A the process is endothermic and ΔH is –
- B the process is endothermic and ΔH is +
- C the process is exothermic and ΔH is –
- D the process is exothermic and ΔH is +

23. Which class includes more than two-thirds of the elements of the Periodic Table?

- A metalloids
- B metals
- C non-metals
- D noble gases

24. Which group of the Periodic Table has elements that are stored under oil to keep them from reacting vigorously with oxygen and moisture in the air?

- A Group I
- B Group II
- C Group IV
- D Group VII

25. Which one of the following could be used to test acids and alkalis?

- A litmus
- B limewater
- C glowing splint
- D burning splint

26. When dilute hydrochloric acid is added to solid **X** fizzing is observed.
The gas produced turns limewater cloudy.

Which ion does solid **X** contain?

- A Ca^{2+}
- B Cl^-
- C CO_3^{2-}
- D SO_4^{2-}

27. Which statement is **TRUE** about the extraction of a metal?

	name of metal	name of ore	method of extraction
A	aluminium	bauxite	heating with carbon
B	aluminium	haematite	electrolysis
C	iron	bauxite	electrolysis
D	iron	haematite	heating with carbon

28. Which element reacts vigorously with water?

- A Cu
- B Fe
- C Li
- D Zn

29. Which metal reacts with $0.1 \text{ mol/dm}^3 \text{ HCl (aq)}$ to produce hydrogen gas, at room temperature and pressure?

- A Ag
- B Au
- C Cu
- D Mg



30. Which group of elements usually forms oxides with the general formula X_2O_3 ?

- A Group I
- B Group II
- C Group III
- D Group IV

31. Which Period 3 element is most likely to be malleable and ductile?

- A Al
- B Ar
- C Cl
- D P

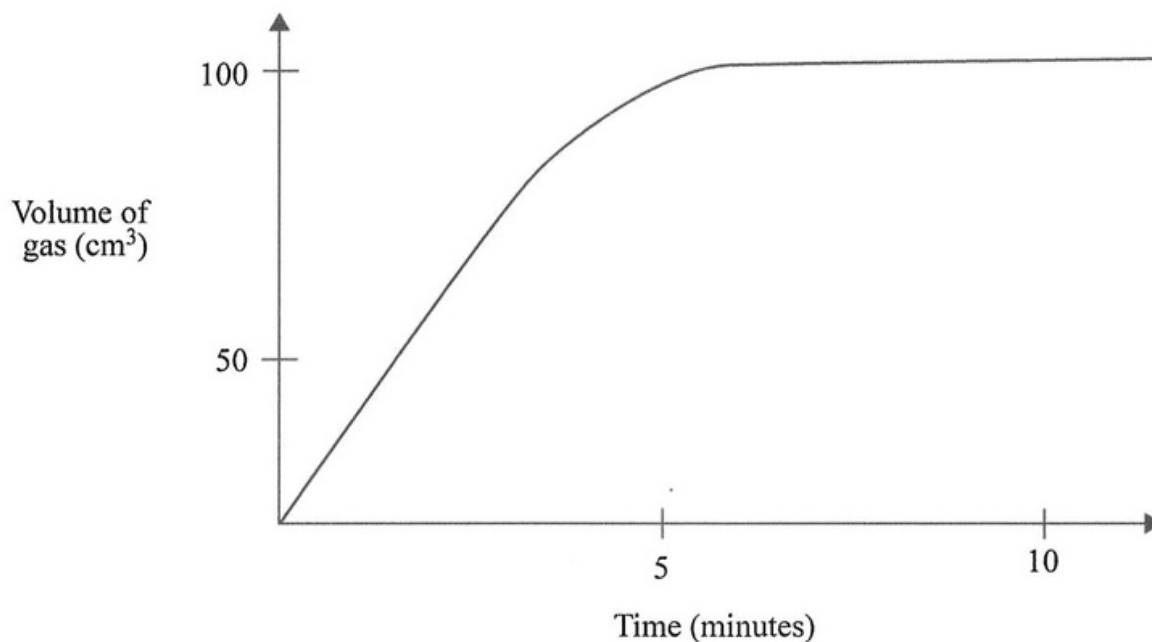
32. Which process uses electricity to cause a chemical change?

- A corrosion
- B electrolysis
- C oxidation
- D neutralisation

33. Which reaction is endothermic?

- A photosynthesis
- B condensation
- C combustion
- D freezing

34. 200 cm³ of dilute hydrochloric acid are added to 1 g of magnesium. The graph shows the volume of hydrogen collected over 10 minutes.



What would be the volume of hydrogen collected if the final measurement had been made after 20 minutes?

- A 50 cm³
- B 100 cm³
- C 200 cm³
- D 240 cm³

Use the list of gases to answer questions 35 to 37.

- A carbon dioxide
- B water
- C oxygen
- D hydrogen

- | | | | | | |
|-----|--|---|---|---|---|
| 35. | Which gas is flammable? | A | B | C | D |
| 36. | Which gas is used in fire extinguishers? | A | B | C | D |
| 37. | Which gas is a product of complete combustion? | A | B | C | D |



38. What is a correct use for sulfur dioxide?

- A antacid
- B food preservative
- C detergent
- D fertiliser

39. What is a correct statement about sulfuric acid?

- A acts as a dehydrating agent
- B acts as a reducing agent
- C is mono-basic
- D is produced from brine

Use the list of ions to answer questions 40 and 41.

- A Al^{3+}
- B Cu^{2+}
- C Fe^{2+}
- D Fe^{3+}

40. Which ion gives a dark blue solution with excess aqueous ammonia?

- A B C D

41. Which ion gives a green precipitate with aqueous sodium hydroxide?

- A B C D

42. Which salt could be made by titration?

- A lead(II) chloride
- B barium sulfate
- C calcium carbonate
- D sodium chloride

43. Which solvent is sulfur trioxide dissolved in during the Contact process?

- A concentrated sulfuric acid
- B dilute sulfuric acid
- C oleum
- D water

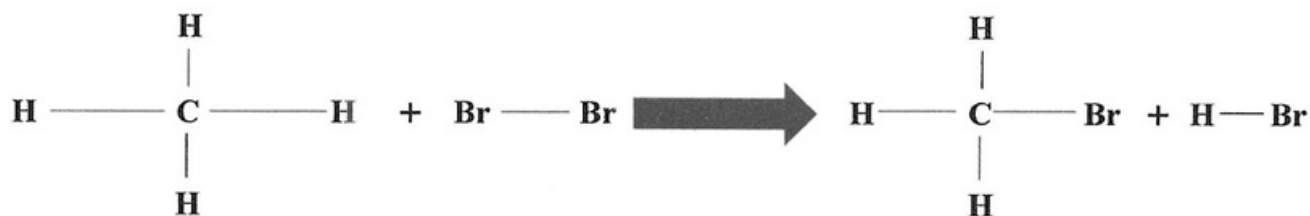
44. Which two oxides are amphoteric?

- A Al_2O_3 and ZnO
- B CaO and SO_2
- C ZnO and NO_2
- D MgO and CO_2

45. What is the basicity of ethanoic acid, CH_3COOH ?

- A 1
- B 2
- C 3
- D 4

46. Which type of reaction is represented by this equation?



- A neutralisation
- B oxidation
- C polymerisation
- D substitution

47. Which organic compound has a relative molecular mass of 74?

- A butane, C_4H_{10}
- B butanol, C_4H_9OH
- C ethene, C_2H_4
- D ethanoic acid, CH_3COOH



48. What is a potentially harmful effect of overuse of pesticides?

- A build-up in the food chain
- B eutrophication
- C lung disease
- D ozone depletion

49. Which source is **NOT** finite?

- A coal
- B gas
- C oil
- D solar

50. Which substance is a non-biodegradable pollutant?

- A fertilisers
- B detergents
- C plastics
- D sewerage

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