9 SCIENCE 2015

CHEMISTRY TEST ONE: THE ATOM

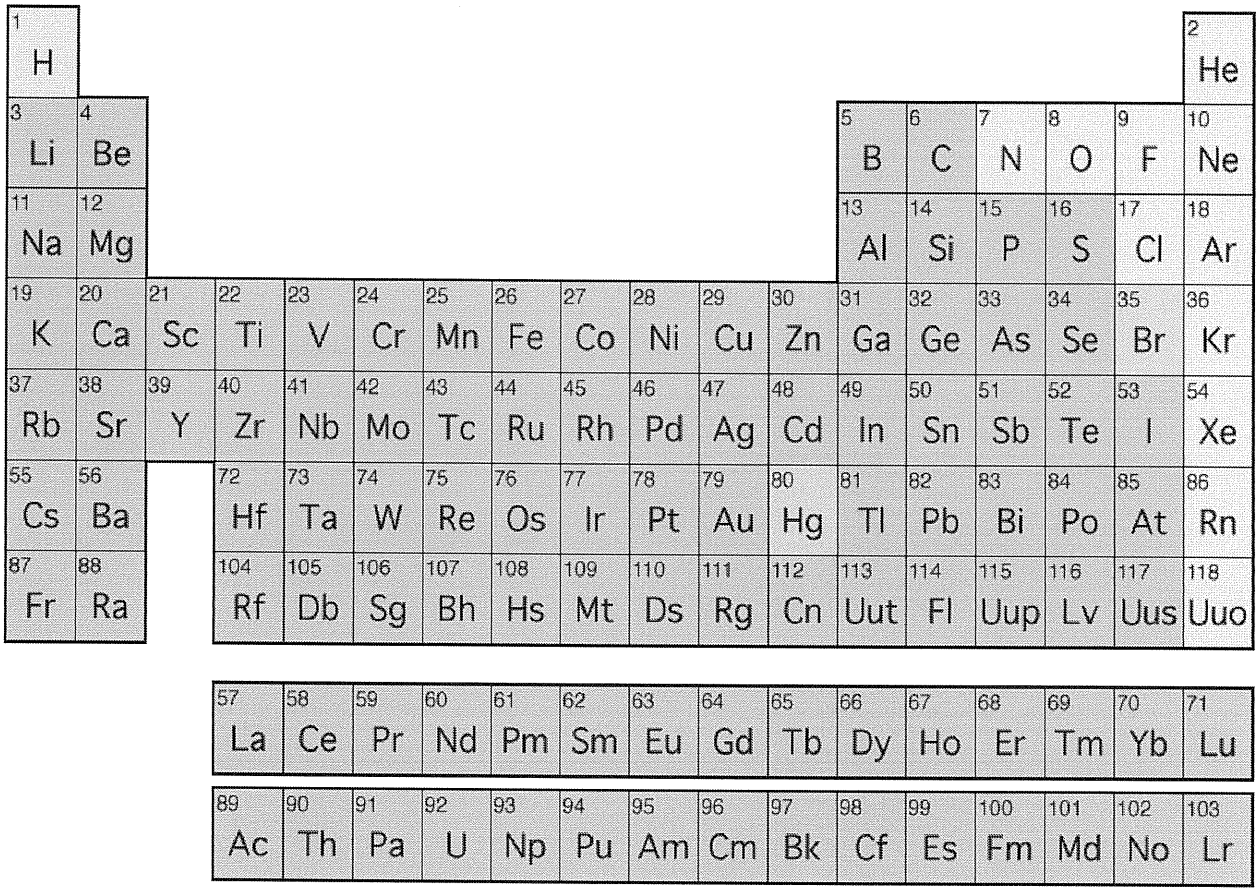
Name: _____ **Mark:** **/61**

ANSWER KEY **Percentage:** **%**

Table of common ions

Cations		Anions	
+1 charge		**- 1 charge**	
Hydrogen	H^+	Fluoride	F^-
Lithium	Li^+	Chloride	Cl^-
Sodium	Na^+	Bromide	Br^-
Potassium	K^+	Iodide	I^-
Copper (I)	Cu^+	Hydride	H^-
Silver	Ag^+	Hydroxide	OH^-
Ammonium	NH_4^+	Nitrite	NO_2^-
		Nitrate	NO_3^-
+2 charge		**- 2 charge**	
Manganese	Mn^{2+}	Oxide	O^{2-}
Magnesium	Mg^{2+}	Sulfide	S^{2-}
Calcium	Ca^{2+}	Carbonate	CO_3^{2-}
Barium	Ba^{2+}	Sulfate	SO_4^{2-}
Zinc	Zn^{2+}	Sulfite	SO_3^{2-}
Copper (II)	Cu^{2+}		
Mercury (II)	Hg^{2+}		
Iron (II)	Fe^{2+}		
Tin (II)	Fe^{2+}		
Lead (II)	Pb^{2+}		
Nickel (II)	Ni^{2+}		
Beryllium	Be^{2+}		
+3 charge		**- 3 charge**	
Aluminium	Al^{3+}	Nitride	N^{3-}
Iron (III)	Fe^{3+}	Phosphate	PO_4^{3-}
Boron	B^{3+}	Phosphide	P^{3-}
Chromium	Cr^{3+}		

Periodic Table



1 H																	2 He
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		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		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo

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
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

Multiple Choice Answer Sheet:

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D
9. A B C D
10. A B C D

SECTION A: **MULTIPLE CHOICE** **(10 marks)**

Select the most correct answer for each question below.

1. The third electron shell of an atom can only hold:

(a) 18 electrons.
(b) 2 electrons.
(c) 8 electrons.
(d) 4 electrons.

2. To work out the number of neutrons in an atom:

(a) Take the atomic number from the mass number.
(b) Take the mass number from the atomic number.
(c) Add the mass number to the atomic number.
(d) Add the number of electrons to the number of protons.

3. How many of the known elements are found naturally on Earth?

(a) 87
(b) 94
(c) 79
(d) 91

4. The definition that best describes the word 'element' is:

(a) The fundamental building block of all materials.
(b) A substance made up of only one type of atom.
(c) A substance made up of two or more types of atoms.
(d) A metal that has many atoms.

5. H_2O (water) is an example of a/an:

(a) Element.
(b) Crystal lattice.
(c) Compound.
(d) Mixture.

6. When an atom loses electrons it forms a/an:

(a) Ion.
(b) Anion.
(c) Charged atom.
(d) All of the above.

7. The type of atom most likely to form a positively charged ion is:

(a) A metal.
(b) A non-metal.
(c) An atom with more protons than electrons.
(d) None of the above.

8. A cation is most likely to be formed when:

(a) An ion loses electrons.
(b) An atom loses electrons.
(c) The valence shell is full.
(d) All of the above.

9. How easily a compound dissolves is known as its:

(a) Crystallisation rate.
(b) Viscosity.
(c) Conductivity.
(d) Solubility.

10. An ionic compound is formed due to:

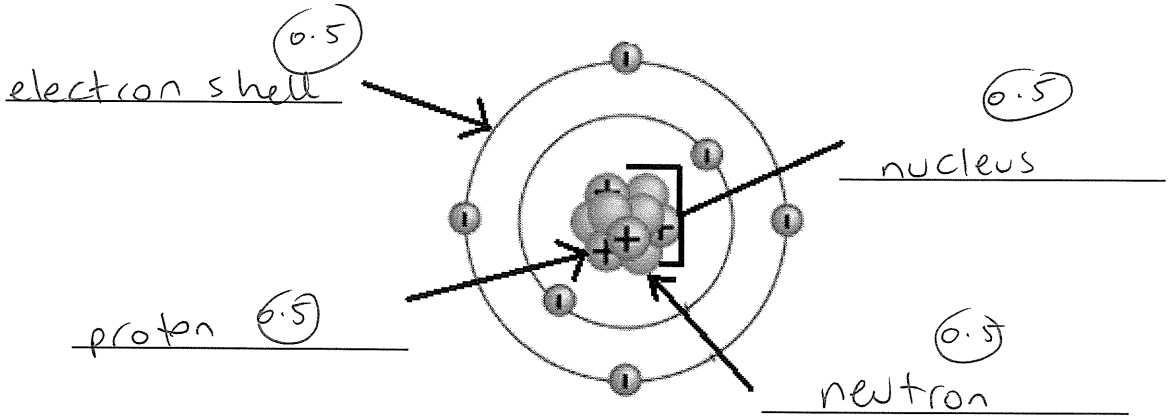
(a) The attraction of atoms with like charges.
(b) Two different types of atoms joining together.
(c) The attraction of atoms with opposite charges.
(d) All of the above.

SECTION B: SHORT ANSWER **(51 marks)**

1. State the difference between an element and a compound. (2 marks)

Element made up of only one type of atom (1)
Compound made up of two or more types of atom (1).

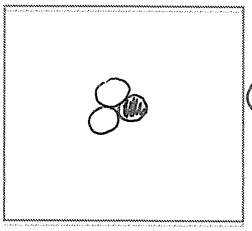
2. Label the diagram of the atom below. (2 marks)



3. Follow the instructions below (draw neatly and in pencil). (4 marks)

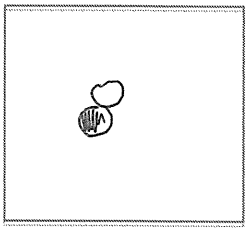
a. In the box to the right draw a compound with three atoms.

must be different



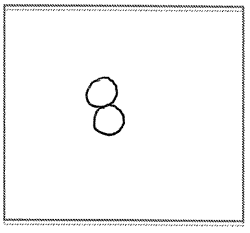
b. In the box to the right draw a compound with two atoms.

must be different

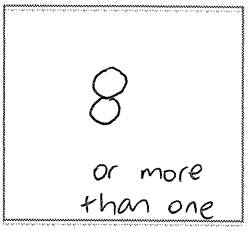


c. In the box to the right draw an element with two atoms.

must be the same



d. In the box to the right draw an example of a molecule.



4. Fill in the missing element names and symbols below. (7 marks)

ELEMENT	SYMBOL
Hydrogen	H
Helium	He
Beryllium	Be
Boron	B
Nitrogen	N
Oxygen	O
Neon	Ne
Magnesium	Mg
Aluminium	Al
Silicon	Si
Phosphorus	P
Sulphur or Sulfur	S
Chlorine	Cl
Argon	Ar

0.5 mark each

5a. Fill in the table below (use the table of common ions at the front to help you).

(4 marks)

Ionic formulae	Name of metal (cation)	Name of non-metal (anion)	Name of compound
$MgCO_3$	Magnesium (0.5)	Carbonate (0.5)	Magnesium Carbonate (1)
NaI	Sodium (0.5)	Iodide (0.5)	Sodium Iodide (1)

b. Work out the ionic formulas in the table below (use the table of common ions to help you).

(4 marks)

Compound	**Working out**	**Ionic formula**
Boron oxide	B^{3+} O^{2-} → B_2 O_3 (1)	B_2O_3 (1)
Iron (III) oxide	Fe^{3+} O^{2-} → Fe_2 O_3 (1)	Fe_2O_3 (1)

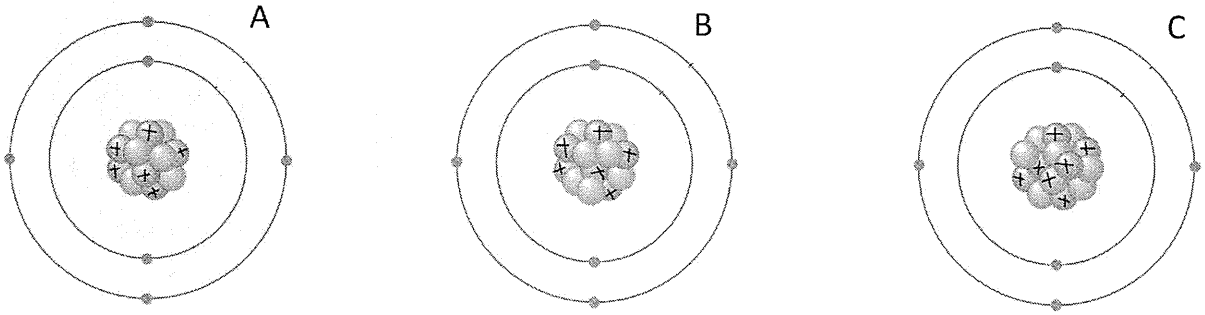
6. What subatomic particles are found in the nucleus of an atom? What is the charge of each? (2 marks)

Neutrons (0.5) : no charge (0.5)

Protons (0.5) : positive charge (0.5)

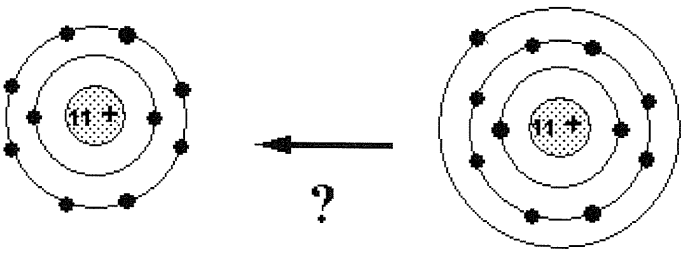
7. a. Which of the following are isotopes of the same element? (2 marks)

A & B



b. Which element has the two isotopes pictured above? Carbon

8. These questions all refer to the diagram below: (4 marks)



Na^+ (0.5) Na (0.5)

a. What element is shown in the diagram above? Sodium (1)

b. Write the appropriate symbol beneath each diagram.

c. What is different between the two diagrams?

Either one is an ion & the other is an atom (1)

or

one has more electrons than the other.

The left has lost an electron ect.

d. Did this change form an anion or a cation? Cation (1)

9. Write the term next to its matching definition below. (5 marks)

Electron shells, valence shell, atomic number, mass number, isotope

a) The number of protons and neutrons in the nucleus of an atom.

Mass number (1)

b) Atoms that have the same number of protons but a different number of neutrons in their nucleus.

Isotope (1)

c) The number of protons in the nucleus of an atom.

Atomic number (1)

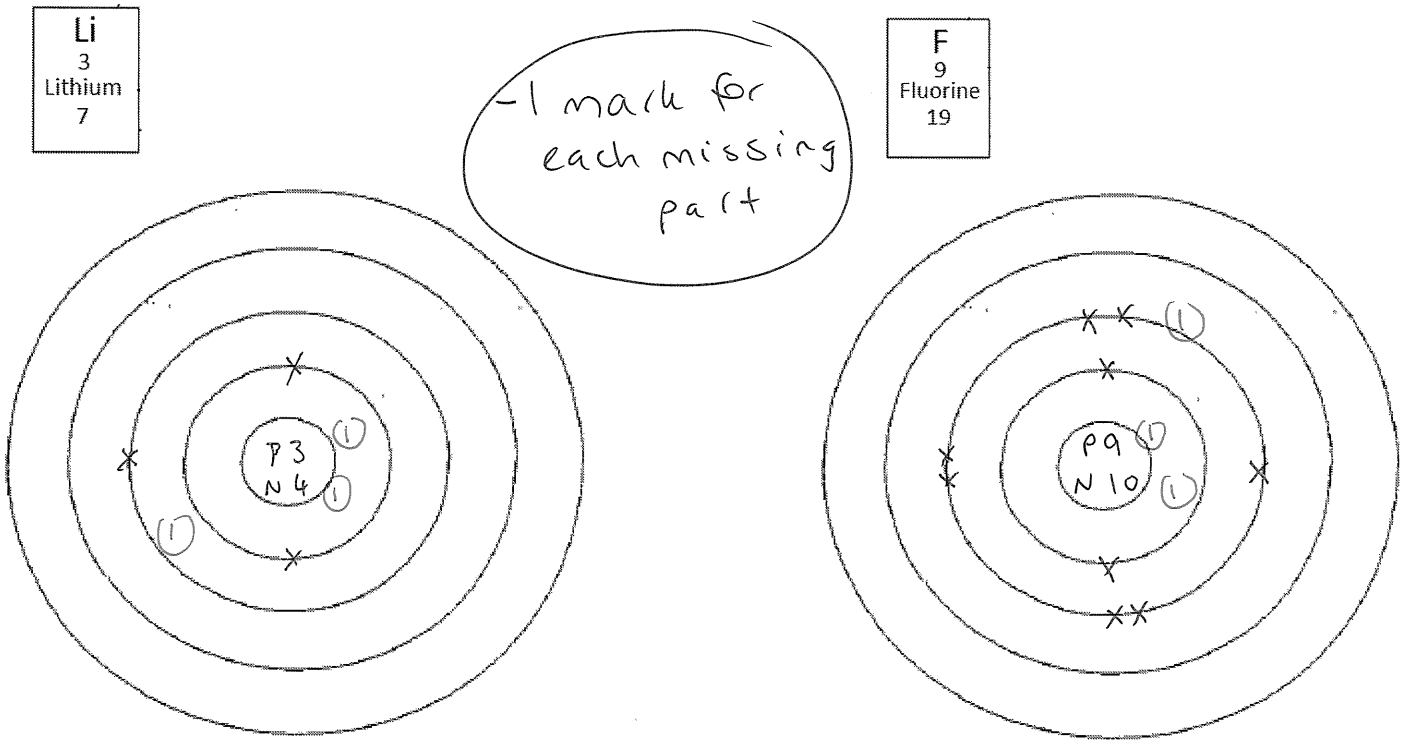
d) The outermost electron shell of an atom.

Valence shell (1)

e) The layer/s that surrounds the nucleus and hold electrons.

Electron shells (1)

10. Complete the electron configurations below (neatly in pencil). (4 marks)



11. Determine the following for the element. (3 marks)

Number of protons: 19 (0.5)

Number of electrons: 19 (0.5)

Number of neutrons: 20 (0.5)

Atomic number: 19 (0.5)

Mass number: 39 (0.5)

Element symbol: K (0.5)

K
19
Potassium
39

12. Propose why atomic symbols are the same all over the world. (2 marks)

Elements are written in different languages (1) around the world, the symbols are the same internationally so they can be recognised (1).

13. These questions refer to the diagram shown below. (3 marks)

a. What is the name of the type of structure shown?

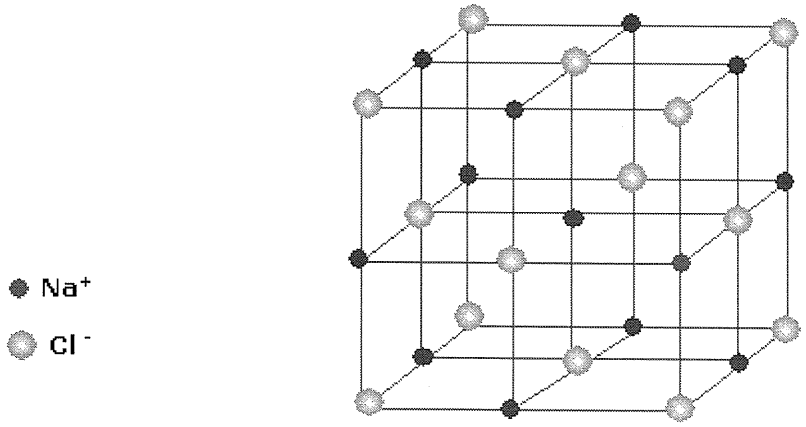
Crystal lattice (1)

b. What is the name of the type of bond found between each of the atoms?

Ionic bond (1)

c. What is the name of the compound shown below? (1)

Sodium chloride / NaCl



14. Read the information below then answer the questions. (3 marks)

*An ionic compound is formed when a **calcium ion** (calcium is a metal) joins with an **oxygen ion** called oxide.*

a. Which of the above is the cation? Calcium (1)

b. Which of the above would have gained electrons to become an ion?

Oxygen (1)

c. What is the name of the compound formed? calcium oxide (1)