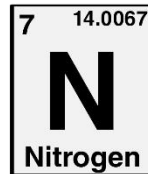
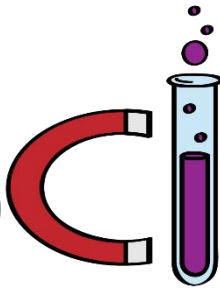
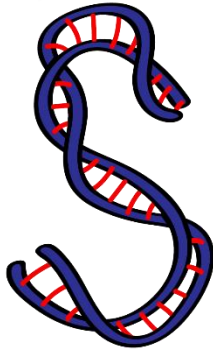




ASPIRE
INTERNATIONAL SCHOOL



Science Department

2023/2024

Year 8

**Term 1, Summary notes and Questions on
Unit 2**

Name:

Class:



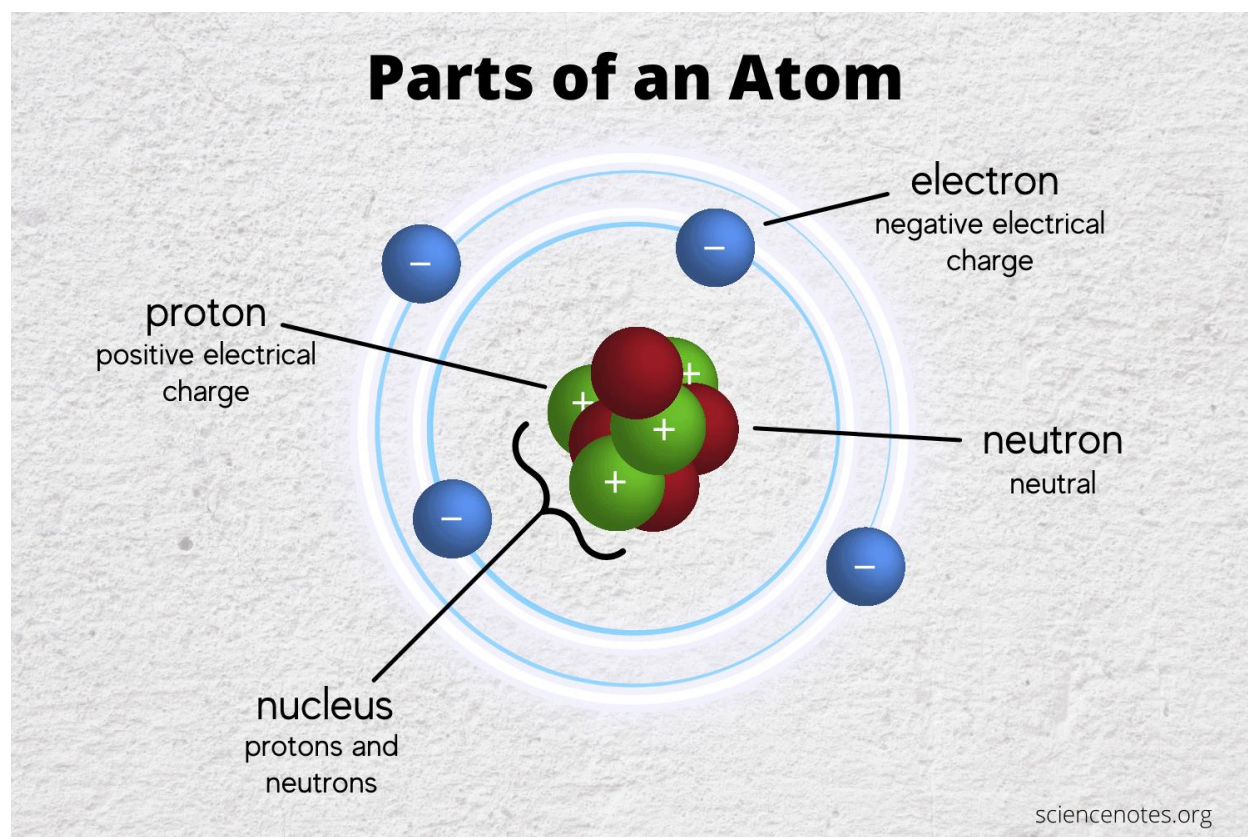
Chemistry

2.1 ATOMIC STRUCTURE AND THE PERIODIC TABLE

Atom is the smallest building unit of matter

What are the sub-atomic particles?

- **Protons** have a positive electrical charge
- **Neutrons** have Neutral Charge/ have no electrical charge.
- **Electrons** have a negative electrical charge
- Why the atom is electrically neutral? Because Number of Positive proton = number of negative electrons




Periods vs Groups

More Information Online WWW.DIFFERENCEBETWEEN.COM

	Periods	Groups
DEFINITION	Periods are the horizontal rows in the periodic table.	Groups are the vertical columns in the periodic table.
NUMBER	7	18
SIMILARITY	The elements in the same period have the same number of electron shells.	The elements in the same group have the same number of valence electrons.

The differences between atomic number and mass number

<p>ATOMIC NUMBER VERSUS MASS NUMBER</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #004a7c; color: white; padding: 5px;">Atomic number is the number of protons present in an atom</td> <td style="background-color: #6a3d9a; color: white; padding: 5px;">Mass number is the sum of the number of protons and the neutrons of an atom</td> </tr> </table>	Atomic number is the number of protons present in an atom	Mass number is the sum of the number of protons and the neutrons of an atom
Atomic number is the number of protons present in an atom	Mass number is the sum of the number of protons and the neutrons of an atom		
	<div style="border: 2px solid black; padding: 10px;"> <p>Mass number Number of protons and neutrons in atom</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Atomic symbol Abbreviation used to represent atom in chemical formulas</p> <p>Atomic number Number of protons in atom</p> </div>		

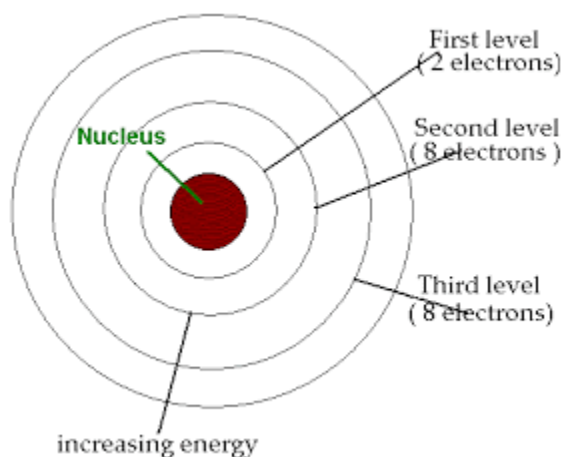
Atomic number= Number of protons = number of electrons.

Mass number= number of protons + number of neutrons.

Number of neutrons = Mass number – atomic number.

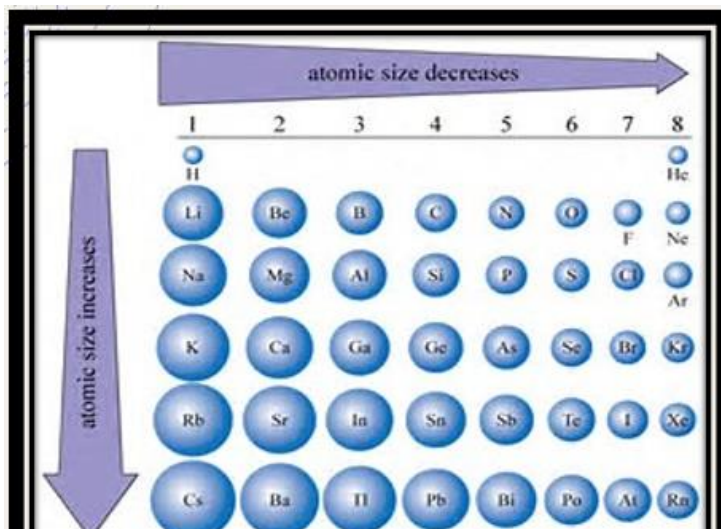
electrostatic attraction between the positive charge on the protons and the negative charge on the electrons is what holds individual atoms together.

The Rules of Electronic Configuration:



2.2 Trends in Groups within the Periodic Table

Trends of atomic size within the periodic table



atomic size decreases →							
1	2	3	4	5	6	7	8
H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca	Ga	Ge	As	Se	Br	Kr
Rb	Sr	In	Sn	Sb	Te	I	Xe
Cs	Ba	Tl	Pb	Bi	Po	At	Rn

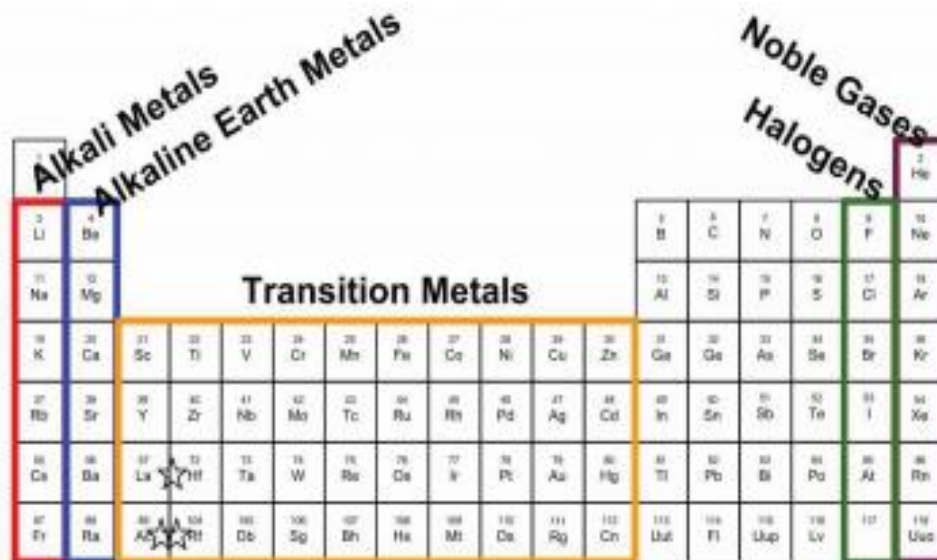
- The atoms of the elements increase in mass as you progress from left to right (starting with hydrogen) and downwards in the Periodic Table.
- Decrease in mass as we move from left to right across the same period

Names of groups at the periodic table:

Group 1: The alkali metals (All the alkali metals have only 1 electron in the outermost shell)

Group 7 : The Halogens (All the halogens have 7 electrons in the outermost shell)

Group 8: Noble gases (All the noble gases have 8 electrons in the outermost shell) (inert gases) (unreactive gases)



1 Alkali Metals		2 Alkaline Earth Metals										17 Halogens						18 Noble Gases													
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne														
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar														
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr														
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe														
55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og

2.3 Why elements react to form compounds

Types of Bonding

Points of comparison	Ionic Bond	Covalent Bond
Definition	an attraction between a positively charged ion and a negatively charged ion	a bond made when a pair of electrons is shared by two atoms
Melting and boiling points	very high melting points and boiling points. This is because there are very strong electrostatic forces holding the ions together	<ul style="list-style-type: none">• Covalent substances made from simple molecules have low melting points and boiling points because although the forces holding the molecules together are strong, the forces between the molecules, intermolecular forces are weak.
Electrical conductivity	<ul style="list-style-type: none">• Ionic compounds will conduct electricity if they are dissolved in water or if they are melted to form a liquid because of the presence of free moving ions.	<ul style="list-style-type: none">• Covalent substances made from simple molecules do not conduct electricity

- The metal loses electrons to form + ion.
- Non-metal gains electrons to form – ion.

Points of Comparison	Group 1	Group 7
Atomic size	As we move down across the group the atomic size will increase	As we move down across the group the atomic size will increase
Electrostatic attraction force	Electrostatic force will decrease	Electrostatic force will decrease
Losing or gaining electrons	It will be easily for Potassium to lose electrons than lithium and sodium and form positive ion	It will be easily for fluorine to gain electrons than bromine and chlorine and form negative ion
Reactivity	Potassium is more reactive than lithium and sodium	Fluorine is more reactive than bromine and chlorine

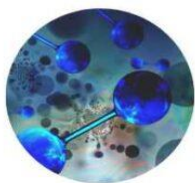
Ion	Atom
-an atom which has gained at least one electron to be negatively charged or lost at least one electron to be positively charged -More stable than atom as its outermost energy level is fill with electrons	-Smallest building unit of matter. -Not stable because the outer most energy level not filled with the electrons (atoms of group 1 & 7)

Molecule

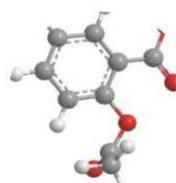
vs

Compound

A molecule is made up of two or more atoms that are bonded together.



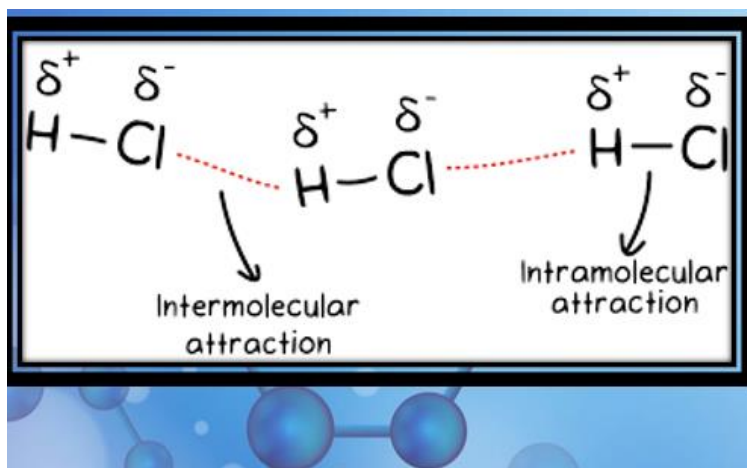
A chemical compound is a chemical substance composed of many identical molecules (or molecular entities).



2.4 Simple and giant structures

Types of Compounds	
Ionic Compounds	Covalent Compounds
Are formed due to electrostatic attraction force between positive ion and negative ion.	Are formed due to sharing of pair of electrons.
Compounds are formed in regular pattern, and regular shape and form giant structure called lattice.	Covalently bonded substances fall into two main types: <ul style="list-style-type: none"> • simple covalent molecules. giant covalent structures
	Simple molecules like carbon dioxide (CO ₂), (O ₂), (Methane) Giant covalent structure like diamond and graphite.
Strong compounds due to the electrostatic attraction force between positive and negative ions	Weak compounds because the force between the molecules which is intermolecular forces are weak.

Diamond	Graphite
<ul style="list-style-type: none"> • Each carbon atom forms four strong covalent bonds. • These large structures are called <u>macromolecule</u>. 	<ul style="list-style-type: none"> • The carbon atoms each make bonds with three other atoms. • Soft material. • Graphite is used for the 'lead' in pencils, and for lubricating moving parts in machines.



The forces holding the molecules together are very strong. But the forces between the molecules are weak. The forces between the molecules are called **intermolecular forces**.

Extra Questions On Unit 2:

Solve:

1. Chlorine ($_{35}^{17}\text{Cl}$)

Protons = ...17...

Electrons = ...17...

Neutrons = ...18....

Electronic structure:

2,8,7

2. Fluorine ($_{19}^9\text{F}$)

Protons = ...9....

Electrons = ...9.....

Neutrons = ..10.....

Electronic structure:

2,7

3. Aluminium ($_{27}^{13}\text{Al}$)

Protons = ...13...

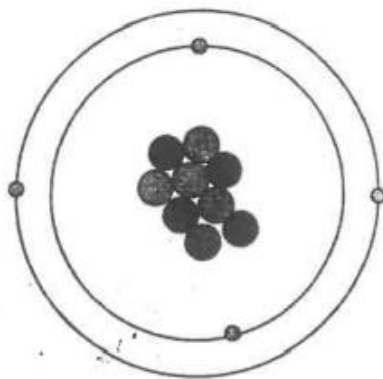
Electrons = ...13...

Neutrons = ...14...

Electronic structure:

2,8,3

Look at the diagram of a beryllium atom.



(a) (i) How many electrons are in the atom?

4

[1]

(ii) How many neutrons are in the atom?

5

[1]

(b) Write down the chemical symbol for beryllium.

Be

[1]

(c) Lithium is the third element in the Periodic Table.

Beryllium is the fourth element.

Lithium has fewer neutrons than beryllium.

Describe two other ways in which the structure of a lithium atom is different from a beryllium atom.

1 Lithium has less protons/ electrons

2 Lithium has lower atomic number [2]

1 Sodium and lithium are both elements in Group 1 of the Periodic Table.

H hydrogen 1	
Li lithium 3	Be beryllium 4
Na sodium 11	Mg magnesium 12
K potassium 19	Ca calcium 20

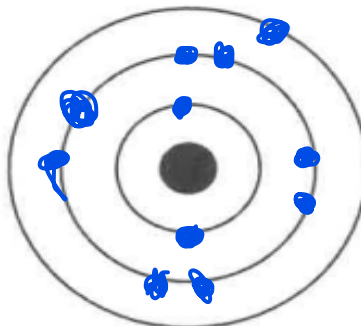
					He helium 2
B boron 5	C carbon 6	N nitrogen 7	O oxygen 8	F fluorine 9	Ne neon 10
Al aluminium 13	Si silicon 14	P phosphorus 15	S sulfur 16	Cl chlorine 17	Ar argon 18

(a) Write down the number of protons in a sodium atom.

11

[1]

(b) Complete the diagram to show how the electrons are arranged in a sodium atom.



NOT TO SCALE

[2]



2 This table contains some data about the elements in Group 7 of the Periodic Table. The elements are given in descending order.

DL

Element	Atomic number	Mass number	Melting point in °C	Boiling point in °C	Reactivity
fluorine	9	19	-220	-188	most reactive
chlorine	17	35	-101	-34	
bromine	35	80	-7	59	less reactive
iodine	53				
astatine	85				

a What trends can you see in this group of the Periodic Table?

The trends are:

- the melting points increase as you go down the group
- the boiling points increase as you go down the group
- the elements become less reactive as you go down the group

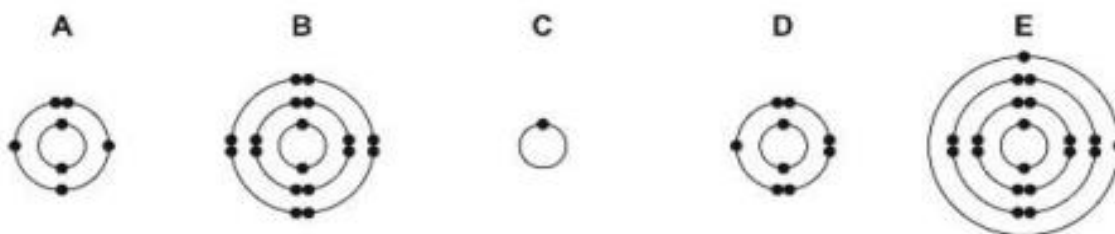
b Iodine is the fourth element in this group. Would you expect the melting point of iodine to be higher or lower than that of bromine?

The melting point of iodine will be higher than that of bromine.



The electronic structures of five atoms of different elements, A, B, C, D and E, are shown below.

0L



Answer the following questions about these structures. Each structure may be used once, more than once or not at all.

(a) Which structure

- | | |
|---|---|
| (i) is in Period 4 of the Periodic Table, | E |
| (ii) is a noble gas, | B |
| (iii) is in Group II of the Periodic Table, | E |
| (iv) has five electrons in its outer shell, | A |
| (v) has a proton (atomic) number of 7, | A |
| (vi) represents a fluorine atom? | D |

[6]

Number of period will indicates the number of energy levels (shells) while the number of group will indicates the number of electrons in the outer shell



2 The table shows information about elements.

atomic symbol	number of electrons in	
	one atom of the element	one ion of the element
Li	3	2
Mg	12	10
Al	13	10
Cl	17	18
K	19	18
Ca	20	18

(a) (i) Which atom loses three electrons to form an ion?

Circle the correct answer.

Li Mg Al Cl K Ca [1]

(ii) Which atom forms a negative ion?

Cl

Explain your answer.

Because it gains electron

(iii) Two elements in the table are in Group 1.

Write down the atomic symbols of these two elements.

Li and K



2 Look at the diagram.

It shows part of the Periodic Table.

		H						He	
Li	Be			B	C	N	O	F	Ne
Na	Mg			Al	Si	P	S	Cl	Ar
K	Ca	transition elements							

(a) Write down the chemical symbol for the element which has the electronic structure 2.8.4.

.....Si..... [1]

(b) Write down the chemical symbol for an element in the same **group** as Be.

.....Mg or Ca..... [1]

(c) Hydrogen and oxygen react together to make **molecules** of water.

Write down the **type** of bonding in a water molecule.

.....Covalent..... [1]

-Compare between ionic and covalent bonds in terms of:

Definition, strength, melting and boiling point, and electrical conductivity.

[You can check p. 6 and 8 the tables of comparison at summary notes of unit 2](#)