MINISTRY OF EDUCATION, SINGAPORE
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
General Certificate of Education Ordinary Level

SCIENCE (CHEMISTRY, BIOLOGY) 5118/01

Paper 1 Multiple Choice

October/November 2011

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and index number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Data Sheet is printed on page 19.
A copy of the Periodic Table is printed on page 20.

This document consists of **17** printed pages and **3** blank pages.

Singapore Examinations and Assessment Board

UNIVERSITY of CAMBRIDGE International Examinations

IB11 11_5118_01/RP

[Turn over

1 A salt is dissolved in water. The results of two separate tests on the solution are shown in the table.

test		result
1	add aqueous ammonia	a white precipitate which dissolves when an excess of aqueous ammonia is added
2	add dilute nitric acid then aqueous barium nitrate	a white precipitate

What is the salt?

A aluminium chloride

B aluminium sulfate

C zinc chloride

D zinc sulfate

2 The table shows the boiling points of some of the gases present in air.

gas	boiling point / °C
argon	–186
helium	–269
neon	–246
nitrogen	–196
oxygen	–183

When air is cooled to –200 °C, some of these gases liquefy.

Which gases liquefy?

A argon, helium and neon

B argon, nitrogen and oxygen

C helium and neon only

D helium, neon and nitrogen

3 What can be deduced from the symbol $^{4}_{2}He$?

A An atom of helium contains 2 electrons.

B An atom of helium has 2 protons and 4 neutrons in its nucleus.

C Helium has a proton (atomic) number of 4.

D Helium occurs as a diatomic molecule.

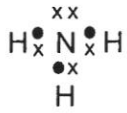
4 An element Y reacts with chlorine to form a solid of formula YCl.

Which is the electronic structure of Y?

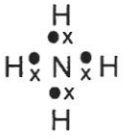
A 2, 7 **B** 2, 8, 1 **C** 2, 8, 2 **D** 2, 8, 7

5 Which diagram shows the outer electron structure in a molecule of ammonia?

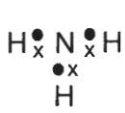
A



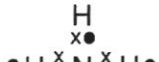
B



C



D



key

x = nitrogen electron

• = hydrogen electron

6 20 cm^3 of carbon monoxide are reacted with 10 cm^3 of oxygen.

The equation for the reaction is

$$2CO + O_2 \rightarrow 2CO_2$$

Which volume of carbon dioxide will be produced?
(all volumes are measured at r.t.p.)

A 10 cm^3 **B** 20 cm^3 **C** 30 cm^3 **D** 40 cm^3

7 What is the mass of sodium hydroxide present in 1 dm^3 of 1.0 mol/dm^3 sodium hydroxide solution? [Relative atomic masses: Na, 23; O, 16; H, 1.]

A 0.1 g **B** 1.0 g **C** 4.0 g **D** 40.0 g

8 Which process is exothermic?

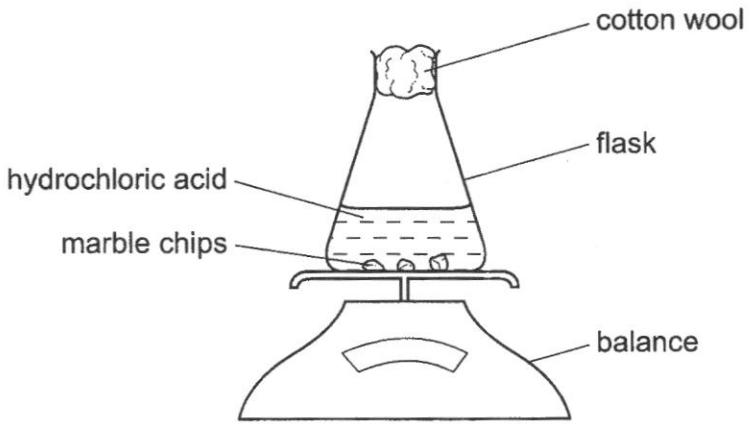
A burning petrol in a car engine

B cracking of petroleum fractions

C fractional distillation of petroleum

D melting bitumen for roads

9 Two experiments are carried out using the apparatus below.

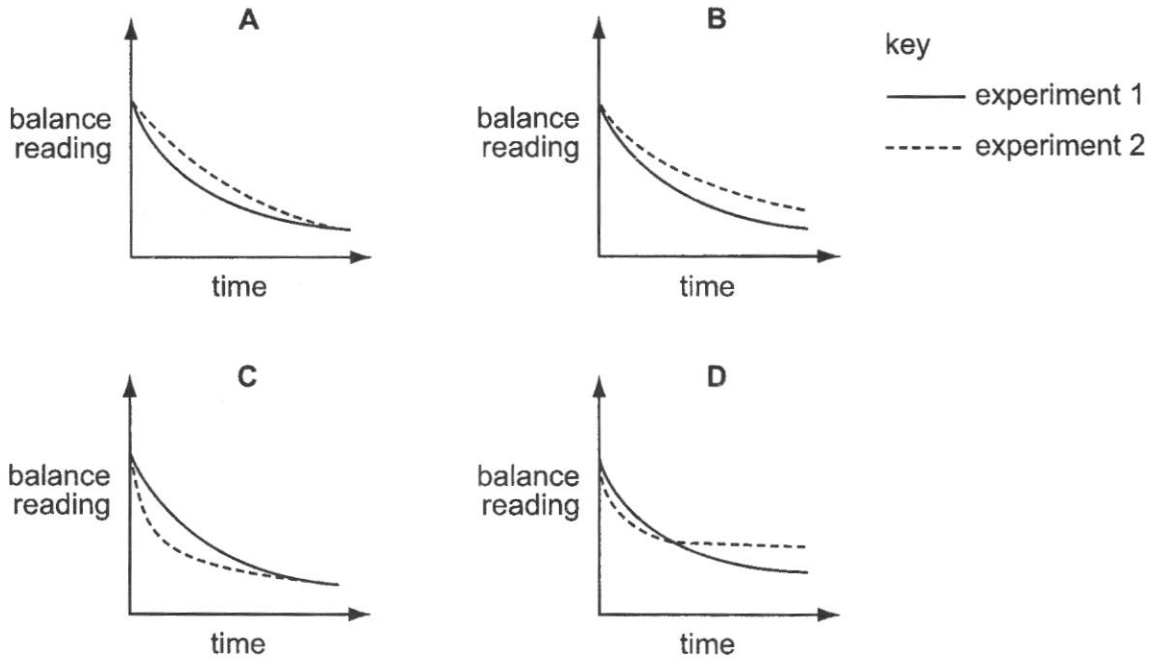


In experiment 1, dilute hydrochloric acid is used.

In experiment 2, more concentrated hydrochloric acid is used.

All other conditions are the same and in both experiments all the marble chips completely react.

Which diagram shows the results obtained?



10 What does an oxidising agent do?

A It turns acidified potassium dichromate(VI) green.

B It turns acidified potassium manganate(VII) colourless.

C It turns aqueous potassium iodide brown.

D It turns Universal Indicator red.

11 Salts are made by reacting acids with bases.

For which acid-base reaction is the titration method used?

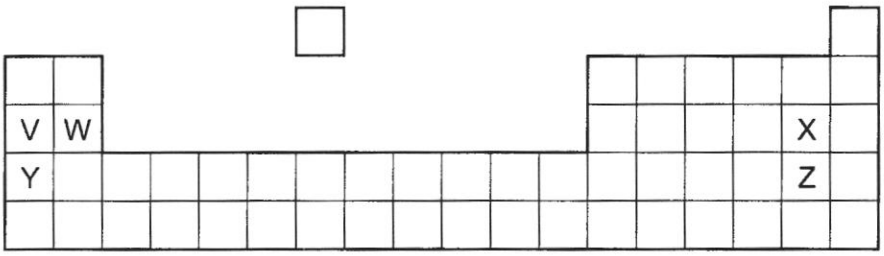
A an insoluble acid with an insoluble base

B an insoluble acid with a soluble base

C a soluble acid with an insoluble base

D a soluble acid with a soluble base

12 Part of the Periodic Table is shown.



The letters are not the symbols of the elements.

Which statement is correct?

A V is more reactive than Y.

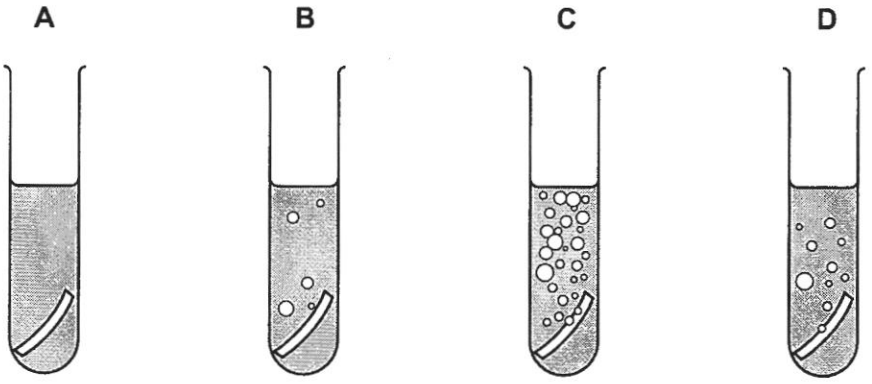
B W has more metallic character than V.

C Y has a lower melting point than V.

D Z is more reactive than X.

13 The metals iron, lead, magnesium and zinc are added to separate samples of dilute hydrochloric acid in test-tubes.

Which tube contains magnesium and dilute hydrochloric acid?



14 Why is limestone added to the blast furnace in the manufacture of iron?

A It lowers the melting point of the iron ore.

B It raises the temperature of the furnace.

C It reduces the iron ore to iron.

D It removes acidic impurities.

15 Which statements about the pollutant carbon monoxide are correct?

1 It is a colourless, odourless gas.

2 It is formed by incomplete combustion of natural gas.

3 It reacts with haemoglobin in the blood.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

16 The table shows the names of four fractions from petroleum and their uses.

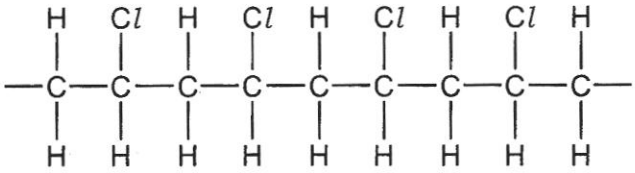
Which fraction is paired with its correct use?

	fraction	use
A	diesel	making road surfaces
B	gasoline	feedstock for the chemical industry
C	kerosene	lubricant
D	lubricating oil	making polishes and waxes

17 Which hydrocarbon is a member of the alkane series?

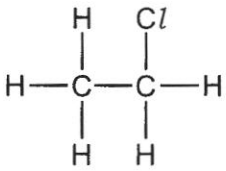
A C_4H_8 **B** C_6H_{14} **C** C_8H_{16} **D** $C_{10}H_{20}$

18 The diagram shows part of the structure of a polymer.

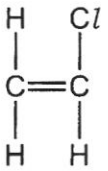


Which monomer is used to manufacture the polymer?

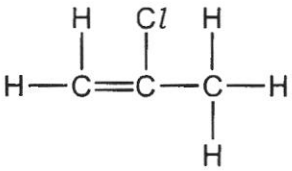
A



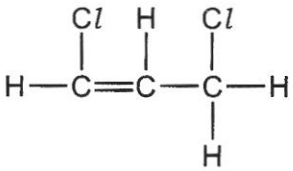
B



C

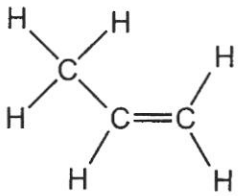


D

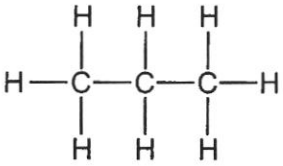


19 Which compound decolourises aqueous bromine?

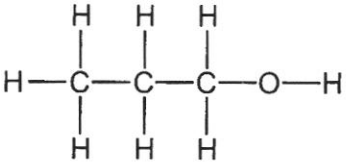
A



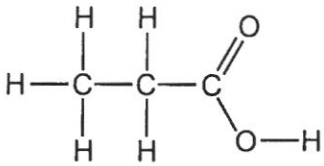
B



C



D



20 Which compound can be oxidised to propanoic acid?

A CH_3OH **B** C_2H_5OH **C** C_3H_7OH **D** C_3H_8

MINISTRY OF EDUCATION, SINGAPORE
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER | S | | | | |

INDEX NUMBER | | | | |

SCIENCE

5118/03

Paper 3 Chemistry

October/November 2011

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Answer Paper

READ THESE INSTRUCTIONS FIRST

Write your Centre number, index number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

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

Section B
Answer any **two** questions.
Write your answers on the lined paper provided and, if necessary, continue on separate answer paper.

A copy of the Data Sheet is printed on page 15.
A copy of the Periodic Table is printed on page 16.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Section A	
Section B	
Total	

This document consists of **11** printed pages and **5** lined pages.

Singapore Examinations and Assessment Board

UNIVERSITY of CAMBRIDGE International Examinations

DC (NF/CGW) 42934

[Turn over

Section A

For Examiner's Use

Answer **all** the questions.

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

1 Name the pieces of apparatus best used to carry out the following procedures.

(a) Measure the melting point of a solid.

..... [1]

(b) Add 250 cm^3 of liquid to a beaker.

..... [1]

(c) Collect and measure the volume of a water-soluble gas.

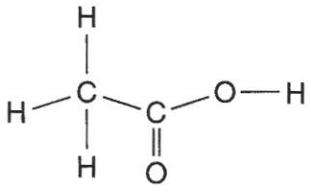
..... [1]

(d) Add 17.3 cm^3 of solution to a flask.

..... [1]

2 Complete Table 2.1 with details of two homologous series.

Table 2.1

the name of a homologous series	the name of an example from the homologous series	the structural formula of the example	the characteristic group of atoms of this series
alcohols			
			$-CO_2H$

[5]

3 Table 3.1 describes several changes. Complete each row of the table by writing on the dotted line above the arrow a suitable description of the change. The first has been completed for you as an example.

For Examiner's Use

Table 3.1

example	ethene	***polymerisation*** →	poly(ethene) production
(a)	sugar solution and yeast	..... →	formation of ethanol
(b)	acid and alkali	..... →	salt production
(c)	carbon	..... →	carbon dioxide formation
(d)	dissolving ammonium nitrate in water	..... →	drop in temperature
(e)	Na	..... →	formation of Na^+
(f)	silver nitrate solution and hydrochloric acid	..... →	insoluble silver chloride formed

[6]

4 Four unlabelled metals, **A**, **B**, **C** and **D**, are tested in a laboratory. These are the results.

For Examiner's Use

Metal **A** has to be hot before it will react with steam.
Metal **B** has to be very hot before it will react with steam. It reacts slowly with dilute hydrochloric acid.
Metal **C** is the only one to react with cold water. The reaction with water is steady but not violent.
Metal **D** does not react with dilute hydrochloric acid.

(a) Place the metals **A**, **B**, **C** and **D** in order of reactivity.

most reactive .....

.....

.....

least reactive .....

[2]

(b) Suggest a possible name for **any two** of the metals, **A**, **B**, **C** or **D**.

	letter of metal (**A**, **B**, **C** or **D**)	name of metal
(i)		
(ii)		

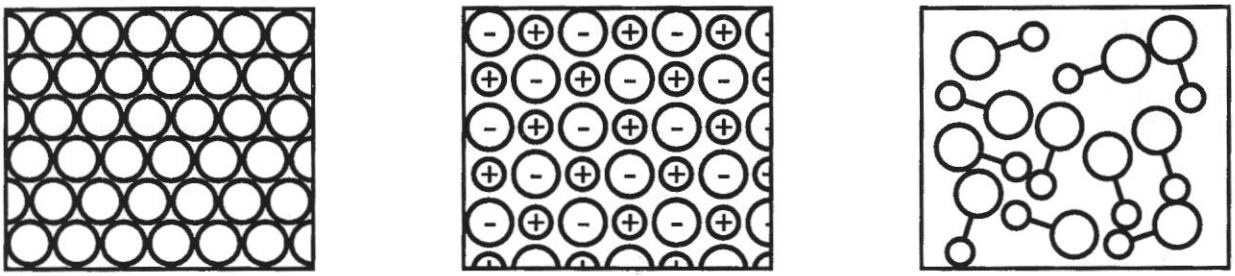
[2]

(c) Write a chemical equation for the reaction of any **one** of the metals with water. State symbols are **not** required.

..... [2]

5 Fig. 5.1 shows the arrangement of particles in three substances at room temperature.

For Examiner's Use



solid copper | solid sodium chloride | gaseous hydrogen chloride

Fig. 5.1

(a) Which of the substances has the lowest melting point? Explain why it has a low melting point.

substance .....

explanation .....

.....[2]

(b) **(i)** One of the substances in Fig. 5.1 conducts electricity. Name this substance.

substance .....[1]

(ii) When all three substances in Fig. 5.1 are liquids, another will conduct electricity. Name this substance. Explain why it conducts electricity when liquid.

substance .....

explanation .....

.....

.....[3]

6 An atom has an atomic number of 8 and a relative atomic mass of 16.

For Examiner's Use

(a) Determine the number of protons and of neutrons in the nucleus of this atom.

protons ..... neutrons ..... [2]

(b) When atoms of this element form chemical bonds they form a stable electronic structure. Name the **two** different types of chemical bonds. Explain how atoms of this element are chemically combined to form a stable electronic structure.

bond type .....

explanation .....

.....

.....

bond type .....

explanation .....

.....

.....

[4]

7 **E** is one of the substances used in a blast furnace to manufacture iron. Fig. 7.1 describes some of the reactions of **E**.

For Examiner's Use

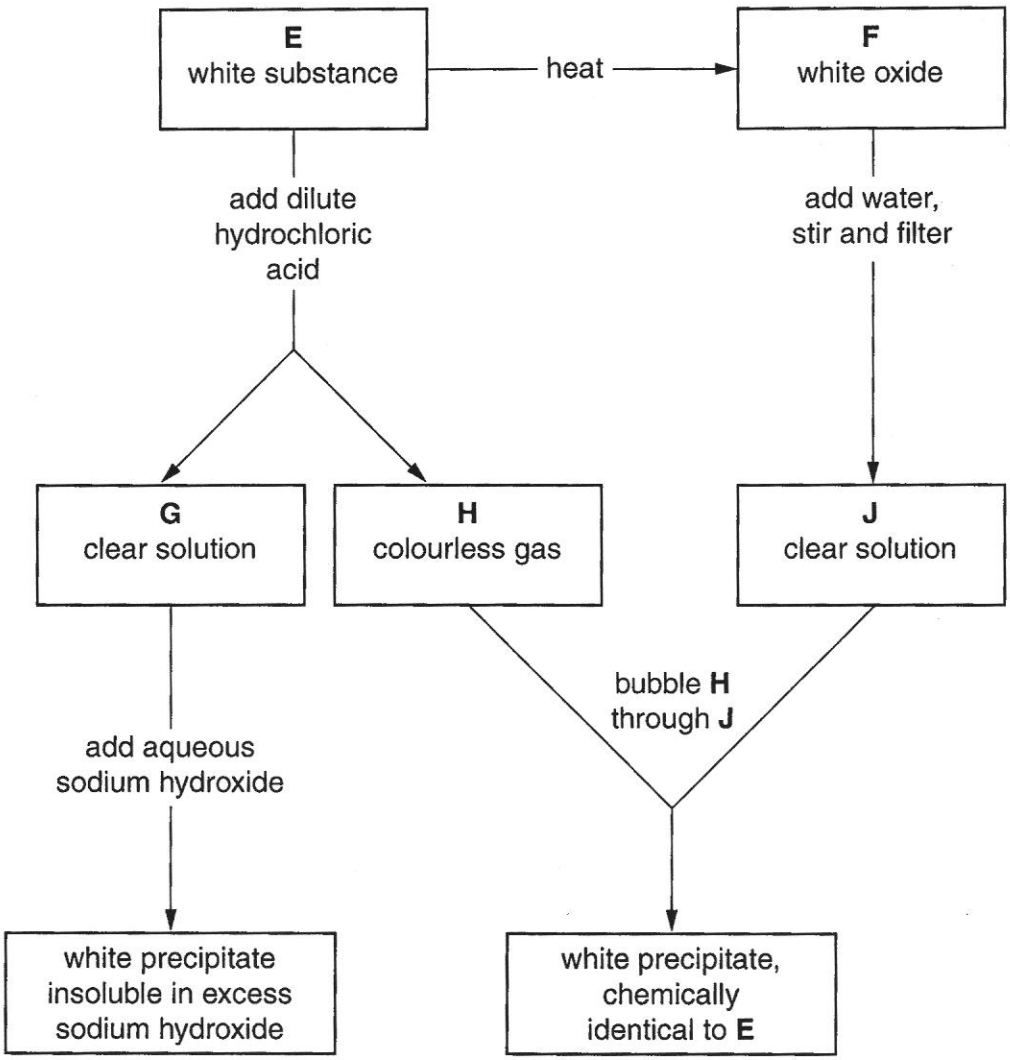


Fig. 7.1

(a) Identify **E**, **F**, **G**, **H** and **J**.

E .....

F .....

G .....

H .....

J .....

[5]

(b) Write an equation for any **one** of the changes described in Fig. 7.1.

.....[2]

8 Titanium, Ti, is a metal used in the aerospace industry. It can be extracted by heating its chloride to 2000 °C with magnesium in an atmosphere of the noble gas argon. Magnesium is reformed from the magnesium chloride and recycled during the process.

For Examiner's Use

The extraction of titanium is represented by the following equation.

$$TiCl_4 + 2Mg \rightarrow 2MgCl_2 + Ti$$

(a) (i) What can you conclude about the comparative reactivity of magnesium and titanium from this equation?

.....

.....

(ii) Suggest the purpose of the atmosphere of argon.

.....

(iii) Suggest a reason for recycling the magnesium from the magnesium chloride formed in the process.

.....

[3]

(b) What mass of magnesium chloride will be formed when 6 kg of titanium is extracted? Show your working.

[Relative atomic masses: A_r: Mg, 24; Cl, 35.5; Ti, 48]

mass of magnesium chloride = ... kg [2]

Section B

Answer any **two** questions.

Write your answers on the lined pages provided and, if necessary, continue on separate answer paper.

9 **(a)** Briefly describe the manufacture of alkenes from long-chain alkanes. [4]

(b) Describe a laboratory test to distinguish between alkanes and alkenes. [3]

(c) What volume of oxygen, measured at room temperature and pressure, is needed to burn completely 5 dm^3 of ethene? Show your working. [3]

10 **(a)** Explain why hydrochloric acid can act as an acid and why sodium hydroxide can act as an alkali. Include ionic equations in your explanation. [4]

(b) When hydrochloric acid reacts with lumps of zinc, hydrogen gas is given off. State and explain **three** ways of increasing the speed of this reaction. Use your knowledge of reacting particles in your explanations. [6]

11 The Periodic Table on page 16 contains an element with proton number 9 and another element with proton number 17.

(a) Identify and name these **two** elements and the group of the Periodic Table in which they are positioned. [3]

(b) Give the electronic structures of these **two** elements. Use these to explain why both elements appear in the same group of the Periodic Table. [3]

(c) Elements with proton numbers 9, 17 and 35 are in the same group of the Periodic Table. For these **three** elements, suggest **two** similarities in their properties and **two** trends in their properties. [4]