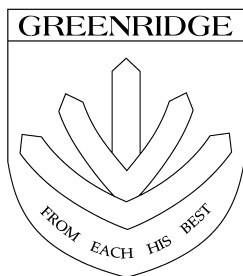


Name : _____ ()

Class : _____



GreenRidge Secondary School

Mid-Year Examination 2002

Subject : Science(Chemistry) (5152)
Secondary Three Express

Date : 14 May 2002

Duration : 1 h 30 mins

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INSTRUCTIONS TO CANDIDATES

Write your name, index number and class in the spaces at the top of this page and on all separate answer paper used.

Section A (20 marks)

Answer **all** questions on the OMR sheet provided. Hand up the OMR sheet separately.

Section B (30 marks)

Answer **all** questions. Write your answers in the spaces provided on the question paper.

Section C (20 marks)

Answer **two** questions. Write your answers on the foolscap papers provided.
Attach the foolscap to the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

A copy of Periodic Table is available on Page **10**.

You are allowed to use the Calculator.

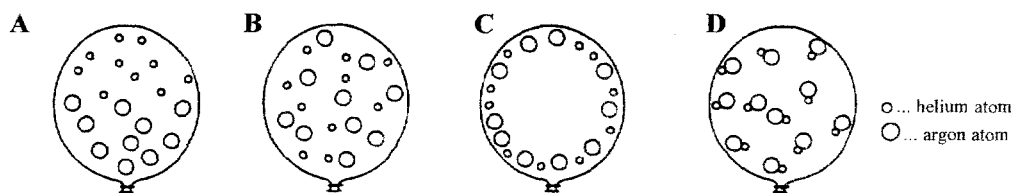
FOR EXAMINER'S USE	
Section A	/20
Section B	/30
Section C	/20
Total	/70

*This paper consists **10** printed pages, including this page.*

Section A [20 marks]

Answer **all** questions on the OMR sheet provided.

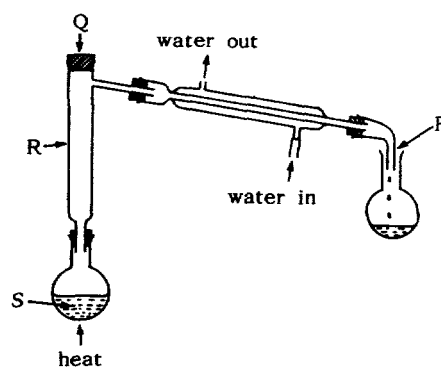
1. Which diagram shows the arrangement of particles inside a balloon filled with a mixture of helium and argon?



2. A mixture of two liquids is fractionally distilled in the apparatus shown in figure to the right.

Which one of the following alterations would best improve the efficiency of the separation of the liquids?

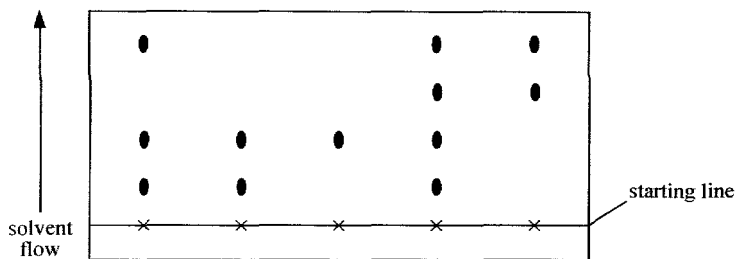
- A. Corking the apparatus at P
B. Inserting a thermometer at Q
C. Filling tube R with glass beads
D. Putting “anti-bumping” granules into S



3. Oxygen gas is obtained industrially by

- A. Evaporation
B. Fractional Distillation
C. Simple Distillation
D. Boiling

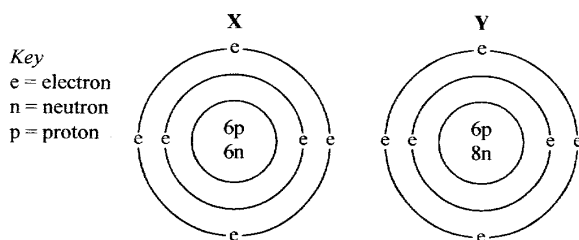
4. The diagram shows a chromatogram which was prepared using spots of five different inks.



How many different dyes were used to make the five inks?

- A. 3
B. 4
C. 5
D. 12

5. A pure compound **X** has a melting point 800°C and is soluble in water. Compound **X** conducts electricity when it is in aqueous or molten state. Which one of the following is **X** likely to be?
- calcium carbonate
 - ethanol
 - silicon dioxide
 - sodium chloride
6. An atom of argon has 18 electrons round its nucleus. Which of the following particles does **not** have 18 electrons round its nucleus?
- Ca^{2+}
 - Cl^{-}
 - K^{+}
 - O^{2-}
7. An atom of element X has the symbol ${}^{19}_9\text{X}$. Which statement about element X is correct?
- It is in Group III of the Periodic Table.
 - It is in Group VII of the Periodic Table.
 - In one atom, the number of protons + the number of neutrons is 9.
 - In one atom, the number of protons + the number of electrons is 19.
8. Two particles X and Y have the structures shown.



Which term describes X and Y?

- Allotropes
 - Ions
 - Isomers
 - Isotopes
9. The table below gives some of the properties of four substances A to D.

Substance	Melting point/ $^{\circ}\text{C}$	Boiling point/ $^{\circ}\text{C}$	Ability to conduct electricity	
			When liquid	In aqueous solution
A	-144	78	None	None
B	-144	-85	None	Good
C	180	218	None	(Insoluble)
D	808	1465	Good	Good

Which of the substances A, B, C or D, could be hydrogen chloride?

10. Which one of the following is a pure compound?
- A. air
 - B. carbon
 - C. oxygen
 - D. steam
11. Which one of the following substances forms crystals containing small molecules?
- A. Copper
 - B. Diamond
 - C. Iodine
 - D. Silica (sand)
12. A crystal of sodium chloride is held together by
- A. covalent bonds.
 - B. double bonds.
 - C. positive ions in a 'sea of electrons'.
 - D. the attraction of oppositely charged ions.
13. In which pair do the elements combine to form a compound with an ionic lattice?
- A. Carbon and hydrogen
 - B. Carbon and oxygen
 - C. Hydrogen and chlorine
 - D. Potassium and chlorine
14. How many elements are there in ammonia gas?
- A. one
 - B. two
 - C. three
 - D. four
15. A metal M forms a carbonate with the formula M_2CO_3 . The mass of 1 mole of the carbonate is 74 g. What is the relative atomic mass of M?
- A. 7
 - B. 14
 - C. 37
 - D. 74
16. Which compound reacts with carbon dioxide?
- A. calcium chloride
 - B. calcium hydroxide
 - C. calcium nitrate
 - D. calcium sulphate

17. Which of the following substances is used to neutralize acidity in soil?
- A. ammonium nitrate
 - B. calcium hydroxide
 - C. magnesium sulphate
 - D. potassium chloride
18. Lead(II) sulphate is insoluble in water. What should be added to dilute sulphuric acid to prepare lead(II) sulphate?
- A. powdered lead(II) carbonate
 - B. powdered lead(II) chloride
 - C. aqueous lead(II) nitrate
 - D. powdered lead(II) oxide
19. Which one of the following could best be prepared by a reaction involving an acid?
- A. iron(II) carbonate
 - B. lead(II) carbonate
 - C. magnesium sulphate
 - D. sodium hydroxide
20. The oxide of a metal was found to react **both** with hydrochloric acid and with sodium hydroxide solution. Which one of the following is the best description of the oxide?
- A. acidic
 - B. alkaline
 - C. amphoteric
 - D. neutral

Section B [30 marks]

Write your answers in the spaces provided on the question paper.

B1. Classify the following as either *ionic* or *covalent*: [5]

- (a) carbon dioxide _____
- (b) zinc chloride _____
- (c) hydrogen chloride _____
- (d) water _____
- (e) chlorine gas _____

B2. (a) Complete the table below: [4]

Particle	Mass Number	Atomic Number of the element	Number of		
			Electrons	Protons	Neutrons
Lithium atom	7	3		3	
Sodium ion		11		11	13
Hydrogen ion		1		1	0
Fluorine atom	19	9		9	

(b) By means of suitable electron diagrams, illustrate the bonding in these compounds. (*Show all electrons shells*)

(i) Sodium chloride [2]

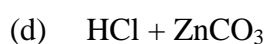
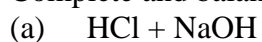
(ii) carbon dioxide [2]

B3. (a) Define an 'acid'. [1]

(b) Sodium carbonate was reacted with hydrochloric acid to form three products. Write a balanced chemical equation for this reaction. [1]

(c) Describe a test to identify the gas released in (b). [1]

B4. Complete and balance the following chemical equations: [6]



B5. Write ionic equations, including state symbols, for the following reactions: [4]

(a) Iron + dilute sulphuric acid

(b) Barium nitrate + dilute sulphuric acid

B6. An excess of lead(II) oxide was added to 50 cm³ of dilute nitric acid. After stirring, the mixture was filtered. The filtrate was evaporated to half its original volume and then left to cool. As it cooled, white crystals formed.

(a) Name the white crystals. [1]

(b) Why is an excess of lead(II) oxide used? [1]

(c) Explain why the crystals cannot be dried by heating. [1]

(d) Name an alternative to lead(II) oxide which can be used to prepare the same salt named in (a) above. [1]

Section C [20 marks]

Answer **two** questions. Write your answers on the foolscap papers provided.
Attach the foolscap to the question paper.

- C7. (a) Define proton number (atomic number) and nucleon number (mass number). [2]
(b) An atom is given this symbol:
- $${}_{17}^{35}\text{Cl}$$
- (i) Name the particles present in the atom and state their positions in the atom. [3]
(ii) State the number of each of the particles present in the atom. [3]
(c) Describe the physical properties you would expect of a compound that results from the bonding of this atom with a hydrogen atom. [2]
- C8. (a) Magnesium oxide is an ionic compound whereas carbon dioxide is a covalent compound.
(i) By means of suitable electron diagrams, illustrate the bonding in these two compounds. [4]
(ii) Give two physical properties of ionic compounds and state how these properties differ in compounds containing covalent bonds. [2]
(b) The atomic number of the noble gas Krypton is 36. For the element of atomic number 34, predict
(i) whether the element is metallic or non-metallic
(ii) the charge on the ion that the element forms.
Briefly explain your answers. [4]
- C9. (a) Sodium hydroxide is said to be a "typical *alkali*". Explain what is meant by an alkali, and state **two** properties which an alkali possesses. [2]
(b) What would you observe if carbon dioxide were bubbled into lime water, until no further change was seen? [2]
(c) Sulphur dioxide is an acidic oxide.
(i) Name two other types of oxides and give an example of each. [4]
(ii) Explain why sulphur dioxide is classified as an acidic oxide, and why calcium oxide is not. Write equations to support your explanation. [2]

~ The End ~

