

3051/1

BGCSE

School Number	Candidate Number
Surname and Initials	

CHEMISTRY

PAPER 1 3051/1

Friday 30 MAY 2003 12.30 – 1.45 P.M.

Additional materials:
Paper for rough work
Periodic Table

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS TO CANDIDATES

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

All answers are to be recorded in this booklet.

Write your school number, candidate number, surname and initials in the spaces provided at the top right-hand side of this booklet.

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.

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

This question paper consists of 16 printed pages and 4 blank pages.

1. Which process can be used to change iodine crystals to iodine gas?

- A distillation
- B evaporation
- C filtration
- D sublimation

The table shows the melting points and boiling points of four substances.

substance	melting point /°C	boiling point /°C
A	545	1,300
B	-7	59
C	-165	-92
D	27	98

Use the table to answer questions 2 to 4.

Choices can be used once, more than once or not at all.

Which substance

2. is a solid at 30 °C,

A B C D

3. is a gas at room temperature, 20 °C,

A B C D

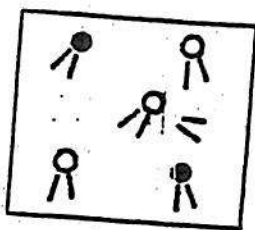
4. has a melting point closest to the melting point of ice?

A B C D

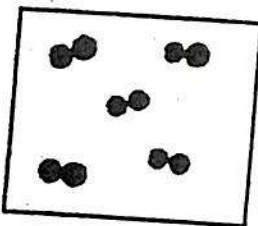
5. Which test could be used to show that a sample of water is pure?

- A It freezes at exactly 0 °C.
- B It turns anhydrous copper(II) sulphate blue.
- C It turns cobalt(II) chloride paper pink.
- D When it evaporates, it leaves no residue.

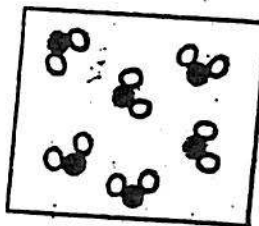
The diagrams represent particle arrangements in four substances.



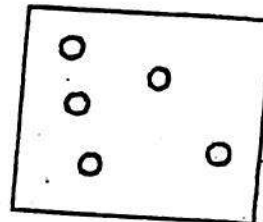
A



B



C



D

Use the diagrams to answer questions 6 to 8.

Which diagram represents

6. a mixture of monatomic gases,

A B C D

7. molecules of hydrogen gas,

A B C D

8. steam?

A B C D

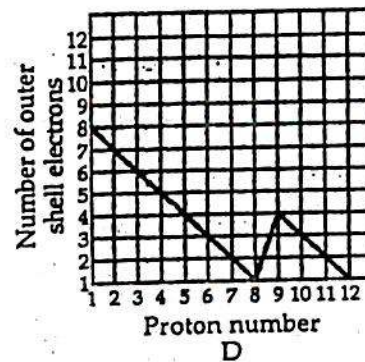
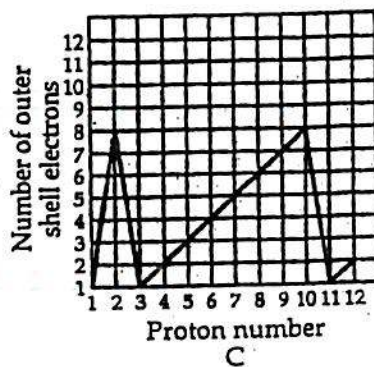
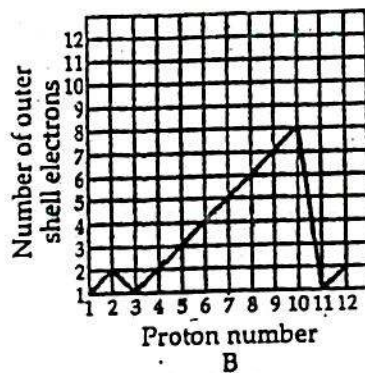
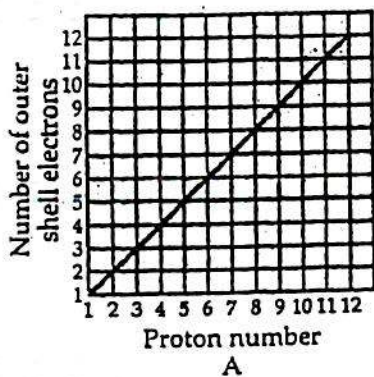
9. The element with atomic number 2 is likely to have similar properties to the element with the atomic number

- A 9
- B 10
- C 12
- D 19

10. Element Z may be represented as ${}^{18}_8\text{Z}$. Which is the structure of the ion Z^{2-} ?

	protons	neutrons	electrons
A	8	8	10
B	8	10	10
C	10	10	8
D	10	18	8

11. The number of outer shell electrons for the atoms of the first 12 elements in the Periodic Table was plotted against the proton (atomic) number of the element. Which graph was obtained?



With the aid of the information in the Periodic Table, answer questions 12 to 15 using the elements listed.

- A Sodium
 B Copper
 C Silicon
 D Iodine

Choices can be used once, more than once or not all.

Which element

12. is in group 1,
 13. has 35 neutrons in an atom,
 14. has an atom with the electronic configuration 2, 8, 1,
 15. has diatomic molecules?

A B C D

A B C D

A B C D

A B C D

16. What is the mass of one mole of calcium nitrate, $\text{Ca}(\overline{\text{NO}_3})_2$?

A 40 g

B 102 g

C 150 g

D 164 g

17. The composition of dry air is given in the table.

gas	percent (%)
carbon dioxide	0.03
rare gases	0.97
oxygen	20.00
nitrogen	79.00

What volume of carbon dioxide is contained in a bottle holding one mole of dry air at r.t.p.?

A 7.2 cm^3

B 72.0 cm^3

C 720.0 cm^3

D 7,200.0 cm^3

18. What is the percentage by mass of magnesium in magnesium oxide, MgO ?

A 16

B 24

C 40

D 60

19. Which symbols represent the ammonium, hydrogen and hydroxide ions?

- | | | | |
|---|-----------------|---------------|---------------|
| A | NH_4 | H | OH |
| B | NH_4^+ | H^+ | OH^- |
| C | NH_4^+ | OH^+ | OH^- |
| D | NH_3 | OH^- | OH^- |

20. Which metal oxide is amphoteric?

- A copper oxide
- B sodium oxide
- C aluminium oxide
- D magnesium oxide

21. Which is NOT a characteristic property of an acid?

- A Turns blue litmus red
- B Produces ammonia gas on reacting with an ammonium salt.
- C Tastes sour.
- D Undergoes a neutralization reaction.

22. Which one of the following substances gives a white precipitate with barium chloride solution and a lilac flame test?

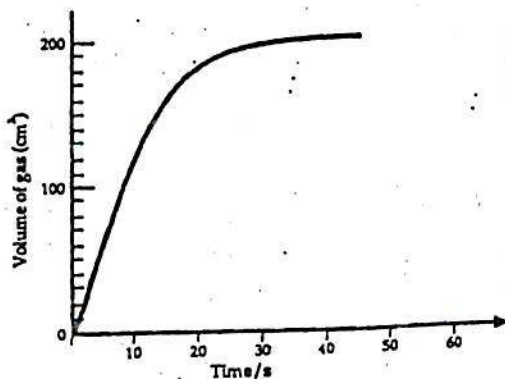
- A sodium sulphate
- B calcium chloride
- C potassium sulphate
- D lithium chloride

23. A white compound produces a mixture of gases when heated. This mixture turns moist Universal Indicator paper red and relights a glowing splint. What does this mixture contain?
- A an acidic gas and hydrogen
 - B an acidic gas and oxygen
 - C an alkaline gas and hydrogen
 - D an alkaline gas and oxygen
24. An electric current was passed through an unknown solution. The gases evolved were collected and tested. The gas from the anode causes a glowing splint to burst into flames and the gas from the cathode burned with a "squeaky pop". Which solution was probably used?
- A concentrated hydrochloric acid
 - B sodium chloride
 - C silver nitrate
 - D dilute sulphuric acid

25. Aqueous copper(II) sulphate is electrolyzed using copper electrodes. Which observations will be made?

	at anode (+ve)	at cathode (-ve)	colour of the solution
A	anode dissolves	pink solid forms	blue colour fades
B	anode dissolves	pink solid forms	no change
C	colourless gas forms	colourless gas forms	no change
D	colourless gas forms	pink solid forms	blue colour fades

The graph shows the results of an experiment to determine the rate of reaction between magnesium ribbon and excess dilute hydrochloric acid.



Use the information and graph to answer questions 26 to 28.

26. Which is the correct equation for the reaction?
- A magnesium + hydrochloric acid \rightarrow magnesium chloride + water
- B magnesium + hydrochloric acid \rightarrow magnesium chloride + hydrogen
- C magnesium + hydrochloric acid \rightarrow magnesium chloride + carbon dioxide
- D magnesium + hydrochloric acid \rightarrow magnesium chloride + water + carbon dioxide

27. How long did it take for one half of the magnesium ribbon to react?
- A 10 seconds
 - B 20 seconds
 - C 30 seconds
 - D 40 seconds
28. What effect would using an equal mass of powdered magnesium instead of the ribbon have on the rate and total volume of gas evolved?
- A faster rate increased volume of gas
 - B faster rate the same volume of gas
 - C slower rate increased volume of gas
 - D slower rate the same volume of gas
29. In which form of carbon are the atoms bonded tetrahedrally?
- A charcoal
 - B diamond
 - C graphite
 - D lampblack
30. A sample of water did not lather readily with soap. Which ion is likely to be present in the water?
- A calcium
 - B carbonate
 - C sodium
 - D sulphate

31. The scale or fur most often found in kettles used for boiling hard water is a deposit of

- A calcium carbonate
- B copper(II) carbonate
- C lead(II) carbonate
- D zinc carbonate

32. Copper(II) carbonate, calcium carbonate and zinc carbonate decompose when heated. The temperature at which decomposition takes place depends upon the position of the metal in the reactivity series.

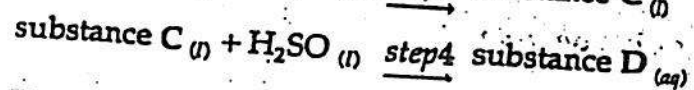
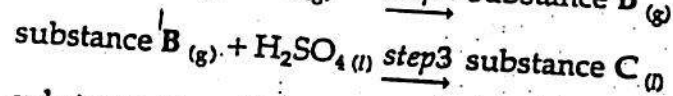
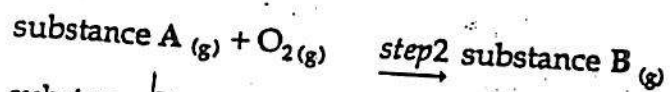
What is the correct order for their decomposition?
(lowest temperature → highest temperature)

- | | | | |
|---|----------------------|----------------------|----------------------|
| A | copper(II) carbonate | zinc carbonate | calcium carbonate |
| B | calcium carbonate | zinc carbonate | copper(II) carbonate |
| C | zinc carbonate | copper(II) carbonate | calcium carbonate |
| D | zinc carbonate | calcium carbonate | copper(II) carbonate |

33. If 20 g of an element X combines with 30 g of an element Y in one sample of a compound, then in another sample of the same compound 100 g of element X would combine with:

- A 100 g of Y
- B 150 g of Y
- C 30 g of Y
- D 20 g of Y

The diagram shows the industrial production of dilute sulphuric acid.



Use this information to answer questions 34 to 36.

34. Which step results in an aqueous solution?
- A step 1
 - B step 2
 - C step 3
 - D step 4
35. What is substance A in the diagram?
- A sulphuric acid
 - B sulphur dioxide
 - C sulphur trioxide
 - D oleum
36. In which step is a catalyst used?
- A step 1
 - B step 2
 - C step 3
 - D step 4

37. Which industrial process uses iron as a catalyst?

- A making ethanol from ethene and steam
- B making ammonia from nitrogen and hydrogen
- C making steel
- D making sulphur trioxide from sulphur dioxide and oxygen

38. Which physical property makes metals useful for making bottle caps for sodas?

- A biodegradable
- B compressible
- C ductile
- D malleable

39. A company advertises a product that can be used to seal breaks in garden hoses and household pipes. This product is delivered by an aerosol spray and contains aluminium metal in a paste.

Which properties make this product useful?

	water soluble	flexible	corrosion
A	no	yes	small
B	no	no	large
C	yes	no	large
D	yes	yes	small

Use the following substances to answer questions 40 to 43.

- A propane
- B ethene
- C ethanol
- D coal

The choices can be used once, more than once or not at all.

40. The substance produced by fermentation and used in the fuel gasohol.
41. A hydrocarbon which may undergo polymerization.
42. The main component of cooking gas used in The Bahamas.
43. The substance that when completely burned produces a pollutant other than carbon dioxide.

A B C D

A B C D

A B C D

A B C D

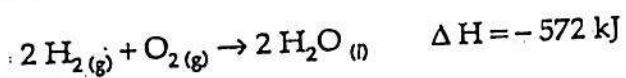
44. Which best describes an aqueous solution of pH 6.5?

- A neutral
- B strongly acidic
- C strongly alkaline
- D slightly acidic

45. In the equation $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$

- A iron is oxidised and copper(II) sulphate is the reducing agent.
- B iron is reduced and copper(II) sulphate is the oxidising agent.
- C iron is oxidised and copper(II) sulphate is the oxidising agent.
- D iron is reduced and copper(II) sulphate is the reducing agent.

46. The formation of water is shown by the equation below: ~



What kind of chemical reaction is shown by this equation?

- A endothermic reaction producing 572 kJ of energy
- B endothermic reaction absorbing 572 kJ of energy
- C exothermic reaction producing 572 kJ of energy
- D exothermic reaction absorbing 572 kJ of energy

47. What is the basicity of sulphuric acid?

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