

Chemistry	
Periodic Table Worksheet 4	
Name :	Date :

Section A: Multiple Choice Questions

1. An unknown element X has seven valence electrons in the valence shell. Which of the following can be deduced correctly about element X?

A	It forms a halide salt of NaX with sodium.
B	It is a gas at room temperature.
C	It can displace iodine from aqueous lithium iodide.
D	It has a lower boiling point than chlorine.

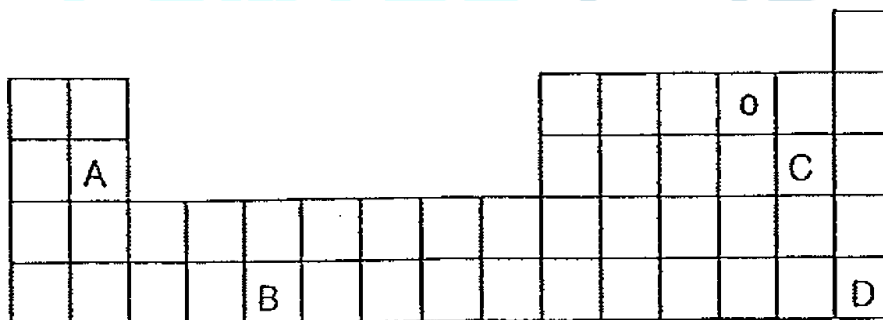
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2. Which statement best explains why potassium and francium are placed in the same group of the Periodic Table?

A	Both elements contain one valence electron in their valence shell.
B	Both elements can form ionic compounds with Group 17 elements.
C	Both elements have same number of valence shells.
D	Both elements are good conductors of electricity.

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3. The diagram below shows part of the Periodic Table. The position of element oxygen (O) is shown in the Periodic Table. Which element, A, B, C or D, in this Periodic Table is most likely to exist as monatomic?



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4. Beryllium is placed in Group 2 of the Periodic Table. It is expected to have chemical properties similar to

A	radium
B	boron
C	chromium
D	lithium

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5. Elements X and Y form a compound of formula X_2Y_3 . The compound has a low melting point. In which groups of the Periodic Table are elements X and Y likely to be found?

	X	Y
A	Group 13	Group 2
B	Group 15	Group 16
C	Group 16	Group 15
D	Group 2	Group 13

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6. Which of the following is not one of the trends when moving down Group 17 of the Periodic Table?

A	Changes in colour
B	Changes in melting points
C	Changes in valency
D	Changes in reactivity

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7. Which of the following statements about elements in the Periodic Table is not correct?

A	Group 2 elements form basic oxides with oxygen.
B	Group 1 elements are soft and shiny.
C	Group 16 elements are diatomic molecules.
D	Group 17 elements gain one electron to form negative ions.

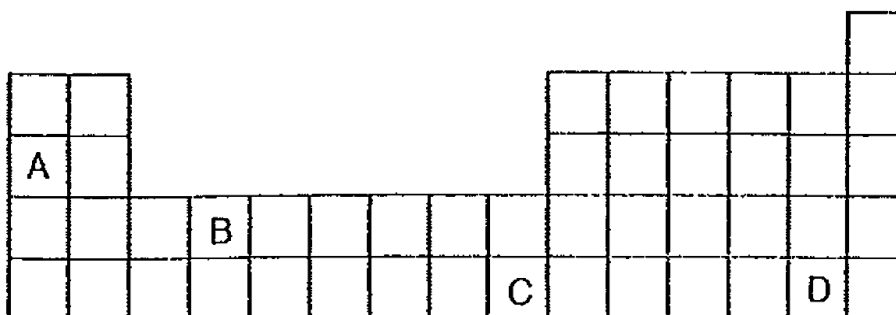
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8. An element Q forms a basic oxide with a chemical formula Q_2O_3 . Which of the following statements about element Q is not correct?

A	It is located in Group 13 of the Periodic Table.
B	It can be cut by knife.
C	It is a good conductor of electricity in solid state.
D	It is malleable and ductile.

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9. The diagram below shows four elements in the Periodic Table. One of the elements reacts with water to produce a solution. When the solution is warmed together with ammonium chloride, a pungent gas is released which causes red litmus paper to turn blue. Which element could have reacted with water?



A			B						
						C		D	

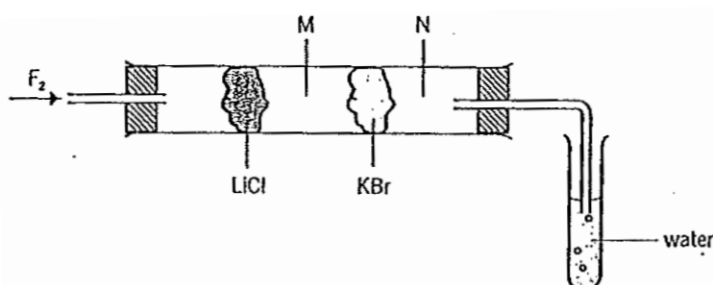
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10. Which of the following properties about magnesium, lithium and aluminium is correct?

A	They form basic oxides.
B	They react vigorously with cold water.
C	They release hydrogen gas in acidic solutions.
D	They gain electrons in chemical reactions.

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11. The diagram shows a gas passing through an apparatus which contain various substances.



What are the colours observed at M, N and water during the experiment?

	M	N	water
A	Black	Brown	Red-brown
B	Brown	Green	Black
C	Yellow	Green	Violet
D	Green	Brown	Red-brown

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12. Element X is soft, good conductor of electricity and floats in water. Which of the following could be the properties for carbonate of X?

	Formula	Solubility in water	Melting point (°C)
A	XCO_3	Yes	950
B	X_2CO_3	No	350
C	$X(CO_3)_2$	No	95
D	X_2CO_3	Yes	950

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13. The table below shows information for five elements. Which two elements are in the same group of the Periodic Table?

Element	M	N	L	P	Q
Electronic configuration	2,8,4	2,8,18,18,5	2,8,18,5	2,8,18,25,9,2	2,8,18,32,14,3

A	M and N
B	P and Q
C	N and L
D	L and P

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14. Which statement is correct about changes in properties of the elements from left to right across a period in the Periodic Table?

A	The number of valence electrons decreases.
B	The size of atoms decreases.
C	The number of electron shells increases.
D	The elements changes from non-metallic to metallic.

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15. Which statement about a new element, which has seven outer electrons in its atoms, is correct?

A	It is monatomic.
B	It forms a covalent compound with hydrogen.
C	It forms a positive ion.
D	It forms covalent compounds with Group I elements.

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16. Astatine (At) is in Group 17 of the Periodic Table. Which of the following is a property of astatine?

A	It forms a basic oxide.
B	It is a good conductor of electricity.
C	It is displaced by chlorine from aqueous potassium astatide.
D	It displaces iodine from aqueous potassium iodide.

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17. Selenium, Se, is in the same group of the Periodic Table as sulfur. What is the formula of potassium selenide?

A	K_2Se
B	$KSeO_4$
C	K_2SeO_4
D	K_2SeO_3

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18. Which statement is true about the elements in Group 1 of the Periodic Table?

A	They are equally reactive.
B	They become less metallic as the proton (atomic) number increases.
C	They form chlorides of similar formulae.
D	The proton (atomic) number of an element is one greater than that of the element above it.

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19. Elements X, Y and Z are in the same period of the Periodic Table. X is a metal, Y is a non-metal and Z shows properties of both metals and non-metals.

What is the order of increasing proton (atomic) number?

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

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Section B: Structured Questions

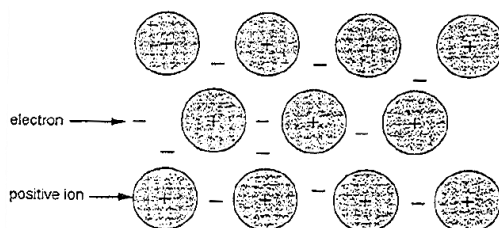
1. Use the information in the table to answer the questions below. (You may use a letter once, more than once or not at all)

1	2	3	4
Element	Formula of oxide(s)	Density of element at r.t.p in g/ cm ³	Volume of 1 mole of atoms at r.t.p in cm ³
A	A ₂ O, A ₂ O ₂	0.00008	12000
E	None formed	0.00346	24000
G	G ₂ O	0.53	13.20
J	J ₂ O	0.97	23.71
L	LO ₂ , LO ₃	2.07	15.46
M	M ₂ O ₃	3.00	15.00
R	RO,	7.86	7.11

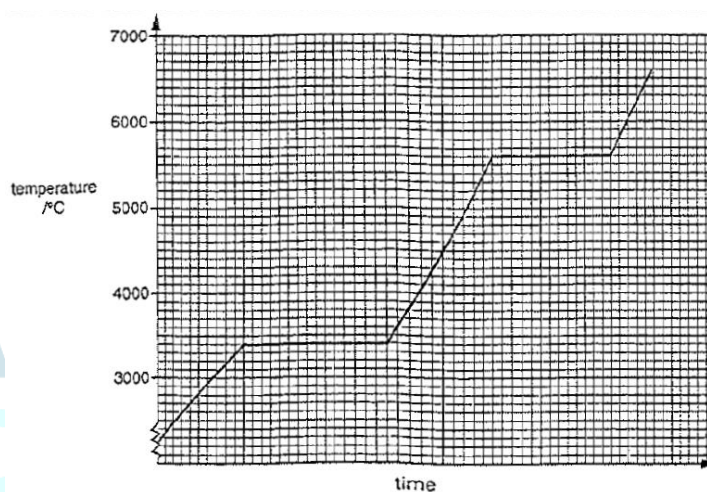
- (a) Which element is a noble gas? Give a reason for your choice. [1]
- (b) Which element could be hydrogen? Give a reason for your choice. [1]
- (c) Which two elements are in the same Group of the Periodic Table? Give a reason for your choice. [1]
- (d) Using columns 3 and 4, calculate the mass of 1 mole of M and hence identify M. [2]
- (e) Give 2 observations you might make when element R is added to dilute hydrochloric acid. [2]

2. The metal tungsten, symbol W, is used to make wire filaments in light bulbs. The wire glows when electricity passes through it.

This is the structure of a typical metal.



- (a) Use this structure to explain how tungsten conducts electricity. [1]
- (b) Suggest two other physical properties of tungsten. [2]
- (c) In a light bulb, the tungsten wire may get so hot that it melts and breaks. This graph shows the heating curve for tungsten.



- (i) Use the graph to give the boiling point of tungsten. [1]
- (ii) Predict the temperature when the tungsten wire breaks. [1]
3. Chlorine gas can be prepared by heating concentrated hydrochloric acid with solid potassium manganate(VII).
- $$\text{KMnO}_4 (\text{s}) + \text{HCl} (\text{aq}) \rightarrow \text{KCl} (\text{aq}) + \text{MnCl}_2 (\text{aq}) + \text{Cl}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$$
- (a) Balance the above equation. [1]
- (b) Chlorine reacts with metals to form metal chlorides. In these reactions, chlorine acts as an electron acceptor. Explain why chlorine atoms gain electrons in these reactions. [2]
- (c) Give the name and formula of the chloride formed when chlorine reacts with the following metals.
- (i) potassium [1]

(ii) iron [2]

(d) Chlorine reacts with non-metals to form non-metal chlorides.

Give the name and formula of the chloride formed when chlorine reacts with the following non-metals.

(i) nitrogen [1]

(ii) phosphorus [1]

4. The table below contains some information about the first three Group 18 elements.

Name	Atomic number	Relative atomic mass	Density at r.t.p./ g dm ⁻³
Helium	2	4	0.167
Neon	10	20	0.833
Argon	18	40	1.67

(a) Suggest why Group 18 elements are also known as *noble gases*. [2]

(b) Describe how the boiling points of Group 18 elements change down the group. [1]

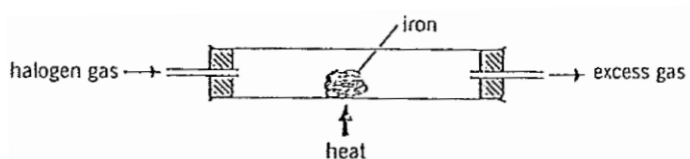
(c) Helium is used to fill small balloons. Explain what properties of helium make it suitable for this application. [1]

(d) Krypton is another Group 18 element, found below argon in the Periodic Table.

(i) State the relative atomic mass of krypton. [1]

(ii) Calculate the density of krypton at r.t.p. [1]

5. The experiment below shows the reaction between halogen and iron.



The observations of the experiments are shown in the table below.

Halogen	Observation
X	Iron wool glows less brightly. Brown solids are formed in the reacting tube.
Y	Iron wool burns brightly and vigorously. Brown solids are formed in the reacting tube.
Z	Iron wool glows brightly and less vigorously. Brown solids are formed in the reacting tube.

- (a) Arrange the halogens, X, Y and Z, in the order of increasing reactivity. [1]
- (b) Brown solids are halides of iron(II). What is the chemical formula for these brown solid when Y reacts with iron? [1]
- (c) (i) Halogen Z is a liquid at room temperature. Identify Z in the Periodic Table. [1]
 (ii) Hence, by using this identity in (c)(i), write a chemical equation for the reaction between Z and aluminium. [1]
- (d) X is a purple gas vapour. State two differences in the physical properties of X and Z. [2]

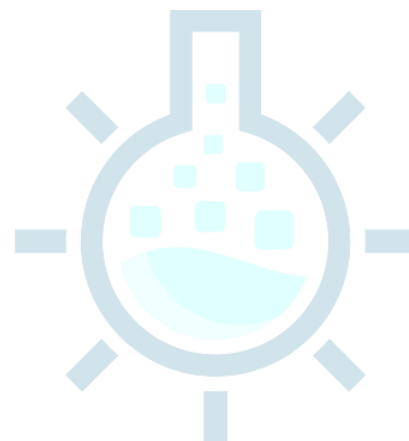
6. The atomic number and mass number of caesium, Cs, are 55 and 133 respectively.

- (a) Fill in the table below to show the number of protons, electrons and neutrons in caesium. [1]

number of protons	number of electrons	number of neutrons

- (b) Would you expect the melting point of caesium to be higher, lower or the same as compared to sodium in the same group? Explain your answer. [2]

- (c) Predict the chemical formula when caesium reacts with the following elements.
- (i) Reaction with sulfur. [1]
 - (ii) Reaction with chlorine [1]
- (d) Caesium is placed in cold water.
- (i) Predict the expected observation. [1]
 - (ii) What would happen when the Universal Indicator is added to the solution after the reaction? [1]

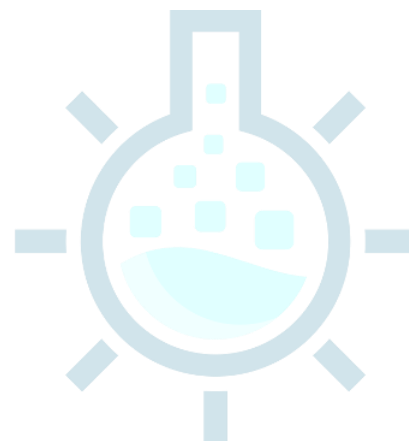


Section C: Free Response Questions

1. The table shows the properties of two metals, sodium and iron.

Property	Sodium	Iron
Relative atomic mass	23	56
Atomic radius (pm)	186	124
Melting point (°C)	98	1538
Boiling point (°C)	883	2861
Density (g cm ⁻³)	0.97	7.87
Hardness	Can be cut by a knife	Cannot be cut

- (a) Which part of the Periodic Table are these two metals found in? [2]
- (b) Based on the data in the table. Compare the melting points, boiling points, densities and extents of hardness of the two metals. Give your reasons. [8]



2. Some information about four elements, W, X, Y and Z are shown in the table.

Element	W	X	Y	Z
Number of electrons in outer shell	4	1	1	1
Density in g/cm^3	2.22	8.9	0.9	11.3
Melting point in $^{\circ}C$	3720	1083	64	328
Atomic radius in pm	77	135	203	154
Ions formed	W^{4+}	X^+ and X^{2+}	Y^+	Z^{2+} and Z^{4+}
Formulae of chlorides	WCl_4 – a colourless liquid	XCl – a white solid XCl_2 – a green solid	YCl – a white solid	ZCl_2 – a white solid ZCl_4 – a colourless liquid

- (a) Y reacts with dilute sulfuric acid to give hydrogen. Construct the equation for this reaction.
- (b) Which one of the elements is a transition element?
- (c) Copper and iron are transition elements.
- (i) Describe the bonding in metals.
- (ii) Explain, in terms of metallic bonding, why copper and iron are good electrical conductors and are malleable.
- (d) Compare the action of steam on copper and on iron.