General

[SBPtrial11-03] Elements are arranged in the modern Periodic Table based on their

A atomic radius
B nucleon number
C number of protons
D number of neutrons

[MRSM03-02] The elements in the Periodic Table are arranged according to the increase in

A number of protons
B number of electrons
C number of neutrons
D relative atomic mass

[SBPmidYear06-07] The elements in the Periodic Table are arranged according to

A the mass of the atom.
B the number of valence electrons.
C the number of neutrons.
D the number of protons.

[SBPTrial07-03] Elements in the Periodic Table are arranged according to an increase in

A proton number
B nucleon number
C relative atomic mass
D relative molecular mass

[MRSM11-38] Table 5 shows an atom E with its proton number and nucleon number.

Proton number	14
Nucleon number	28

Table 5

Which group and period is E located in the Periodic Table?

	Group	Period
A	1	3
B	3	4
C	4	3
D	14	3

[SBPTrial08-14] Atom of element X has a proton number of 13. Where is X located in the Periodic Table of Elements?

	Group	Period
A	3	2
B	3	3
C	13	2
D	13	3

[MRSM04-02] Diagram 20 shows the symbol for an atom of element X.

$$^{19}_{9}X$$

Diagram 20

Which of the following group in the Periodic Table is X found?

A 1
B 7
C 9
D 17

[SBPmidYear06-27] The table below shows proton number for element **P**, **Q**, **R** and **S** .

Element	**P**	**Q**	**R**	**S**
Proton Number	7	10	17	19

Which group does each element respectively located in the Periodic table?

	P	**Q**	**R**	**S**
A	Group 15	Group 18	Group 17	Group 1
B	Group 16	Group 2	Group 17	Group 14
C	Group 1	Group 17	Group 15	Group 14
D	Group 18	Group 15	Group 1	Group 17

[MRSM05-22] The table shows atoms with their respective proton number.

Atom	**Proton Number**
W	7
X	9
Y	17
Z	19

Which of the following pairs have the same chemical properties?

A W and Y
B W and X
C X and Y
D X and Z

[SBPtrial11-16] Diagram 6 shows a Periodic Table with four elements represented by letters A, B, C and D. Which of these elements has an electron arrangement of 2.8?

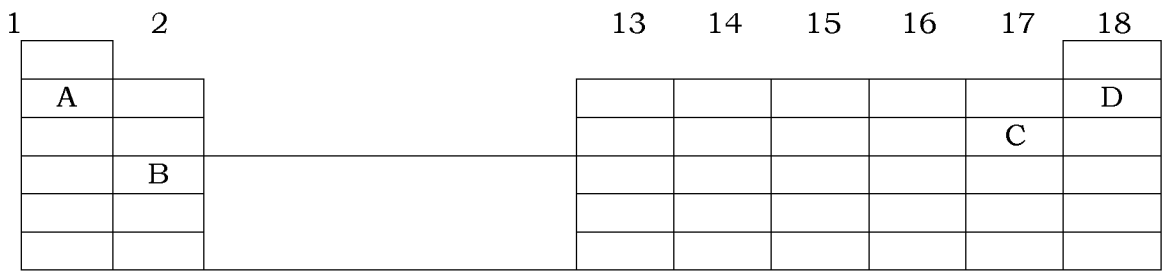


Diagram 6

[MRSM07-23] Diagram 11 shows part of the Periodic Table of Elements.

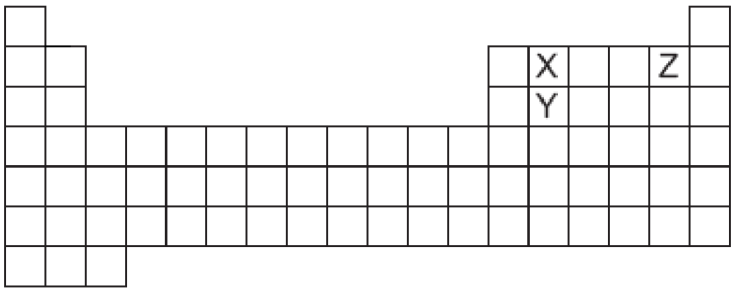


Diagram 11

The proton number of X is

A seven less than that of Z
B three less than that of Z
C one less than that of Y
D sixteen less than that of Y

[SBPdiag08-19] The property of an element which ***cannot*** be predicted from the position of an element in the Periodic Table of Elements is

A the charge of its ion.
B the formula of its oxide
C the number of isotopes it has.
D the acidic or basic nature of its oxide.

[SBPdiag08-35] Which of the following locations are correct of an element with a proton number of 7 in the Periodic Table of Elements?

I Period 2
II Period 5
III Group 15
IV Group 2
A I and III only
B II and IV only
C I and IV only
D II and III only

[MRSM10-05] Table 1 shows the proton number for four elements in the Periodic Table.

Elements	**Proton Number**
T	3
U	6
V	11
W	17

Table 1

Which of the following pairs of elements are placed in the same group in the Periodic Table?

A T and U
B V and W
C T and V
D U and W

[MRSM10-04] What is the factor that determines the chemical properties of an element?

A The number of proton in an atom
B The number of neutrons in the nucleus
C The number of electrons in the outer most shell
D The number of electrons in an atom

History

[SPM09-18] The following statements refer to the contributions of a scientist in the development of the Periodic Table.

- **Plotted the graph of the atomic volume against the atomic mass the elements**
- **Successful in showing the properties of the elements formed a periodic pattern with their atomic masses**

Who was the scientist?

A Lothar Meyer
B Henry Moseley
C John Newlands
D Dmitri Mendelev

[SBPmidYear06-12] The table shows the contributions of scientists X and Y towards atomic model.

Scientist	Contribution
X	Electrons are spread across the positively charged atom.
Y	Atoms are hard spheres which cannot be split.

Which of the following represents scientists *X* and Y?

	X	Y
A	J.J Thomson	John Dalton
B	Neils Bohr	J.J. Thomson
C	J.J. Thomson	Ernest Rutherford
D	James Chadwick	John Dalton

[SBPTrial08-03] The following statement is about the arrangement of the elements in the Periodic Table of Elements.

Elements are arranged in order of increasing atomic mass in the Periodic Table

Which of the following scientists made the above statement?

A Meyer
B Newlands
C Mendeleev
D Dobereiner

Group 18

[SPM05-02 | SBPdiag07-31] Which of the following elements are in Group 18 in the Periodic Table of elements?

A Helium and krypton
B hydrogen and oxygen
C oxygen and krypton
D helium, hydrogen and oxygen

[MRSM07-02] Which statement is correct about noble gases?

A Exist as diatomic molecules
B Do not form chemical bonds
C Form ions with different valencies
D Combine with transition metals to form coloured compounds

[SBPtrial10-03] Neon and argon are **unreactive properties**. It means

A they have octet electron arrangement.
B they belongs to Group 18 in the Periodic Table.
C they are held together by weak Van der Waals forces of attraction.
D they are known as noble gasses.

[MRSM05-04] Which of the following gases is a monoatom gas?

A Fluorine
B Helium
C Oxygen
D Nitrogen

[MRSM06-11] Which of the following substance consists of free atoms?

A Nitrogen gas
B Xenon gas
C Glucose powder
D Sodium chloride

[SPM06-22] Diagram 5 shows the symbols for two elements. The letters used are not the actual symbol of the elements.

$$\begin{matrix}20\\10\end{matrix}\mathrm{X} \qquad \begin{matrix}40\\18\end{matrix}\mathrm{Y}$$

Diagram 5

Which of the following is true about X and Y?

A Element X is more reactive than element Y
B Both elements X and Y are monoatomic
C Both elements X and Y react with chlorine gas
D Element X reacts with element Y to form a compound with the formula XY

[SBPmidYear07F4-10] A new element with symbol Nw is discovered. It has eight outer electrons in its atom. Which of the following statements is true?

A Nw exists as monoatomic.
B Nw is a solid at room temperature.
C Nw reacts with sodium to form an ionic compound.
D Nw is a good conductor of electricity in solid state.

[SBPdiag08-11] The element which does not form compound with other elements is likely to have proton number of

A 4
B 8
C 10
D 16

[SBPTrial07-42] Profesional cyclists usually fill their bicycle tyres with gas X which makes the bicycle lighter.

Which of the following elements X, Y, W and Z in the Periodic Table is suitable to be used in bicycle tyres?

A X
B Y
C W
D Z

[SBPmidYearF5-29]

A meteorologist would like to release a weather balloon to the atmosphere to carry out carry out studies on the weather.

Between **A, B, C** and **D** in the Periodic Table shown below which is the most suitable element to fill up the weather balloon?

[SBPmidYearF508-04] The table shows the properties of element Q.

Element	**Properties**
Q	• Non-flammable • Used as carrier gas in gas-liquid chromatography • Filled in electric light bulbs

Which of the following elements is Q?

A Sodium
B Helium
C Argon
D Silver

[SPM10-09] Diagram 1 show an air balloon filled with gas X.

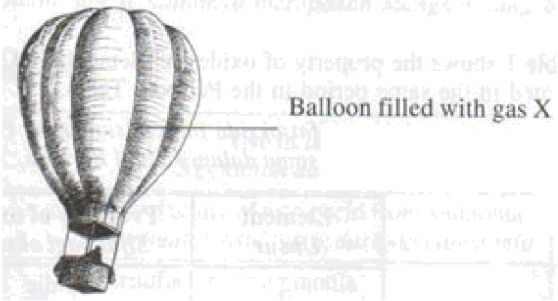


Diagram 1

In which group is X located in the Periodic Table?

A Group 15
B Group 16
C Group 17
D Group 18

Group 1

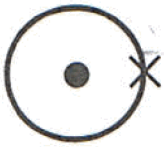
[SBPdiag06-27] Which of the following shows the number of protons of an element in Group 1 of the Periodic Table of the Elements?

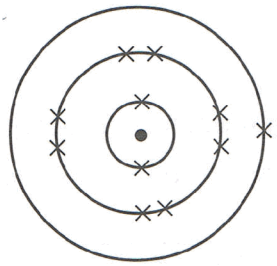
A 3
B 7
C 13
D 17

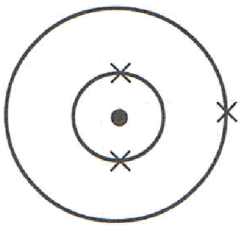
[SPM11-27] The following information is about atom Q and atom P.

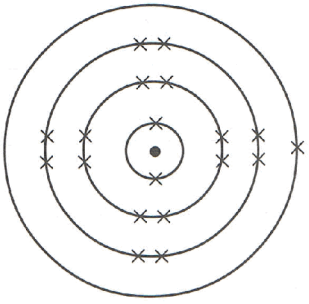
- Atom Q is located in Period 2 of the Periodic Table.
- The electron arrangement of atom P is 2.8.1.
- Element Q is located above element P in the same group of the Periodic Table

Which diagram shows the electrons arrangement of atom Q?

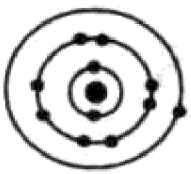
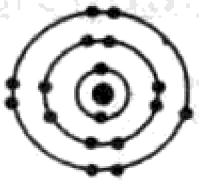
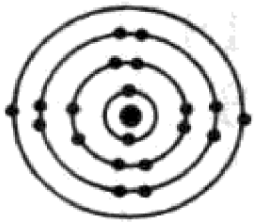
A 

B 

C 

D 

[SPM05-23] Which of the following diagrams represents the electron arrangement of an element of Group 1?

A  B  C  D 

[SPM08-14] Which statement explains why the size of the atoms of Group 1 elements increases when going down the group in the Periodic Table 1?

A The number of protons increases
B The relative atomic mass increases
C The number of valence electrons increases
D The number of shells filled with electrons increases

[SPM10-12] Which statement explains why the reactivity of Group 1 elements increases when going down the group?

A The physical state of the elements changes from gas to liquid then to solid at room temperature
B The attractive force between valence electron and the nucleus becomes stronger
C The valence electron gets further away from the nucleus
D The melting points of the elements decrease

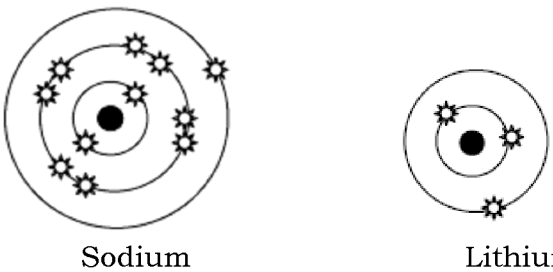
[SBPdiag06-19] Which of the following statements is true of Group 1 elements when going down the group?

A	Reactivity	Decreases
B	Atomic size	Decreases
C	Melting point	Increases
D	Electropositivity	Increases

[MRSM10-23] Why the reactivity of Group 1 elements increases when going down the group?

A The size of atom decreases
B The density of element increases
C The ability of the atom to donate valence electron increases
D The attraction between nucleus and the valence electron become stronger

[MRSM05–05] The diagram shows the electron configuration of lithium atom and sodium atom.



Sodium Lithium

Both atoms are in Group 1 of the Periodic Table. Which of the following statements are true about lithium and sodium element?

I The size of lithium atom is smaller than sodium atom
II The density of sodium is less than lithium
III The hardness of sodium is higher than lithium
IV The melting point of lithium is higher than sodium

A I and II only
B II and III only
C I and IV only
D I, II, III and IV

[SPM03-23] Element Y is below potassium is the same group in the Periodic Table. Determine the formula of the product and the reactivity of Y with chlorine compared to the reaction of potassium with chlorine

	Formula of product	Reactivity
A	YCl_2	Less reactive
B	YCl_2	More reactive
C	YCl	Less reactive
D	YCl	More reactive

[SPM03-32] Table 2 shows the proton number of elements P and Q.

Element	Proton number
P	3
Q	11

Which of the following statements are true of the elements in table 2?

I Q is more reactive than P
II The atomic size of Q is bigger than P
III Both elements P and Q can conduct electricity
IV P and Q are in the same group in the periodic table

A I and II only
B I and IV only
C II, III and IV only
D I, II, III and IV

[SPM08-27] Table 2 shows the proton numbers of elements X and Y. X and Y are not the actual symbols of the elements.

Element	Proton number
X	11
Y	19

Table 2

Which statements are true about elements X and Y?

I Atoms X and Y have one valence electron
II Element X is more reactive than element Y
III Atom X has a bigger atomic size than atom Y
IV Elements X and Y are in the same group in the Periodic Table

A I and III
B I and IV
C II and III
D II and IV

[SBPTrial09-28] Diagram 9 shows the symbols for elements X and Y.

$$^{23}_{11}X \qquad\qquad ^{39}_{19}Y$$

Diagram 9

Which of the following is true about elements X and Y?

A Element X is less reactive than element Y
B Both elements X and Y are monoatomic gas
C Both elements X and Y are non metal
D Element X reacts with element Y to form an ionic compound

[SBPtrial11-29] Element X is below potassium in the Periodic Table. We can predict that

A Element X is less electropositive than potassium
B The size of atom X is smaller than potassium
C Atom of element X has more valence electrons than potassium
D Element X reacts more vigorously than potassium in oxygen

[SPM09-28] Element Z is located in the same group as potassium is the Periodic Table. Z is not the actual symbol of the element.

Which of the following statements are chemical properties of elements Z?

I reacts with water to produce an alkaline solution
II reacts with oxygen to produce a black solid
III reacts with chlorine gas to produce a white solid
IV reacts with sodium hydroxide solution to produce an acidic solution

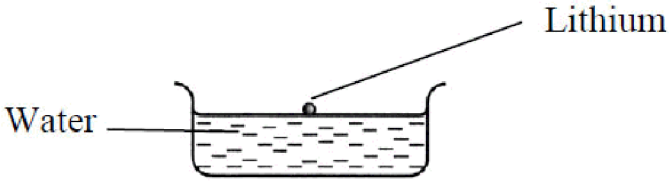
A I and III
B I and IV
C II and III
D II and IV

[MRSM09-05] Which of the following is true about the products formed when sodium reacts with water?

I Oxygen
II Hydrogen
III Sodium oxide
IV Sodium hydroxide

A I and IV
B II and IV
C I and III
D I, III, and IV

[SBPtrial10-17] Diagram 4 show reaction lithium with water.



Lithium reacts with water to produce solution that

A turns red litmus paper blue.
B turns blue litmus paper red.
C no visible change in the colour of the blue litmus paper.
D no visible change in the colour of the red litmus paper.

[SPM06-23] Diagram 6 shows the observation of a reaction when a piece of metal X and metal Y of the same size are put into a beaker containing cold water.

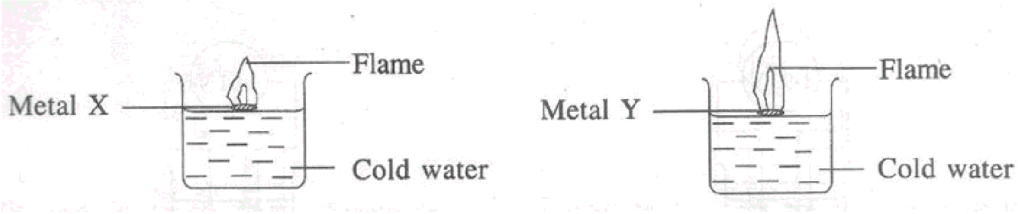


Diagram 6

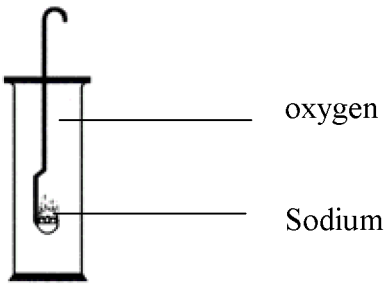
Which of the following explains the observation?

A Metal Y is harder than metal X
B Metal Y is denser than metal X
C The atom of metal Y contains more protons than the atom of metal X
D The atom of metal Y releases electron more easily than the atom of metal

[SPM11-13] Which chemical equation represents the reaction between sodium metal and oxygen gas?

A $Na + 0_2 \rightarrow Na0_2$
B $Na + 0_2 \rightarrow Na_2O$
C $2\,Na + 0_2 \rightarrow Na_20$
D $4\,Na + 0_2 \rightarrow 2Na_20$

[SBPmidYear06-13] The diagram shows the reaction between sodium with oxygen gas.



What is the observation for the reaction?

A Sodium glows brightly.
B Sodium burns slowly with a red flame.
C Sodium burns very rapidly and brightly with a lilac flame
D Sodium burns rapidly and bright with a yellow flame.

[SBPmidYear06-19]Francium atom has one valence electron. Therefore francium

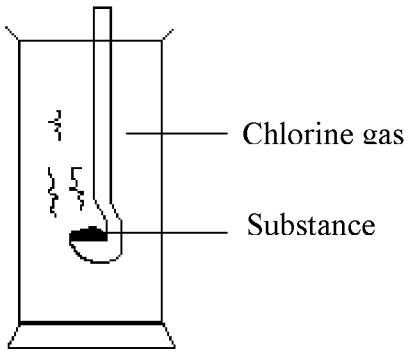
I conducts electricity
II is an element in Group 1
III reacts with water.
IV reacts with chlorine to form FrCl compound

A I and II only
B III and IV only
C I, III and IV only
D I, II ,III and IV

[SBPdiag07-04] Which of the following elements burns in air to form an oxide and when the oxide dissolves in water, it turns blue litmus to red?

A Sodium
B Potassium
C Carbon
D Hydrogen

[SBPdiag07-26] The diagram shows the set up of the apparatus for an experiment to study the reaction between chlorine gas and substance X.



When the reaction is completed, a white solid is observed. Name the substance produced.

A Copper(II) chloride
B Iron(II) chloride
C Lithium chloride
D Lithium oxide

[SBPdiag08-49] Elements P, Q and R are in the same group in the Periodic Table of Elements. Table 4 shows the observation for the reaction of the elements with chlorine and the formula of the chloride formed.

	Reaction with chlorine	**Formula of chloride**
P	Burns brightly	PCl
Q	Burns very brightly	QCl
R	Burns most brightly	RCl

Table 4

Which of the following statements is correct?

A P, Q, R are earth metals
B The atomic radius increases from P to Q to R
C The elements form ion with univalent negative charge
D Their reactivity decreases down the group

[SBPmidYear07F4-11] Which of the following metals burn with a very bright purplish flame in a gas jar filled with oxygen and produces a white residue?

A Lead
B Silver
C Sodium
D Potassium

[SBPmidYear07F4-36] Caesium metal is below sodium in Group 1 of the Periodic Table of Elements. Which of the following statements are true about caesium?

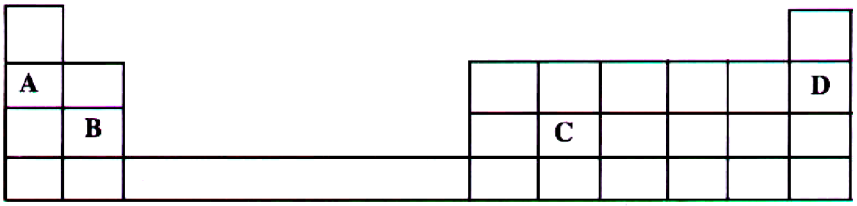
I Caesium is denser than sodium
II Caesium is more reactive than sodium
III Caesium atom is bigger than sodium atom
IV Caesium is more electropositive than sodium

A I and III only
B II and IV only
C II, III and IV only
D I, II, III and IV

[SBPmidYearF508-14] X is an element that has the following properties;

- *Soft solid*
- *Reacts with cold water to form alkaline solution*
- *Store in paraffin oil*

Among elements A, B, C and D in the Periodic Table of elements, which element represent X?



Group 17

[SBPTrial08-28] The following elements are in Group 17 in the Periodic Table of Elements **except**

A bromine
B chlorine
C helium
D iodine

[SBPmidYear07F4-12] Chlorine is a Group 17 element.
Which of the following statements regarding chlorine is true?

A It exists as a liquid at room temperature.
B It reacts with water to produce hydrogen gas.
C It reacts with iron wool to form iron(II)chloride.
D It reacts with potassium to form potassium chloride

[SBPmidYear06-35] An atom X requires one electron to form ion X^-. What can be deduced about X?

A It is a halogen
B It is a noble gas
C It is in Group 15 in the Periodic Table of Elements
D It is in Group 16 in the Periodic Table of Elements

[MRSM05–07] Chlorine gas reacts with water to form a ...

A brown coloured solution
B yellow coloured solution
C solution of pH 12
D solution that bleaches the colour of litmus paper.

[SPM11-08] Which elements dissolve in water to produce solution that turns blue litmus paper to red and then decolourised?

I Chlorine
II Bromine
III Iodine
IV Astatine

A I and II
B I and III
C II and IV
D III and IV

[MRSM11-23] Table 1 shows the boiling points of three elements in Group 17.

Halogen	**Boiling point (°C)**
Fluorine	-188
Chlorine	-35
Bromine	59

Table 1

Which of the following best explain why the boiling point increases down the group?

A Increase in proton number.
B Increase in strength of the intermolecular forces
C Increase in number of occupied shells of the atom
D Increase in strength of the covalent bond between the atoms

[SBPmidYear06-31] The table shows physical properties of halogens.

Halogen	**Relative molecular mass**	**Boiling point/ °C**	**Melting point/ °C**	**Colour**
Chlorine	71	-101	-35	Greenish yellow
Bromine	160	-7	59	Reddish brown
Iodine	254	114	184	Purplish black

Flourine is the first element in halogens. Which of the following is true about fluorine?

A Its boiling point is -188 °C
B Its melting point 212 °C
C Its relative molecular mass is 120
D Its colour is black.

[MRSM07-38] L and M are diatomic elements. L is less reactive than M.
Which of the following elements are L and M?

	L	M
A	Bromine	Iodine
B	Iodine	Bromine
C	Sodium	Potassium
D	Potassium	Sodium

[SBPtrial10-25] Chlorine react with cold sodium hydroxide solution. Which of the chemical equation shows the reaction?

A $Cl_2(g) + NaOH\ (aq) \rightarrow NaOCl(aq) + HCl\ (aq)$
B $Cl_2(g) + 2NaOH\ (aq) \rightarrow 2NaCl\ (aq) + H_2\ (g\ ) + O_2\ (g)$
C $2Cl_2(g) + 4NaOH\ (aq) \rightarrow 4NaCl\ (aq) + 2H_2O(l) + O_2(g)$
D $Cl_2(g) + 2NaOH\ (aq) \rightarrow NaCl\ (aq) + NaOCl(aq) + H_2O(l)$

Period

[SBPmidYear06-03] A period of elements in the Periodic Table of Elements

A is a list of metals in order of reactivity.
B is a horizontal row of element.
C is a vertical column of element.
D contains the same number of electrons in their outermost shell

[MRSM07-40] Element X is placed on the right of element Y in the same Period of the Periodic Table. If the proton number of Y is 12, then the electron arrangement of X is

A 2.8.2
B 2.8.6
C 2.8.8.2
D 2.8.8.6

[MRSM11-05] What are the changes that occur as we go across Period 3 in the Periodic Table?

I The proton number increases
II The atomic radius increases
III The electronegativity increases
IV The metallic properties of the element decreases

A I and II
B II and IV
C I and III
D I, III and IV

[MRSM03-32]

Element	**Na**	**Mg**	**Al**	**Si**	**P**	**S**	**Cl**	**Ar**
Proton number	11	12	13	14	15	16	17	18

Table 4

Table 4 shows the proton number of elements in period 3. Which of the following represent changes crossing the period, from left to right?

I Increase in atomic size
II Decrease in electronegativity
III Increase of valence electrons
IV Decrease of metallic properties

A I and IV only
B II and III only
C III and IV only
D I, III and IV only

[MRSM04-33] Table 2 shows the elements found in Period Three of the Periodic Table.

Na	**Mg**	**Al**	**Si**	**P**	**S**	**Cl**	**Ar**

Table 2

Which of the following statements is true?

I The boiling point of sulphur is higher than chlorine.
II Aluminium is less electropositive than magnesium.
III The size of sodium ion is bigger than magnesium ion.
IV Oxide of elements changes from acidic to base as we go from left to right in Period Three.
A I and II only
B III and IV only
C I, II and III only
D I, II, III and IV

[MRSM06–24] The table shows information about atoms of elements X, Y and Z.

Element	**Proton Number**
X	11
Y	14
Z	17

Based on the information given, it can be expected that

A the atomic radius decreases from X to Z
B the density of atom decreases from X to Z
C elements X, Y and Z are in Period 2 of the Periodic Table
D X oxide is acidic, Y oxide is amphoteric and Z oxide is basic

[SBPmidYear07F4-13] The atomic size decreases across the Period 3 because the

A proton number increases.
B nucleon number decreases.
C number of neutrons increases.
D number of shell occupies electron decreases.

[SPM11-46] Table 5 shows the observation when oxides of elements in Period 3 of the Periodic Table is added to sodium hydroxide solution and nitric acid.
X, Y and Z are not the actual symbols of the elements.

Oxide of element in Period 3	**Observation**	
	Sodium hydroxide solution	**Nitric acid**
XO_3	Dissolves to form a colourless solution	No changes
YO	No changes	Dissolves to form a colourless solution
Z_2O_3	Dissolves to form a colourless solution	Dissolves to form a colourless solution

Table 5

What is the correct arrangement in increasing proton number of the elements?

A X. Y, Z
B X. Z, Y
C Z, Y, X
D Y. Z. X

[SBPmidYear06-38] The table shows the information about elements W, X and Y

- Elements W, X and Y are located in Period 3 of the Periodic Table of Elements
- Oxide of element Y is amphoteric
- Oxide of element W is acidic
- Oxide of element X is base

Which of the following is the arrangement of the elements W, X and Y in ascending order of their proton number?

A Y, W, X
B W, X, Y
C X, Y, W
D W, Y, X

[SBPdiag06-10] X, Y and Z are three different elements in the same period of The Periodic Table of the Elements. X is a non metal, Y is a metal and Z is a transition metal. Which is the correct order of these elements in The Periodic Table of Elements across the period from left to right?

A X, Y, Z
B X, Z, Y
C Y, Z, X
D Z, Y, X

[MRSM07-23] Table 38 shows the proton number of elements P, Q, R and S.

Element	**P**	**Q**	**R**	**S**
Proton number	11	13	16	19

Table 38

The sequence of the elements in the order of increasing atomic size is

A S, R, Q, P
B R, Q, P, S
C P, Q, R, S
D S, P, Q, R

[SBPTrial08-35] Table 3 shows the proton number of elements S, T, U and V.

Element	**S**	**T**	**U**	**V**
Proton number	11	14	16	19

Table 3

What is the arrangement of elements S, T, U and V in **ascending** order of atomic size?

A S, T, U, V
B S, V, T, U
C V, U, T, S
D U, T, S, V

[SBPTrial07-29] The table shows the electron arrangements of atoms of four elements.

Element	**F**	**Al**	**Cl**	**K**
Electron arrangement	2.7	2.8.3	2.8.7	2.8.8.1

Which of the following is the correct arrangement of the elements according to increasing order of electronegativity?

A F, Al, Cl, K
B F, Cl, Al, K
C K, Cl, Al, F
D K, Al, Cl, F

[SPM10-11] Table 1 shows the property of oxide of elements P, Q and R. These elements are located in the same period in the Period Table.

Element	**Property of oxide**
P	Acidic
Q	Basic
R	Amphoteric

Table 1

Arrange the three elements based on the increasing of proton number.

A R, Q, P
B R, P, Q
C Q, P, R
D Q, R, P

[SPM04-02 | SBPdiag07-41] Aluminium oxide has both acidic and basic properties, therefore it is

A a base oxide
B an acid oxide
C a metalloid oxide
D an amphoteric oxide

[MRSM09-38] Diagram 15 shows the electron arrangement of atom T.

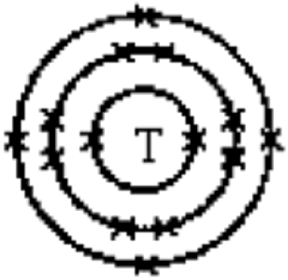


Diagram 15

Atoms T and U are placed in the same period in the Periodic Table. The atomic radius of atom U is larger than atom T. What is the probable electron arrangement of atom U?

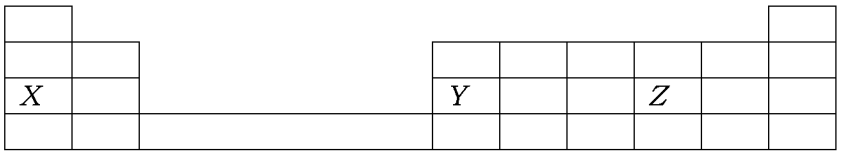
A 2.8.2
B 2.8.6
C 2.8.8
D 2.8.8.4

[SPM08-15] Which elements can form acidic oxides?

I Magnesium
II Sulphur
III Sodium
IV Phosphorus

A I and II
B I and III
C II and IV
D III and IV

[SBPTrial07-16] The figure shows three elements in Period 3 of the Periodic Table.



Which of the following is true about the properties of oxide formed?

A The oxide of *Z* is basic
B The oxide of *Y* is acidic
C The formula of oxide *Y* is *YO*
D The oxide of *X* reacts with an acid to form salt and water

[SBPmidYearF5-06] The table shows the proton numbers for elements X, Y and Z.

Element	Proton Number
X	13
Y	15
Z	11

What type of oxides are formed by X, Y and Z?

	X oxide	Y oxide	Z oxide
A	Amphoteric	Acidic	Basic
B	Amphoteric	Basic	Acidic
C	Acidic	Amphoteric	Basic
D	Acidic	Acidic	Basic

[SBPmidYear07F4-26] Three elements represented by the letters X, Y and Z are in Period 3 of the Periodic Table of Elements. The oxide of X is acidic, the oxide of Y is basic and the oxide of Z is amphoteric.

Which of the following statements are **correct** about elements X, Y and Z?
I Proton number of elements increases from X, Y and Z.
II Atomic size of the elements decreases from Y, Z and X.
III The melting points of the elements increase from X, Y and Z.
IV Electronegativity of the elements increase from Y, Z and X.

A I and III only
B II and IV only
C I, II and III only
D II, III and IV only

[SBPdiag06-03]
An oxide of D can reacts with both hydrochloric acid and sodium hydroxide solution.

Which of the following elements may be D?

A Phosphorus
B Magnesium
C Aluminium
D Sulphur

[SPM06-21] Table 2 shows the electron arrangement for elements W, X, Y and Z.
The letters used are not the actual symbol for the elements.

Element	Electron arrangement
W	2.1
X	2.3
Y	2.8.3
Z	2.8.7

Table 2

Which of the following is an element of Period 3 and able to form an amphoteric oxide?

A W
B X
C Y
D Z

[SPM07-25] Diagram 7 shows the elements in Period 3 of the Periodic Table of Elements.

11	12	13	14	15	16	17	18
Na	**Mg**	**Al**	**Si**	**P**	**S**	**Cl**	**Ar**
23	24	27	28	31	32	35.5	40

Why does the size of the atoms decrease from sodium to argon in the period?

A The number of valence electrons increases
B The electronegativity of the elements increases
C The attraction of the nucleus for electrons in the shells increases
D The properties of the elements changes from metallic to non-metallic

[SBPdiag06-42] Table shows the nucleon number and number of neutrons of element R and element T

Element	Nucleon number	Number of neutrons
R	23	12
T	35	18

Which of the following statements is true for elements R and T?

A R is more electronegative than T.
B R and T exist as diatomic molecules.
C R and T are in the same period of the Periodic Table of the Elements.
D R and T are in the same group of the Periodic Table of the Elements.

[SBPmidYearF508-34] The table shows the proton number for element M and N. Element N is more electronegative than element M because

Element	Proton number
M	8
N	9

A atomic size of N is smaller
B atom N releases electrons easier
C atom N has less valence electron
D atom N has larger number of neutron

[SBPtrial10-43] Table 5 shows the properties of oxide of elements in the Periodic Table.

Oxide	Observation	
	With sodium hydroxide solution	With dilute nitric acid
RxOz	The white powder dissolves to form colourless solution	The white powder dissolves to form a colourless solution.

What is the **inference** that can make from the observation?

A RxOz shows acidic properties only.
B RxOz shows basic properties only
C RxOz shows acidic and basic properties.
D RxOz shows acidic, basic and non-metallic properties.

Transition Elements

[MRSM04-14] Table 1 shows a segment of The Periodic Table.

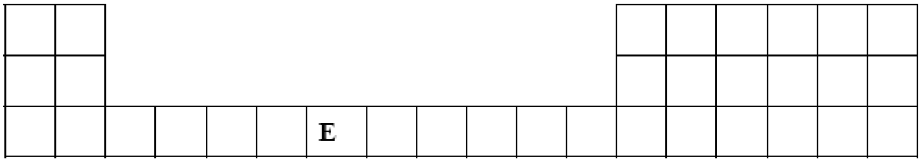


Table 1

Which of the following are the characteristics of element E?

I Can form complex ions.
II Low melting and boiling points.
III Can form coloured compounds.
IV Can be used as catalyst.

A I and II only
B II and IV only
C I, III and IV only
D I, II, III and IV

[MRSM06–23] Element T has the following characteristics:

- **High melting and boiling points.**
- **Forms compounds with various oxidation numbers.**
- **T oxide acts as catalyst.**

Element T could be

A Rubidium
B Silicon
C Manganese
D Magnesium

[SPM07-06] Diagram 3 shows six elements in Period 4 of the Periodic Table of Elements. Which of the following is **not** true about the elements?

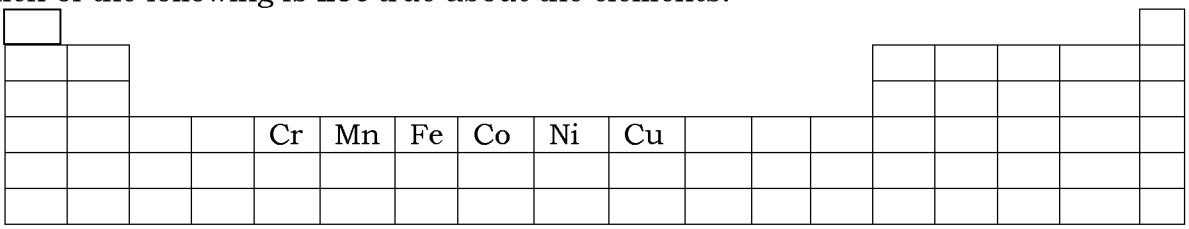


Diagram 3

A They have a high melting point
B They do not conduct heat
C They are able to form coloured compounds
D They are able to show different oxidation number in their compounds

[SBPmidYear07F4-14] The following information shows the properties of element Q.

- **Act as a catalyst**
- **Form complex ion**
- **Forms coloured compounds**
- **Has more than one oxidation number**

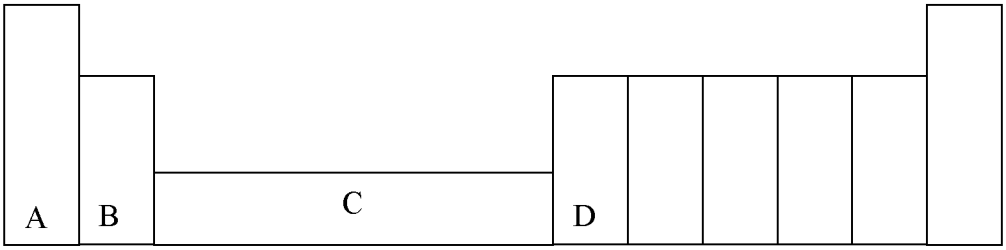
Q is most probably

A iron
B sodium
C sulphur
D magnesium

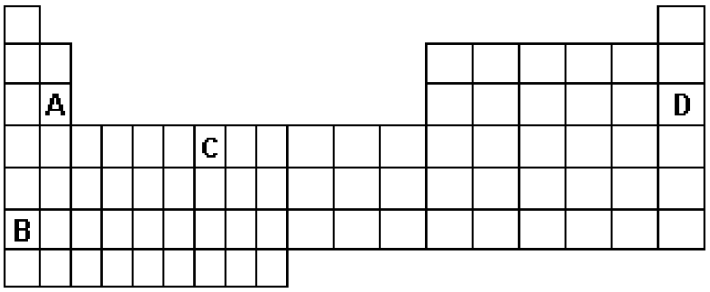
[SPM08-11] The following statements describe the characteristics of an element.

- **Aqueous solutions of its ions are green or brown in colour**
- **Used as catalyst in Haber Process**
- **Has two oxidation number, +2 and +3**

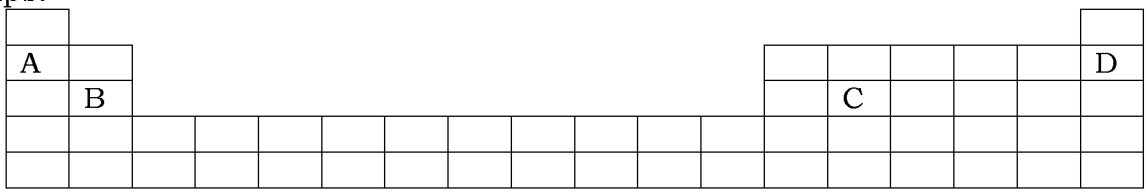
Which of the following shows the position of this element in the Periodic Table?



[SBPTrial09-02] Which of the following shows an element in the Periodic Table of Elements with different oxidation numbers in its compounds?



[SPM04-42] A restaurant owner wants to use colourful electric lamps to attract customers. Which of the following substance A, B, C or D in the Periodic Table is suitable to be used in the lamps?



[SPM10-13] Some transition elements and their compounds are useful catalyst in industries. Which part is correct?

	Catalyst	**Use in industry**
A	Iron	Manufacture of nitric acid from ammonia
B	Nickel	Manufacture of ammonia
C	Manganese(IV) oxide	Manufacture of margarine
D	Vanadium(V) oxide	Manufacture of sulphuric acid

<u>Mixing</u>

[MRSM09-04] Which of the following is true about elements in the Periodic Table?

A The metallic properties increases from left to right across a period
B Elements of the same group have the same physical properties
C Group 18 elements have low melting and boiling points
D Group 17 elements exist naturally as monoatoms

[SPM11-28] Table 1 shows three atoms of the elements and their electron arrangement respectively. The letters used are not the actual symbol of the elements.

Atom of the element	Electron arrangement
P	2.8.1
Q	2.8.4
R	2.8.7

Table 1

Which of the following is correct about the three elements according to the sequence, P, Q and R?

A Atomic radius decreases
B Melting point increases
C Metallic properties increases
D Electronegativity decreases

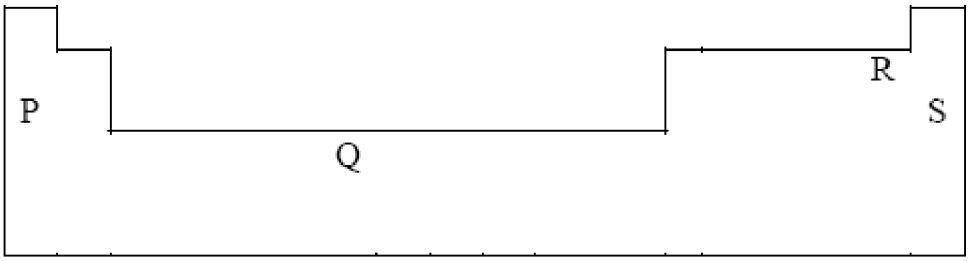
[MRSM07-04] Table 1 shows the nucleon numbers and proton numbers of atoms W, X, Y, and Z.

	W	X	Y	Z
Nucleon number	35	37	40	39
Proton number	17	17	18	19

How many atom(s) represent non-metallic elements?

A 1
B 2
C 3
D 4

[MRSM06–22] The diagram below shows the position of elements P, Q, R and S in the Periodic Table of Elements.



What characteristics of P, Q, R and S?

	P	Q	R	S
A	Metal	Non-metal	Inert gas	Transition
B	Non-metal	Inert gas	Metal	Transition
C	Metal	Transition	Non-metal	Inert gas
D	Inert gas	Non-metal	Transition	Metal

[SBPdiag08-03] Which of the following set of elements consist of all non metals?

A Chlorine, Nitrogen and Sulphur
B Oxygen, Hydrogen and Lithium
C Phosphorus, Lead and Carbon
D Carbon, Iodine and calcium

[SBPdiag08-43] Element X reacts with cold water to form alkaline solution while element Y reacts with water to form acidic solution. Which of the following is the correct group of X and Y in the Periodic Table of Elements?

	X	***Y***
A	1	14
B	2	15
C	1	17
D	3	17

[SBPmidYear07F4-09] Table 1 shows part of the Periodic Table of Elements.

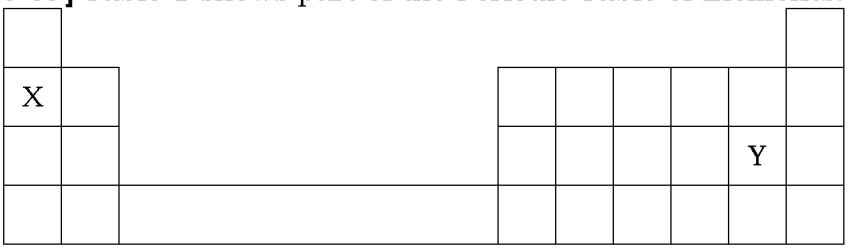


Table 1

What are the electron arrangements for atom of elements X and Y?

	X	**Y**
A	2.1	2.7
B	2.1	2.8.7
C	2.8.1	2.7
D	2.8.1	2.8.7

Structure {Paper02}

[SPM10-03]

Diagram 3 shows of the Periodic Table of Elements

Diagram 3

Based on Diagram 3

(a)(i) Name one element which is a metal. [1M]

.....

(ii) Which group and period is the metal in 3(a)(i) found in? [1M]

Group : ..... Period : .....

(b)(i) Name the element that exist as monoatomic gas. [1M]

.....

(ii) Explain why this gas is monoatomic. [2M]

.....

.....

(c) Sodium reacts with oxygen gas to form sodium oxide, Na_2O.

(i) Write a balanced chemical equation for this reaction. [2M]

.....

(ii) Sodium oxide reacts with water to produce a solution. In table 3, Mark (√) in the box to shows the value of pH of the solution.

pH Value		
4	7	11

Table 3

(d) State which is more electronegative, sodium or chlorine. Explain your answer. [2M]

.....

.....

.....

[MRSM10-02b]

(*b*) When metals of Group 1 react with water, bubbles of colourless gas are evolved. Diagram 2 shows the reaction of the first three alkali metals with water in three different beakers labelled as W, X and Y.

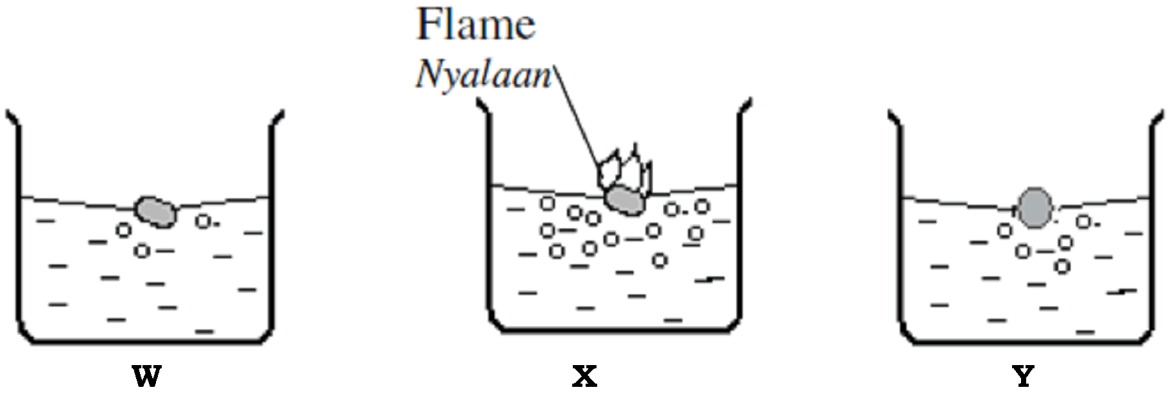


Diagram 2

(i) In which beaker shows the reaction of potassium with water? [1M]

.....

(ii) Based on Diagram 2, name the gas evolved when metals of Group1 react with water. [1M]

.....

(iii) State one observation when a few drops of phenolphthalein indicator is added into the solution formed in W, X and Y. Explain your answer. [2M]

.....

.....

(iv) Complete the following chemical equation: [1M]

..... Na + ... H_2O → ..... + ...

(v) Based on Diagram 2, what can you infer about the density of Group 1 metals compared to water? [1M]

.....

[SPM11-03]

Diagram 3 shows the symbols of the atoms of elements U, V and W. The letters used are not the actual symbols of the elements.

$^{7}_{3}U$ $^{23}_{11}V$ $^{32}_{16}W$

Diagram 3

(a). U and V are Group 1 elements in the Periodic Table.

(i). State the number of valence electrons in the atoms of element U. [1M]

.....

(ii) What is the physical state of U at room conditions? [1M]

.....

(b) Going down Group 1, the reactivity of the elements increases. U and V react with water to produce metal hydroxide solution and hydrogen gas.

(i). Which element, U or V, reacts more vigorously with water? [1M]

.....

(ii) Based on the answer in 3(b)(i), write the chemical equation for the reaction. [2M]

.....

(c) (i) Write the electron arrangement for the atoms of element W. [1M]

.....

(ii) Identify the period for the atoms of element W. [1M]

.....

(iii) Give **one** reason for the answer in 3(c)(ii). [1M]

.....

(d). V and W are placed in the same period in the Periodic Table.

(i). Which element, V or W, has the smaller atomic size? [1M]

.....

(ii). State **one** reason for the answer in 3(d)(i). [1M]

.....

.....

[SBPmidyearF507-01]

Table 1 shows 3 halogens with their respective proton number.

Halogen	Proton Number
P	9
Q	17
R	35

TABLE 1

(a) State the group number for the halogens in the Periodic Table. [1M]

.....

(b) Write the electron arrangement for

(i) atom P [1M] : .....

(ii) atom Q [1M] : .....

Based on your answer in (b), deduce in which period in the Periodic Table the following elements are located.

(i) element P [1M] : .....

(ii) element Q [1M]: .....

(d) The number of neutrons for atom Q is 19. Write the symbol for atom Q in the form of ${}^{A}_{Z}X$. [1M]

.....

(e) As you go down the group for halogens from P to R, state the change in properties with respect to

(i) the size of the atom [1M]

.....

(ii) Electronegativity [1M]

.....

(iii) melting points and boiling points

.....

(f) Iron glows brightly when reacting with element Q. Write the chemical equation for the reaction. [1M]

.....

[SBPdiag07-01]

Figure 1 shows the electron arrangement for the atom of three elements, P,Q and R.

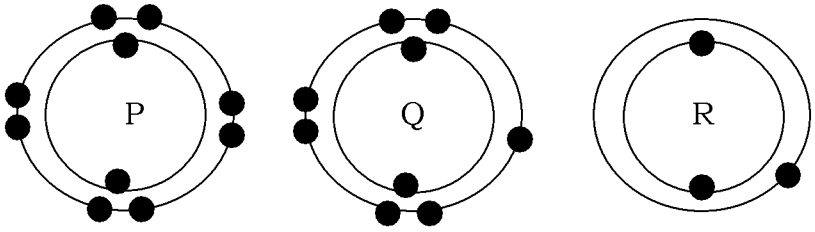


FIGURE 1

(a) Write the electron arrangement for the atoms of elements P, Q and R. [1M]

P :..... Q :..... R :.....

(b) State the group and period in the Periodic Table for each of the elements

(i) element P [1M] : .....

(ii) element Q [1M]: .....

(iii) element R [1M]: .....

(i) Which element is chemically inert? [1M]

.....

(ii) Give a reason for your answer in (c)(i).

.....

(d) Element Q dissolves in water to form an acidic solution and a bleaching agent. Write the chemical equation for the reaction of Q with water.

.....

(e) Which element reacts actively with water? [1M]

.....

(f) The proton number for element X is 17. Among P, Q and R which element shows similar chemical properties to X?

.....

(g) Arrange the atoms P,Q and R in order of increasing atomic size. [1M]

.....

[SBPtrial11-02]

Table 2 shows the elements in period 3 of the Periodic Table of elements.

Element	Na	Mg	Al	Si	P	S	Cl	Ar
Proton number	11	12	13	14	15	16	17	18

Table 2.1

(a) What is meant by period? [1M]

.....

(b) Why these elements are place in period 3? [1M]

.....

(c) Sodium and chlorine can react with water to form a solution.

(i) Write the chemical equation for the reaction of chlorine with water in Table 2.2. [2M]

Element	Chemical equation	Colour change of litmus paper when dip into the solution
Sodium Natrium	$2Na + 2H_2O \rightarrow 2NaOH + H_2$	.....
Chlorine Klorin	.....	.....

Table 2.2

(ii) Litmus paper is placed into the solution formed. State the colour change of the litmus paper in Table 2.2 [2M]

(d) (i) State the changes in the atomic size of the elements across period from left to right. [1M]

.....

Explain your answer in (d)(i)[2M]

.....

.....

[MRSM07-01]

Diagram 1 shows the electronic arrangement of atoms of six elements.
P, Q, R, S, T and U do not represent the actual symbol of the elements. Use the letters to answer the following questions.

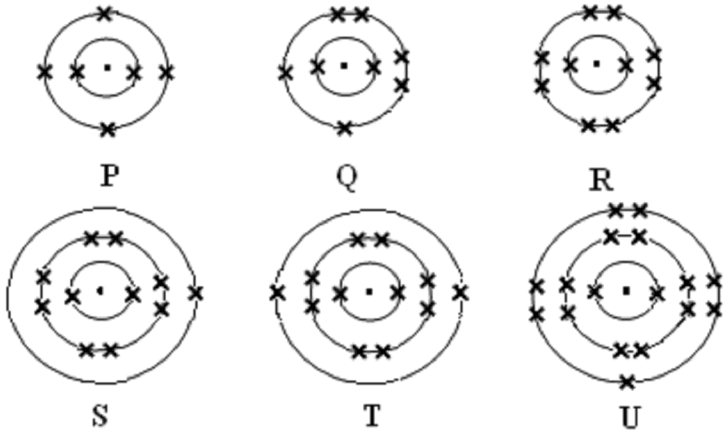


Diagram 1

(a). Determine and fill the position of P and T in the Periodic Table of Elements given below.[2M]

															Q		R
S																U	

(b) State one element which:

(i) is a metal : ..... [1M]

(ii) forms an ion with +2 charge : ..... [1M]

(iii) is used in advertising light: ..... [1M]

(c) Name the products formed when S reacts with water.[2M]

.....

(d) State one usage of U in water treatment plant. [1M]

.....

(e) The atomic radius of T is smaller than S. Explain why.[1M]

.....

[SBPmidyearF407-04]

Diagram 4 shows part of the Periodic Table of Elements. A, B, C, D, E, F, G and H do not represent the actual symbol of the elements.

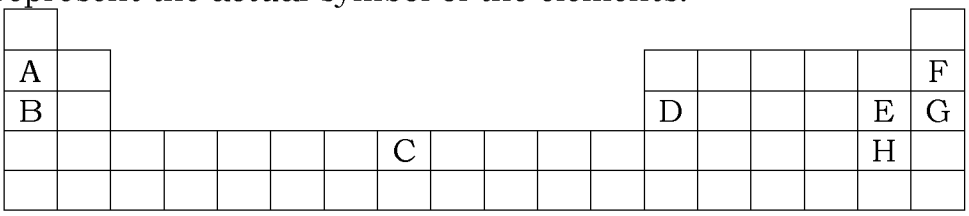


DIAGRAM 4

Using the letters in the Periodic Table of Elements in Diagram 4, answer the following questions.

(a) (i) Choose **one** element which can react with cold water. [1M]

.....

(ii) State whether the solution formed from the reaction in (a)(i) is acidic or alkaline. [1M]

.....

(iii) Write the chemical equation for the reaction between element in (a)(i) and water. [2M]

.....

(b) (i) Which element is a transition element? [1M]

.....

(ii) State **one** special characteristic of transition elements. [1M]

.....

(c) State the number of valence electrons of atom G.

.....

(d) State **one** of the uses of element F.

.....

(e) The electron arrangement of M^{2+} ion is 2.8. In Diagram 4, mark "M" in the box for the location of M element in the Periodic Table of Elements. [1M]

(f) (i) What is the particles found in element E at room temperature? [1M]

.....

(ii) By referring to the attraction forces between the particles, explain why E is a gas and H is a liquid at room temperature. [2M]

.....

.....

.....

.....

[SBPmidyearF406-04]

Figure 4 shows part of the Periodic Table of the Elements. The letters A, B, D, Q, R, T, X and Z do not represent the actual symbol of the elements.

																	A
B												D					
Q												R				T	
	X					Z											

FIGURE 4

Using the letters in the Periodic Table of the Elements, answer the following questions.

(a) Draw the electron arrangement for atom D.[1M]

(b) (i) Which element is monoatomic gas? [1M]

.....

(ii) Which element exists as diatomic molecule? [1M]

.....

(iii) Which element is a halogen? [1M]

.....

(c) State one special characteristic of element Z. [1M]

.....

(d) State the elements that have the same number of valence electron. [1M]

.....

(e) (i) Which of the element in the Periodic Table of the Elements reacts with cold water to produce hydrogen gas? [1M]

.....

(ii) Write a balanced chemical equation for the reaction in (e)(i). [1M]

.....

(f) X can react with T to form a compound.

(i) What type of the compound is formed? [1M]

.....

(ii) Write the chemical formula of the compound. [1M]

.....

[SBPmidyearF406-05]

(a) Rubidium is placed below potassium in Group 1 in the Periodic Table of the Elements

(i) Does rubidium show similar chemical properties as potassium?
Explain your answer. [2M]

.....

.....

(ii) How is rubidium stored in the laboratory? [1M]

.....

(b) Bromine is placed below chlorine in Group 17 in the Periodic Table of the Elements.

(i) What is the physical state of bromine at room temperature? [1M]

.....

(ii) Chlorine is more reactive than bromine. Explain why. [3M]

.....

.....

.....

.....

(c) The symbol of elements in Period 3 are: Na, Mg, Al, Si, P, S, Cl, Ar.

(i) List the symbols of elements that can conduct electricity. [1M]

.....

(ii) Aluminium oxide is an amphoteric. What is the meaning of amphoteric? [1M]

.....

.....

(iii) Write a balanced equation for the reaction that takes place when sodium oxide is dissolved in water. [1M]

.....

[SBPdiag08-03]

Diagram 3 shows the position of several elements in the Periodic Table of Elements. The letters do not represent the actual symbols of the elements.

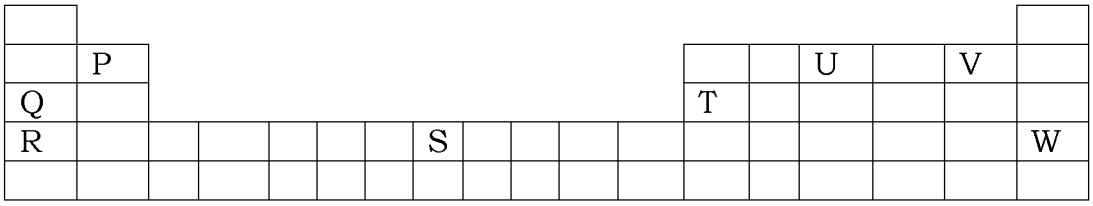


DIAGRAM 3

(a) Using the letters in Diagram 3, answer the following questions.

(i) Choose an element that is monoatomic. [1M]

.....

(ii) Which element forms an amphoteric oxide? [1M]

.....

(iii) Which element is a halogen? [1M]

.....

(b) Write the formula for the ion formed from an atom of element P. [1M]

.....

(c) Which element has the biggest atomic radius? [1M]

.....

(d) (i) Why are elements Q and R placed in the same group? [1M]

.....

(ii) When a small piece of element Q is put into water, a type of solution is formed. Name the type of solution formed. [1M]

.....

(iii) Compare the reactivity of the reaction towards water between elements Q and R. [1M]

.....

(e) Arrange P, U, V and T according to the increase in size of atoms. [1M]

.....

(f) State **one** special characteristic of element S. [1M]

.....

[SBPmidyearF507-03]

Figure 3 shows the location of seven elements A, D, E, G, J, L and M in the Periodic Table. These are not the actual symbols of the elements.

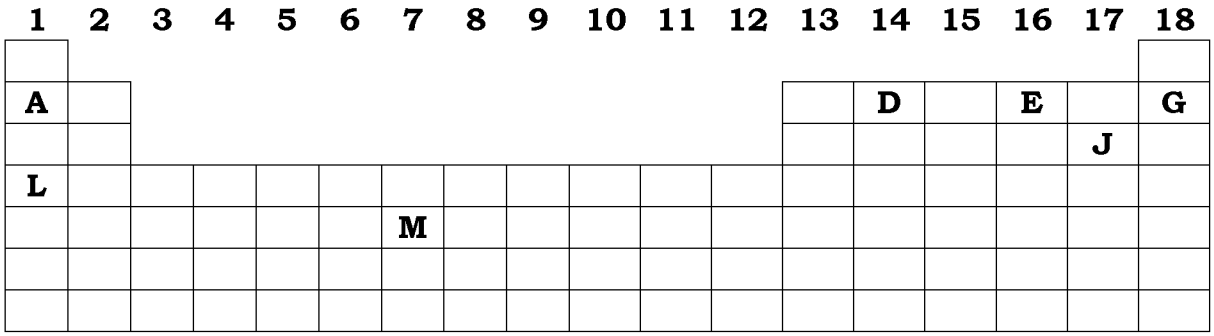


FIGURE 3

Using the letters in the Periodic Table of the elements in Figure 3, answer the following questions

(a) Write the formula for the ion formed from an atom of [2M]

(i) element L : .....

(ii) element E : .....

(b) Which of the element is not chemically reactive? Explain why. [2M]

.....

.....

(c) Element L reacts with element J to form a compound

(i) State the type of bond present in this compound. [1M]

.....

(ii) Write the chemical formula of this compound. [1M]

.....

(iii) Draw the diagram of electron arrangement for the compound that is formed between L and J. [2M]

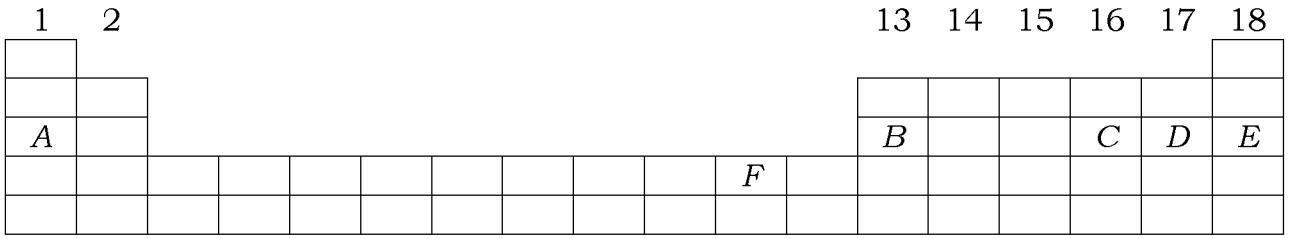
(iv) State one condition by which the compound in c (iii) conducts electricity. Explain your answer. [2M]

.....

.....

[SBPtrial04-01] {Translate}

Diagram below shows the position of six elements, present by A, B, C, D, E and F in the periodic table. By using the letters as symbol, answer the question below.



(a) State the elements exist as diatom at room temperature. [1M]

.....

(b) Write the electron arrangement for atom *E*. [1M]

.....

(c) Draw the electron arrangement in the compound formed between A and D. [2M]

(d)(i) Arrangement the atom of elements of *A, B, C, D* and *E* by decreasing of size of atom. [1M]

.....

(ii) Explain your answer at (d)(i) [2M]

.....

.....

(e) (i) Write the chemical formula for oxide of elements A. [1M]

.....

(ii) Write the chemical equation for the reaction of oxide A with water. [1M]

.....

(iii) A few drop of phenolphthalein was added into the solution formed at (e)(ii). State the changing of colour of solution that can be observe. [1M]

.....

[MRSM03-01]

Table 1 shows the position of a few elements form period 1 to period 3 in the periodic table. Number 1 to 18 represents the group number.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
																	He
Li													*C*		*O*		
	Mg											*Al*				*Cl*	

TABLE 1

Answer the following questions based on the information given in Table I.

(a) (i) Write the electron arrangement for *Cl* atom. [1M]

.....

(ii) Suggest the number of neutrons in *Cl* atoms? [1M]

.....

(b) $^{12}_{6}$C and $^{14}_{6}$C are the isotopes of C

(i) What is meant by isotopes? [1M]

.....

(ii) Explain why $^{12}_{6}$C and $^{14}_{6}$C have the same chemical properties. [1M]

.....

(c) Arrange the elements *He, Li, C, O* and *Mg* according to the atomic size in ascending order. [1M]

.....

(d) *Mg* reacts with oxygen to form a compound.

(i) Write a chemical equation for the reaction. [1M]

.....

(ii) Draw a diagram showing the electronic structure of the compound formed. [2M]

(e) There is no reaction between *He* and *Li*. Explain why.[2M]

.....

.....

.....

[SPM09-02]

Diagram 2 shows the standard representation for the atoms of two elements, lithium and oxygen.

$^{7}_{3}Li$ $^{16}_{8}O$

Diagram 2

(a) What is represented by the number 7 in $^{7}_{3}Li$? [1M[

.....

(b)(i) Write the electron arrangement for an atom of: [2M]

Lithium : .....

Oxygen : .....

(ii) Compare the size of the lithium atom with oxygen atom. [1M]

.....

(c) Complete Table 2 to shows the position of oxygen in the Periodic Table.

Element	**Period**	**Group**
Li		
O		

Table 2

(d) Lithium reacts with oxygen to form a compound, lithium oxide with the formula, Li_2O.

(i) Write the formulae of all the ions in lithium oxide. [1M]

.....

(ii) Explain how each of these ions is formed. [2M]

.....

.....

(iii) State one physical property of lithium oxide. [1M]

.....

[SPM07-05]

Diagram 5 shows the symbols of the atom of element X and element Y. The letters used are not the actual symbols of the elements.

$$^{23}_{11}X \qquad ^{39}_{19}Y$$

Diagram 5

(a) State the proton number of atom of element X. [1M]

.....

(b)(i) identify the position of element X in the periodic table of elements. [1M]

.....

(ii) Explain why element X is placed at the position identified in 5(b)(i). [1M]

.....

(c)(i) The reaction between element X and oxygen is less reactive than the reaction between element Y and oxygen. Explain this using idea about valence electron. [2M]

.....

(ii) Draw a labelled diagram to show the apparatus set-up that can be used to determine the reactivity of the reactivity of the reaction between element X or element Y and oxygen gas. [2M]

(d) 2.3 g of element X reacted completely with oxygen.
The following equation represents the reaction.

$$4X_{(s)} + O_{2(g)} \text{ -- > } 2X_2O_{(s)}$$

[Relative atom relative: X =23, O=16]

(i) Calculate the number of moles of element X. [1 M]

(ii) Calculate the maximum mass of X_2O formed. [3M]

[SPM05-01]

1. Figure 1 shows part of the Periodic Table of the Elements. Q, R, T, X and Y do not represent the actual symbol of the elements.

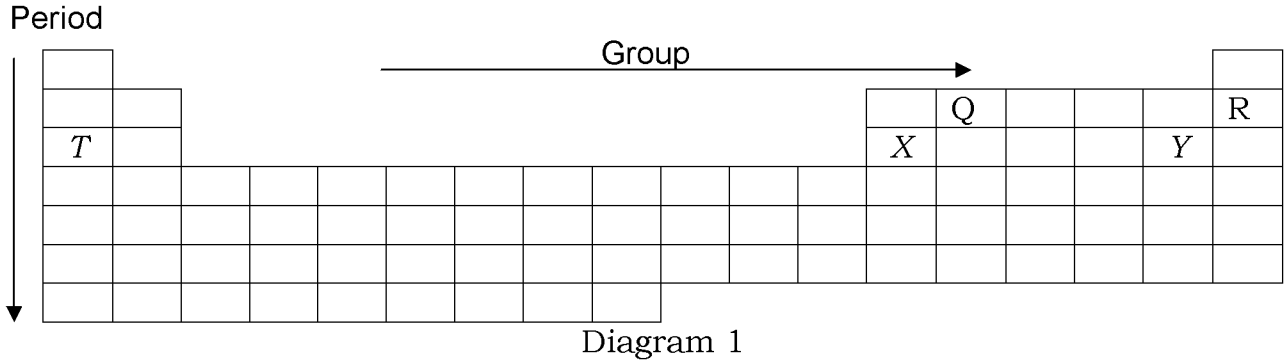


Diagram 1

(a)Using the letters in the Periodic Table of the Elements in Figure 1, answer the questions.
You may use the Periodic Table of the Elements given.

(i) Choose an element that is a halogen. [1M]

.....

(ii) Which element is mono atomic ? [1M]

.....

(iii) Which element forms an amphoteric oxide? [1M]

.....

(b) Arrange Q, R, T, X and Y according to the increase in size of the atoms. [1M]

.....

(c) Write the electron arrangement for an atom of element Q. [1M]

.....

(d) Write the formula for the ion formed from an atom of element Y. [1M]

.....

(e) Why are elements Q and R placed in the same period ? [1M]

.....

(f) When a small piece of element T is put into water, TOH solution is formed and hydrogen gas is released. State **one** observation when red litmus paper is put into the solution. [1M]

.....

(g) State the common name of the elements between group 2 and group 13. [1M]

.....

[SBPdiag07-03]

Figure 3 shows the location of seven elements A, D, E, G, J, L and M in the Periodic Table. These are not the actual symbols of the elements.

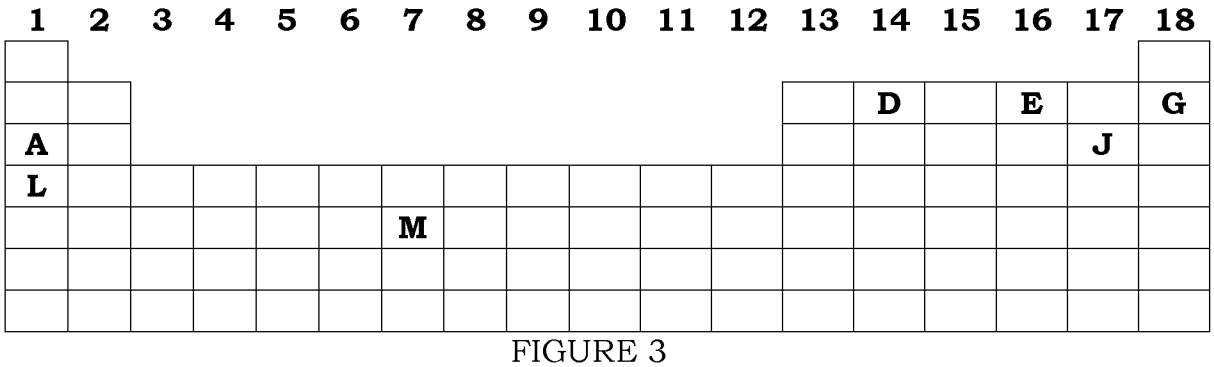


FIGURE 3

Using the letters in the Periodic Table of the Elements in Figure 3, answer the following questions

(a) Write the formula for the ion formed from an atom of

(i) element L [1M]

.....

(ii) element E [1M]

.....

(b) A is a reactive metal that is situated in Group 1.

(i) Give the number of electrons in ion A^+? [1M]

.....

(ii) What is the electron arrangement of ion A^+?

.....

(c) Which of the elements can be used as a catalyst? [1M]

.....

(d) Element L reacts with element J to form a compound

(i) Write the chemical formula of this compound [1M]

.....

(ii) Draw the diagram of the electron arrangement for the compound formed between L and J. [2M]

(iii) State one condition by which the compound in d (ii) conducts electricity? Explain your answer. [2M]

.....

.....

[SPM03-02]

Diagram 2 shows part of the Periodic Table of Elements.

1																	18
	2											13	14	15	16	17	
															O		
	Mg	3	4	5	6	7	8	9	10	11	12	**Al**					
							Fe										

Diagram 2

Based on Diagram 2, answer the following questions.

(a) What is the element represented by the symbol Fe? [1M]

.....

(b) In Diagram 2, mark 'X' in the boxes for all the transition elements [1M]

(c) State **one** specific characteristic of transition elements. [1M]

.....

(d) Write the electron configuration for the Mg atom. [1M]

.....

(e) (i) Write the chemical equation for the reaction between aluminium and oxygen gas. [1M]

.....

(ii) Briefly state the electron transfer in the bond formation between aluminium and oxygen. [2M]

.....

.....

.....

Helium gas	Hydrogen gas
• Light • not reactive • colourless	• Light • Flammable • colourless

(f) Based on the above information, which gas is suitable to be used in meteorological balloons? Give **one** reason. [2M]

.....

.....

[SBPdiag06-01]

Figure 1 shows part of the Periodic Table of the Elements. A, B, C, D, E, F, G and H do not represent the actual symbol of the elements.

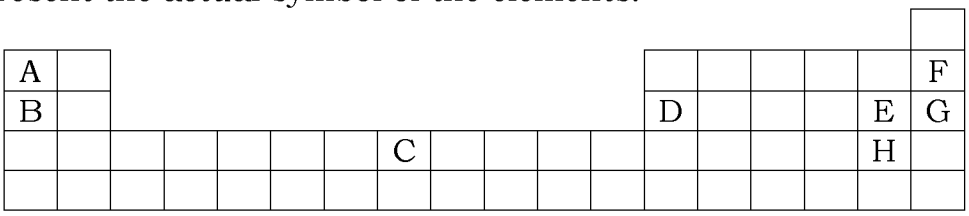


FIGURE 1

Using the letters in the Periodic Table of the Elements in Figure 1, answer the following questions.

(a) Choose two elements which are metals and are placed in the same group. [1M]

.....

(b) Write the electron arrangement for an atom of element F. [1M]

.....

(c) Write the formula for the ion formed from an atom of element D. [1M]

.....

(d) (i) State an element which has a special characteristic that is can form coloured compound. [1M]

.....

(ii) State another special characteristic for the element that is stated in (d)(i). [1M]

.....

(e) State one element that forms acidic oxide. [1M]

.....

(f) Arrange A, B, D, E, F and G according to the increase in size of the atoms. [1M]

.....

(g) Element A can react with water.

(i) Write the chemical equation for the reaction between A and water. [1M]

.....

(ii) When a red litmus paper is put into the solution in (g)(i), the red litmus paper turns blue. Based on the observation, state the property of the solution formed.

.....

(h) Element H is less reactive than element E. Explain why.

.....

.....

.....

.....

[SBPmidyearF407-05]

Table 5 shows all the elements in Period 3 in the Periodic Table of Elements.

Element of Period 3	Sodium Na	Magnesium Mg	Aluminium Al	Silicon Si	Phosphorus P	Sulphur S	Chlorine Cl	Argon Ar
Electron arrangement	2.8.1	2.8.2	2.8.3	2.8.4	2.8.5	2.8.6	2.8.7	2.8.8

TABLE 5

(a) State the change of the following across the Period 3 from sodium to argon. [2M]

(i) Physical state : .....

(ii) Electronegativity : .....

(b) Sodium atom and chlorine atom have three shells occupied with electrons.

(i) Which atom has a smaller atomic size? [1M]

.....

(ii) Explain why. [2M]

.....

.....

.....

(c) (i) What is meant by **amphoteric** oxide? [1M]

.....

(ii) Name an element from Period 3 which form: [2M]

amphoteric oxide : .....

acidic oxide : .....

Essay {Paper02}

[SBPmidyearF406-07a]

(a) Figure 7 shows the chemical symbols which represent two elements of W and Z.

$^{23}_{11}W$ $^{35}_{17}Z$

FIGURE 7

(i) Write the electron arrangement of atoms W and Z. [2M]

(ii) State the position of element W in the Periodic Table of The Element.
Give the reasons for your answer. [4M]

(iii) Which of these two elements has a smaller atomic size?
Explain your answer. [3M]

----------oooOO aĎaŽ OOooo----------

[SBPdiag06-08a]

(a) Helium, $^{4}_{2}He$ exists as a monoatomic gas whereas chlorine, $^{35}_{17}Cl$ exists as a diatomic gas. Explain why. [4Ms]

----------oooOO aĎaŽ OOooo----------

[SBPmidyearF407-07a]

(a) Argon is used to fill electric bulbs because argon does not react with the white hot tungsten filament.

What is the group number of argon in the Periodic Table of Elements?
Explain why argon does not react with hot tungsten filament in term of electron arrangement. [4M]

----------oooOO aĎaŽ OOooo----------

[SBPmidyearF407-07b]

Diagram 7.1 shows the electron arrangement of atom X and atom Y from Group 1 in the Periodic Table of Elements.

X Y

DIAGRAM 7.1

(i) Write a chemical equation for the reaction between element X and oxygen. [3M]

(ii) Compare the reactivity of atom X and atom Y.
Explain your answer by referring to attractive forces between the nuclei and the valence electrons. [6M]

(iii) Lithium, ${}^{7}_{3}Li$ is another element in Group 1.
Predict the reactivity of lithium in its reaction with oxygen compared to element Y.[1M]

----------oooOO aĎaŽ OOooo----------

[MRSM06-07a,b]

(a) Elements in the same group in the Periodic Table have different reactivity.

Reaction between potassium and oxygen is more reactive than the reaction between lithium and oxygen.

Explain why these two elements have different reactivity. [4M]

(b) Diagram 7.1 shows the experiment set-up to investigate the chemical changes that occurs on potassium.

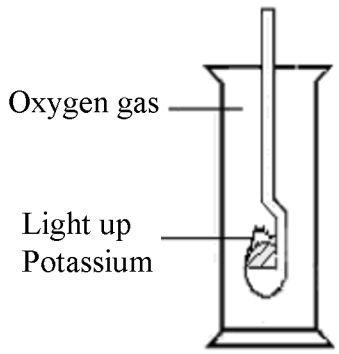
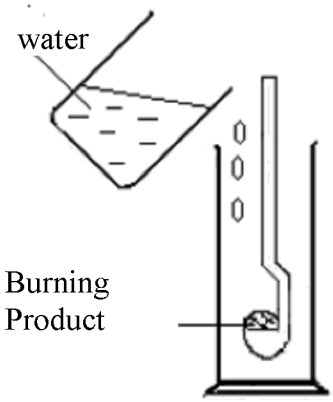
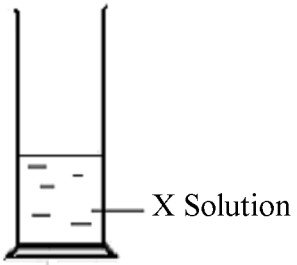
		
Potassium in burnt in a gas jar filled with oxygen	Water is added to the product	Solution X formed

Diagram 7.1

(i) The following chemical equation shows the reaction between potassium and oxygen gas.

$$4K + O_2 \text{ -- > } 2K_2O$$

Given the relative atomic mass of K =39, O = 16.
Calculate the mass of potassium oxide produced if 3.9 g potassium reacts with excess oxygen at room condition. [4M]

(ii) Name solution X and write the chemical equation for its formation. [2M]

----------oooOO aĎaŽ OOooo----------

[MRSM10-09b]

(*b*) Table 9 shows the observation when iron reacts with chlorine and bromine gases.

Reaction	Reactants	Observation
I	Iron + Chlorine gas	The hot iron wool ignites rapidly with a bright flame. A brown solid is formed.
II	Iron + Bromine gas	The hot iron wool glows moderately bright and moderately fast. A brown solid is formed.

Table 9

Based on Table 9,

(i) Write the chemical equation for either of the reactions. [2 *marks*]

(ii) Compare the reactivity of both reactions. Explain your answer.
[The proton number of Cl =17, Br = 35] [4 *marks*]

----------oooOO aĎaŽ OOooo----------

[SBPmidyearF407-07c]

Diagram 7.2 shows the setup of the apparatus to investigate the reaction of chlorine with iron metal.

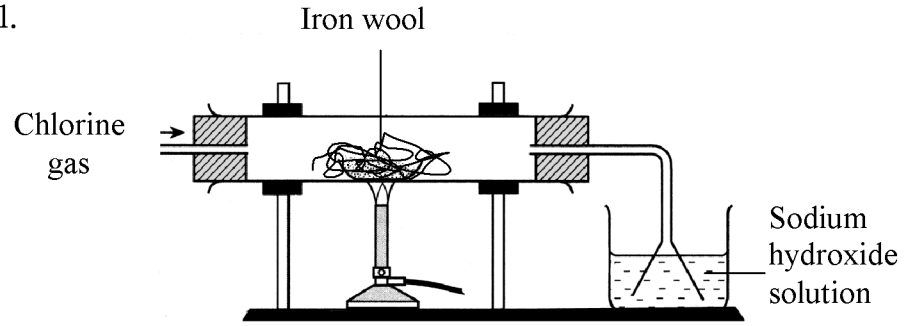


DIAGRAM 7.2

(i) State **two** observations while carrying out the experiment. [2M]

(ii) The chemical equation for the reaction is as follow:

$$3Cl_2 + 2Fe \text{ -- > } 2FeCl_3$$

2.8 g of iron wool is completely reacted with chlorine gas. Calculate the maximum mass of iron(III) chloride formed. [4M]
[Relative atomic mass: Cl=35.5, Fe=56]

----------oooOO aĎaŽ OOooo----------

[MRSM08-07]

(a) Diagram 7.1 shows the position of chlorine and iodine in the Periodic Table of Elements.

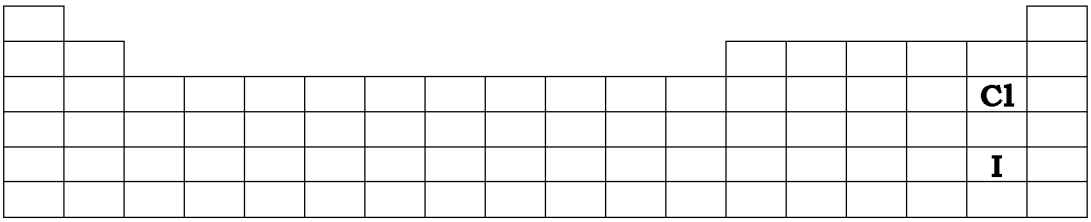


Diagram 7.1

Which group does these elements belongs to? Explain why chlorine is more reactive than iodine. [4M]

(b) Diagram 7.2 shows the reaction between potassium with water. The experiment is repeated using sodium to replace potassium. Observations are recorded in Table 7.1

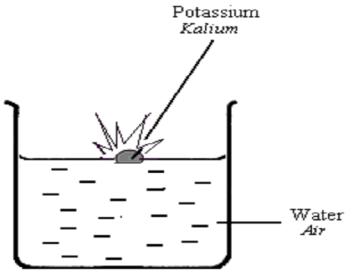


Diagram 7.2

Element	Proton Number	Observation
Potassium	19	Metal moves very vigorously on the surface of water. Colourless solution formed and changed red litmus paper blue.
Sodium	11	Metal moves vigorously on the surface of water with a hissing sound. Colourless solution is formed and changed red litmus paper blue.

Table 7.1

(i) Based on the proton number, explain why both elements show similar chemical properties.[2 M]

(ii) Write a balanced chemical equation for the reaction between potassium and water. [2M]

(iii) Describe briefly why the solutions obtained in both reactions turns red litmus paper blue.[2M]

(c) Table 7.2 shows the proton number of three elements.

Element	Proton Number
C	6
Na	11
O	8

Table 7.2

Explain how bonds are formed when:

(i) Na reacts with O to form a compound P.

(ii) C reacts with O to form a compound Q.

Your answer must include diagrams showing the electron arrangement of compounds P and Q. [10M]

----------oooOO aĎaŽ OOooo----------

[SPM06-08]

Diagram 8.1 and diagram 8.2 show the diagrams of the electron arrangement for atoms of two elements from Group 17 in the Periodic Table of Elements.

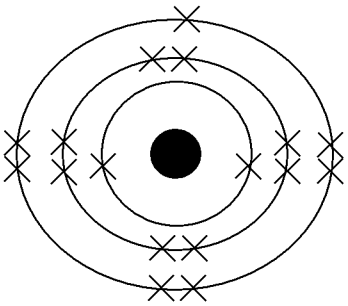


Diagram 8.1

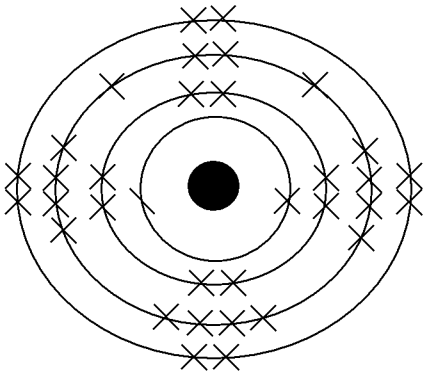


Diagram 8.2

(a) Based on diagram 8.1:

(i) Write the electron arrangement for the atom of the element and name the element. [2M]

(ii) Write the chemical equation for the reaction between this element and sodium hydroxide. [3M]

(b) Compare the attractive forces between the nuclei and the valence electrons in the atoms in diagram 8.1 and diagram 8.2 and relate this to their respective reactivity. [6M]

(c) Another element in Group 17 is a black coloured solid.
Predict the reactivity of this element in its reaction with sodium hydroxide compared to that of that element in diagram 8.2. [1M]

(d) Diagram 8.3 shows the setup of the apparatus to investigate the reaction of an element form group 17 with iron metal.

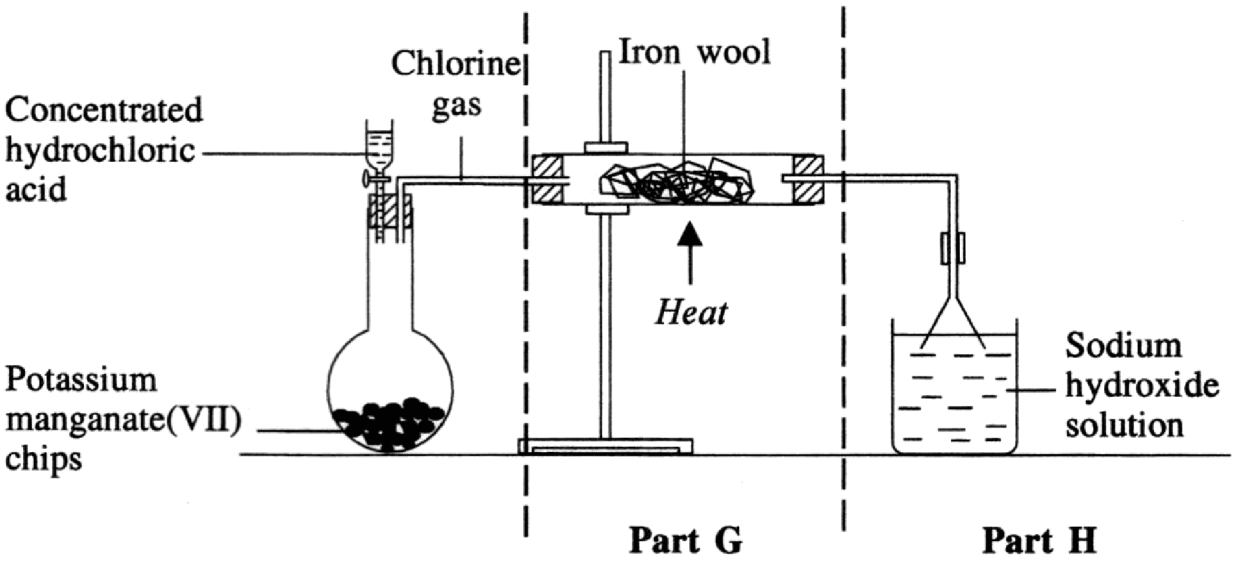


Diagram 8.3

(i) State two precautions that must be taken while carrying out the experiment. [2M]
(ii) Describe and write the chemical equations for the reactions that occur in **Part G** and **Part H**. [6M]

----------oooOO aĎaŽ OOooo----------

Structure {Paper03}

[SPM10-01]

Table 1.1 shows three experiments to investigate the reactivity of Group 1 elements with water. The pH value of the solution formed is measured using pH meter.

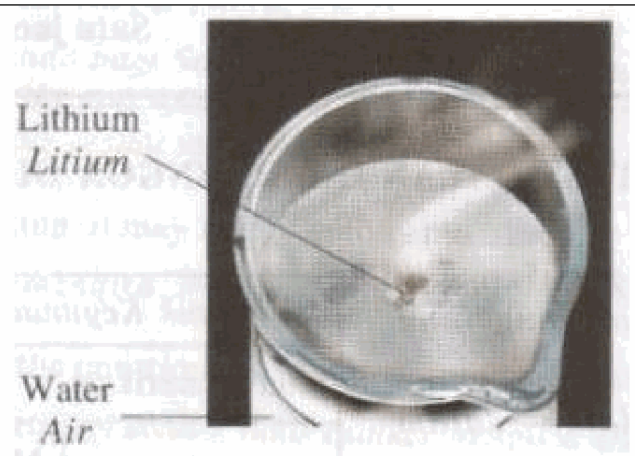
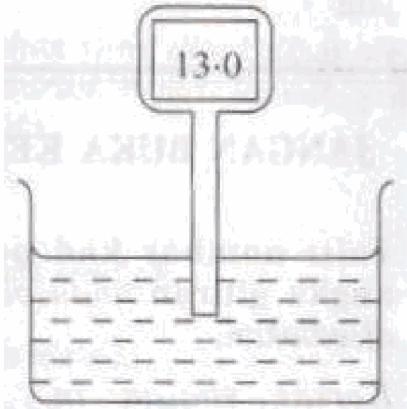
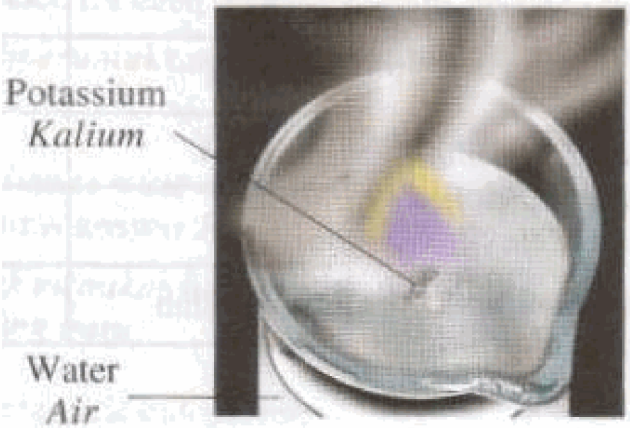
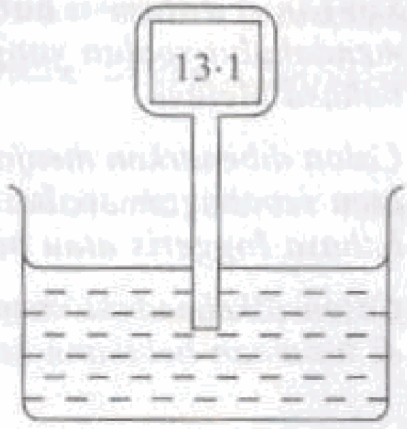
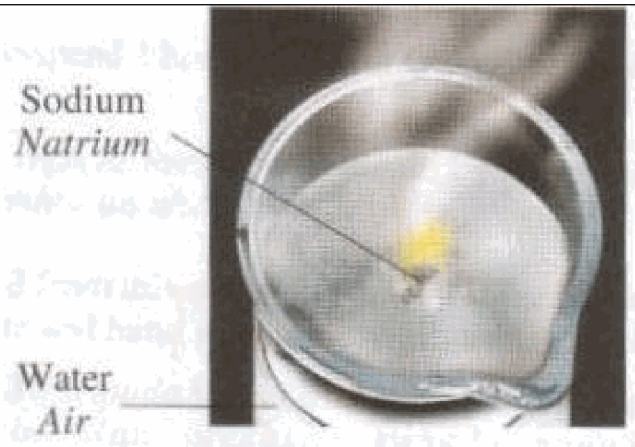
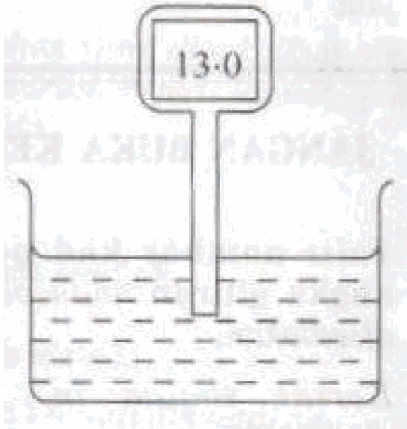
Experiment	Observation during reaction	pH meter reading of the solution after reaction
I		
II		
III		

Table 1.1

(a) Record the pH value of [3M]

Experiment I : .....

Experiment II : .....

Experiment III : .....

(b) State the observations during the reaction in Experiment I, Experiment II and Experiment III in table 1.2. [3M]

Experiment	Observation
I	
II	
III	

Table 1.2

(c) State three inferences from the experiment II. [3M]

.....

.....

.....

(d) State one hypothesis for this experiment. [3M]

.....

.....

(e) State the operational definition for the reactivity of Group 1 elements. [3M]

.....

.....

.....

(f)(i) Arrange the three elements in ascending order of reactivity. [3M]

.....

(ii) Explain the answer in 1(f)(i) based on atomic size. [3M]

.....

.....

.....

(g) Rubidium is placed below potassium in Group 1 of The Periodic Table of Elements. Predict three observations from the reaction of rubidium with water. [3M]

(i). .....

(ii). .....

(iii). .....

[SBPtrial08-02]

Elements in Group 1 of the Periodic Table of Elements can react with water at different rate of reactivity. Table 2 shows the experiment and observations to compare the reactivity of lithium, sodium and potassium with water.

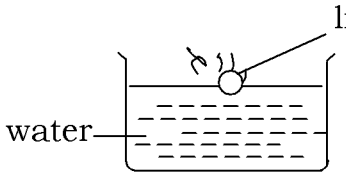
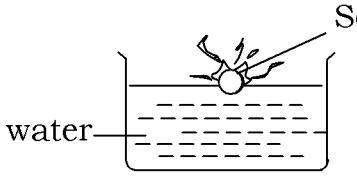
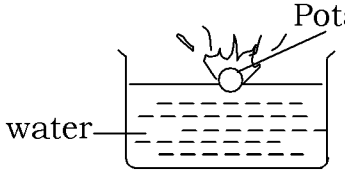
Experiment	**Observation**
	Lithium moves slowly on the water surface. The solution formed turns red litmus paper to blue
	Sodium moves faster and randomly on the surface of the water with a 'hissing' sound. Ignites with a yellow flame. The solution formed turns red litmus paper to blue.
	Potassium moves vigorously and randomly on the water surface. Ignites with a lilac flame and produces a 'pop' sound. The solution formed turns red litmus paper to blue.

Table 2

(a) Based on the experiment above, state [3M]

(i) the manipulated variable. : .....

(ii) the responding variable. : .....

(iii) the fixed variable. : .....

(b) State the hypothesis for the experiment above. [3M]

.....

.....

.....

(c) State the operational definition for the reactions that take place. [3M]

.....

.....

.....

(d) After each experiment, a pH meter is dipped into the solution in the basin. The pH value of the solution is 13. State the inference for the observation. [3M]

.....

.....

.....

(e) Based on the observations in the experiment above, state the relationship between the positions of the elements in Group 1 of the Periodic Table of Elements with the reactivity of the elements towards water. [3M]

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.....

(f) Rubidium is located below potassium in Group 1 of the Periodic Table of Elements. Arrange rubidium and the three elements in the experiment above in the descending order of reactivity of the elements in the reaction with water. [3M]

.....

[SBPdiag05-02]

Elements in Group 1 of Periodic Table can be arranged according to their reactivity with water.

An experiment was carried out to test the above statement.

Table 1 below shows the set-up of apparatus and observation to determine the reactivity of Group 1 elements when reacted with water.

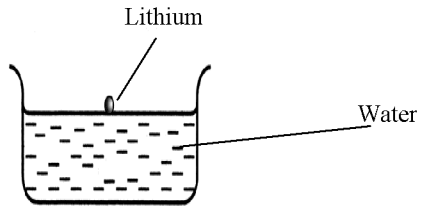
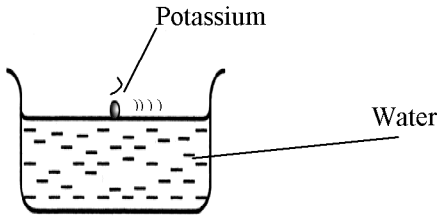
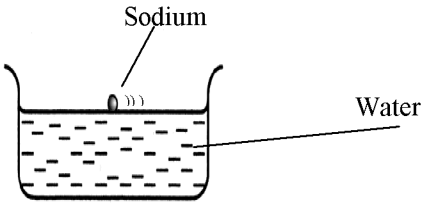
Set-up Apparatus	Observation of Metal
	Lithium moves slowly on the surface of water and produce a "hiss" sound.
	Potassium moves rapidly and randomly on the surface of water and produces a "hiss" sound.
	Sodium moves fast and randomly on the surface of water and produces a "hiss" sound.

Table 1

(a) State the variable that involved in this experiment. [3M]

Manipulated variable : .....

Respond variable : .....

Constant variable :.....

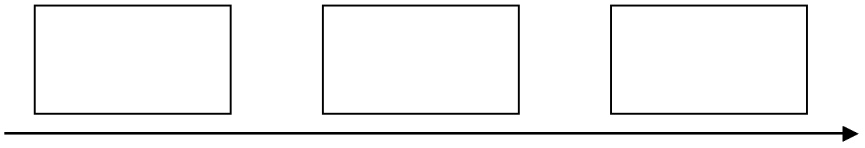
(b) State a hypothesis for this experiment. [3M]

.....

.....

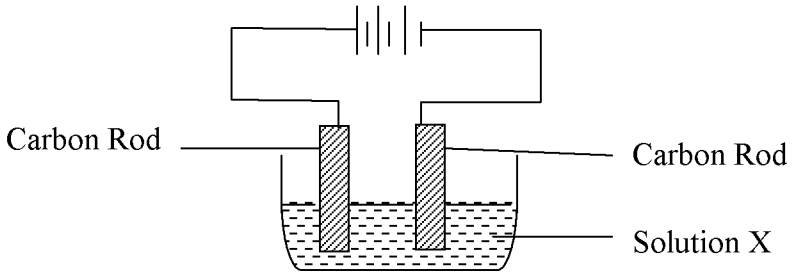
.....

(c) Based on your observation in Figure 2.2 arranges the lithium, potassium and sodium metal according to decreasing of reactivity. [3M]



The arrangement of reactivity of metal with water in descending order

(d) Solution X is solution produced by the reaction of sodium with water. The electrolysis was done on the solution X with the set-up of apparatus below.



Classify the ions in X solution into positive and negative charged ions. [3M]

Positive ion	**Negative ion**

[SBPdiag08-02]

The reactivity of alkali metals with water depends on their position in Group 1 of the Periodic Table of the Elements. Diagram 2 below shows the setup of the apparatus for an experiment to determine the reactivity of the alkali metals with water.

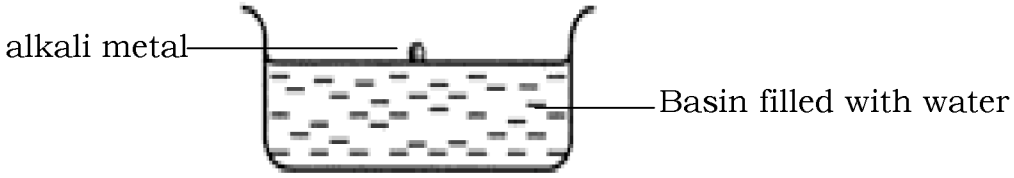


Diagram 2

The experiment is carried out by using lithium, sodium and potassium to react with water respectively. Observation of the experiment is shown in Table 2.1 below.

ALKALI METAL	**OBSERVATION**
Lithium	The lithium metal moves **slowly** on the surface of the water.
Sodium	The sodium metals moves **faster** on the surface of the water with "hissing" sound.
Potassium	The potassium metal moves the **fastest** on the surface of the water.

(a) Complete Table 2.2 below based on the experiment. [6M]

Name of variables	**Action to be taken**
(i) Manipulated variable	(i) The way to manipulate variable ....

(ii) Responding variable	(ii) What to observe in the responding variable ....
(iii) Fixed variable	(iii) The way to maintain the fixed variable ....

Table 2.2

(b) State the hypothesis for the experiment above. [3M]

.....

.....

.....

(c) Based on Table 2.2 arranges the alkali metals in descending order of reactivity of the metals with water. [3M]

.....

(d) The proton number of the alkali metals increases in the order:

Lithium → Sodium → Potassium

State the relationship between the positions of the alkali metals in Group 1 and their reactivity. [3M]

.....

.....

.....

(e) Rubidium is an alkali metal located below potassium in Group 1. Predict the reactivity of rubidium with water. [3M]

.....

.....

.....

[SBPtrial10-01]

Diagram 1.1 shows three sets, Set I, Set II and Set III, of the apparatus set-up for an experiment to compare the reactivity of alkali metals towards oxygen.

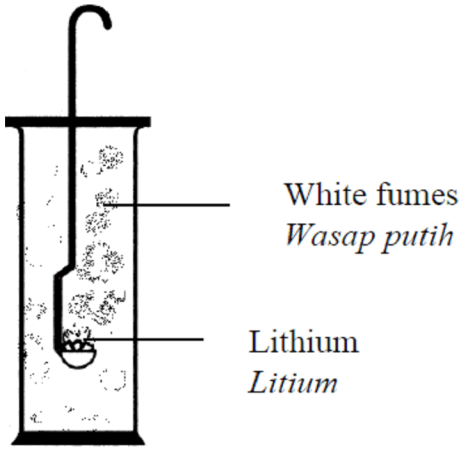
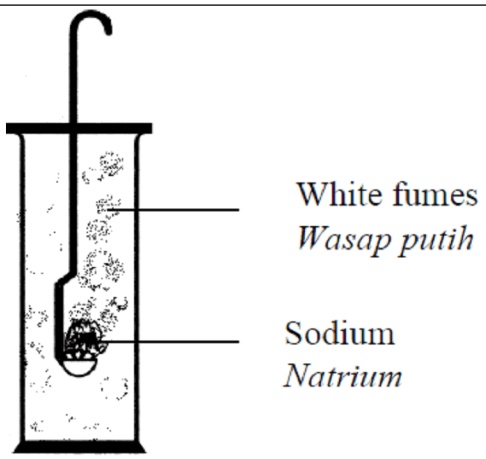
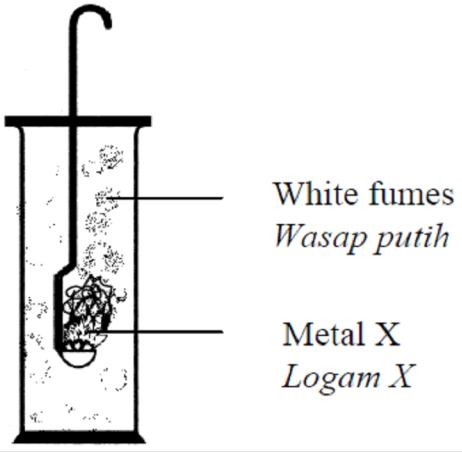
Set	Set-up of apparatus	Observation
I		Lithium burns slowly and produces white fumes
II		Sodium burns vigorously and produces whites fumes.
III		

Diagram 1.1

(a) State **one** hypothesis for this experiment. [3 marks]

.....

.....

(b) Record the observation for Set III in Diagram 1.1. [3 marks]

(c) Construct a table to record the observations for Set I, Set II and Set III. [3 marks]

(d) Based on the observation in Set III, predict metal X. [3 marks]

.....

(e) Diagram 1.2 shows the pH meter readings when the metal oxides formed in Set I, Set II and Set III were dissolved in water.

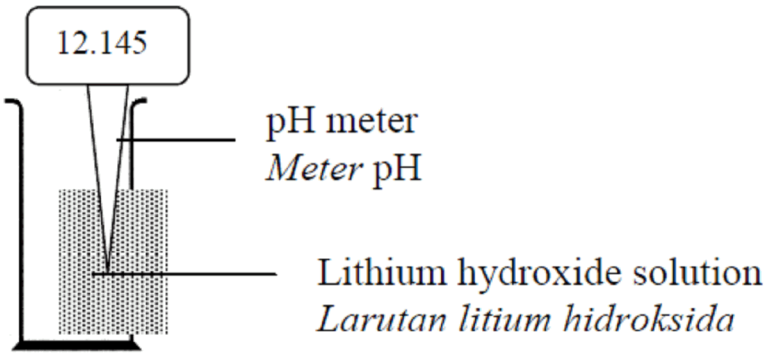
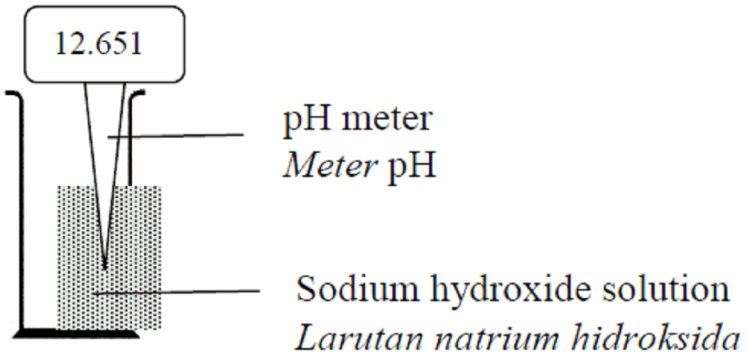
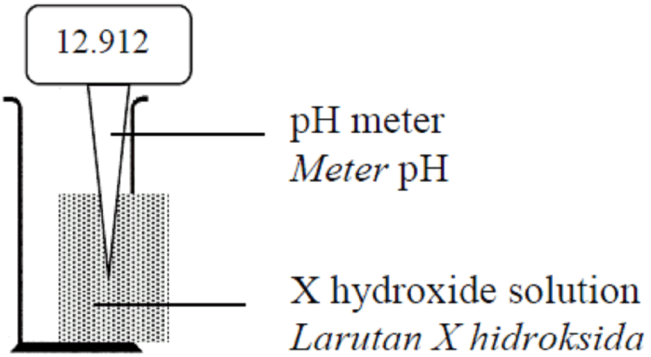
Set	Set-up of apparatus
I	
II	
III	

Diagram 1.2

(f) Record the pH value to one decimal place for Set I, Set II and Set III. [3 marks]

Set I : .....

Set II : .....

Set III: .....

(g) Based on Diagram 1.2, complete the table below.

Manipulated variable:	Method to manipulate the variable:
....	....
Responding variable:	How the variable is responding:
....	....
Fixed variable:	Method to maintain the fixed variable:
....	....

[6 marks]

[SBPdiag07-01]

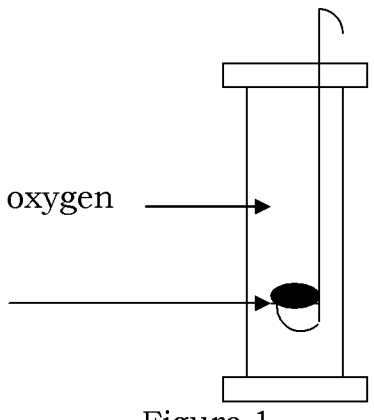


Figure 1

Element	Electron arrangement
P	2.1
Q	2.8.1
R	2.8.8.1

Table 1

Table 1 shows the electron arrangement of atoms of elements P, Q, and R. In an experiment, a group of students intend to compare the reactivity of P, Q, and R in the reaction with oxygen gas. A small piece of the metal is heated in a combustion spoon until it starts burning. The combustion spoon is then lowered into a gas jar of oxygen gas as shown in figure 1.

(a) Tabulate all observations expected from the experiment. [3M]

(b) Arrange the reactivity of the metal with oxygen in descending order. [3M]

.....

(c) Based on the observations in (a), state the inference of the experiment. [3M]

.....

.....

.....

(d) List all the variables involved in this experiment. [3M]

Manipulated variable : .....

Respond variable : .....

Constant variable :.....

(e) If 2.3g of Q is dissolved in 250 cm^3 of distilled water, find the concentration of the solution produced. [Relative atomic mass: Q=23] [3M]

[SBPdiag06-02]

All elements in Group 17 of The Periodic Table of the Elements show similar chemical properties but the reactivity is different.

Figure 2 shows the set-up of apparatus for an experiment to compare the reactivity of chlorine, Cl_2, bromine, Br_2 and iodine, I_2 towards their reaction with iron.

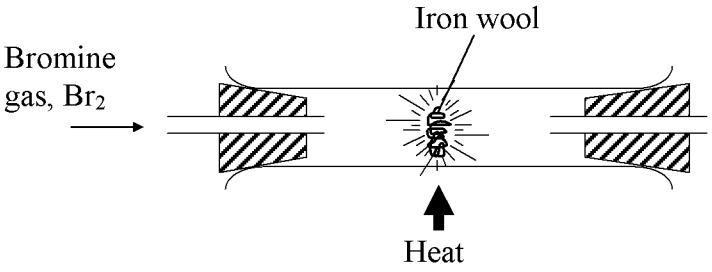
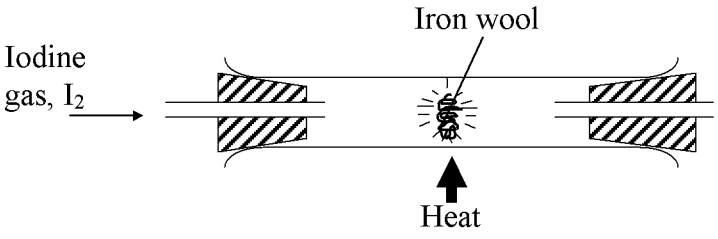
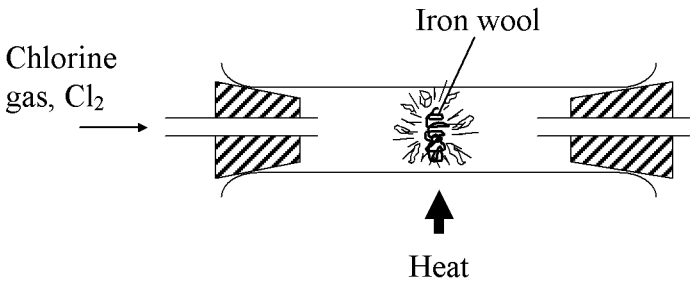
Set-up of apparatus	Observation on the iron wool
	Iron ignites brightly. A brown solid is formed.
	Iron glows dimly and slowly. A brown solid is formed.
	Iron ignites rapidly with a bright flame. A brown solid is formed.

Figure 2

(a) Complete the table below based on the experiment. [6M]

Name of variables	**Action to be taken**
(i) Manipulated variable:	(i) The way to manipulate variable: ....
(ii) Responding variable:	(ii) What to observe in the responding variable: ....
(iii) Fixed variable:	(iii) The way to maintain the fixed variable: ....

(b) State one hypothesis for the experiment. [3M]

.....

.....

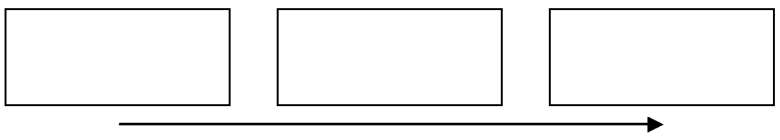
.....

(c) Based on the observation for the experiment, state the relationship between the position of the halogens in The Periodic Table of the Elements and the reactivity of the reaction towards iron. [3M]

.....

.....

(d) Arrange chlorine, bromine and iodine in descending order of reactivity of halogen towards iron. [3M]



Descending order of reactivity of metal towards iron

Essay {Paper03}

[SBP07 F5midyear-03-p3]

The reactivity of the alkali metals increases as you go down the group

Refering to the statement above, plan an experiment to prove it true by using the reactions of lithium, sodium and potassium with water.

Your planning must include the following items: [17M]

(a) Problem statement
(b) All variables involved
(c) List of materials and apparatus
(d) Experimental procedure
(e) Tabulation of data

[SPM08-02-P3]

The three statements below describe the observation made when three elements react with water. The elements are in Group 1 of the Periodic Table of Elements.

Statement 1
Lithium, Li, moves slowly at random on the surface of the water with a little fizzing. The water then turns red litmus paper to blue.

Statement 2
Sodium, Na, moves rapidly at random on the surface of the water with a 'hissing' sound. The water then turns red litmus paper to blue.

Statement 3
Potassium, K, moves very rapidly at random on the surface of the water. It ignite with a lilac flame with a 'pop' and a 'hissing' sound. The water then turns red litmus paper to blue.

Plan a laboratory experiment to investigate the reactivity of lithium, sodium and potassium with water.

Your planning should include the following aspects: [17M]

(a) Aim of the experiment
(b) All the variables
(c) Statement of the hypothesis
(d) List of substances and apparatus
(e) Procedure of the experiment
(f) Tabulation of data