

Year 9 – Chemistry Fundamentals

Mastery Matrix

No.	Topic	Learning Statement	Tier	Course	Revision Guide		RAG		
					Double	Triple	1	2	3
1.1	Elements & Compounds	Describe and draw a model of the three states of matter	F	A	94	C14			
1.2		Use the particle model to explain melting, boiling, freezing and condensing	F	A	94	C14			
1.3		Explain the limitations of the particle theory	HT	A	94	C14			
1.4		Identify a substance's state using its melting and boiling point	F	A	95	C15			
1.5		Classify a substance as an element or compound	F	A	88	C8			
1.6		Identify the symbol for the first 20 elements	F	A	88	C8			
1.7		Name common compounds from their formula	F	A	88	C8			
2.1	Mixtures	Define 'pure substances' and explain the difference between its scientific and everyday meaning	F	A	140	C84			
2.2		Use melting and boiling point data to establish pure substances from mixtures	F	A	140	C84			
2.3		Describe what a 'formulation' is and give examples (Fuels, cleaning agents, paints, medicines, alloys, fertilisers and foods)	F	A	140	C84			
2.4		Use key terms (soluble, insoluble, solute, solvent and solution) correctly to describe a substance dissolving	F	A	89	C9			
2.5		Explain how to separate given mixtures (filtration, crystallisation, simple distillation, fractional distillation, chromatography)	F	A	89	C9			
2.6		Describe the two phases (stationary and mobile) of chromatography and its purpose	F	A	140	C84			
2.7		Calculate R_f values	F	A	141	C85			
2.8		Interpret chromatograms to decide whether a substance is pure or a mixture	F	A	140	C84			
2.9		RP Chromatography: Use paper chromatography to investigate the colours within different substances and calculate R_f values	F	A	140	C84			
2.10		Explain the difference in difficulty of separating compounds compared to mixtures	F	A	88+89	C8+C9			
3.1	Structure of an atom	Describe the plum pudding model of the atom	F	A	90	C10			
3.2		Describe the current (nuclear) model of the atom giving the relative charge and mass of the subatomic particles	F	A	90	C10			
3.3		Recall the radius of an atom and its nucleus	F	A	90	C10			
3.4		Calculate protons, neutrons and electrons for an atom linking to mass and atomic number	F	A	91	C11			
3.5		Draw the electronic structure and work out the electronic configuration for a given atom	F	A	91	C11			
3.6		Define an 'isotope'	F	A	91	C11			
3.7		Link isotopes to relative atomic mass to explain why this is an average	F	A	212	C11			
3.8		Calculate the relative atomic mass of an element given the percentage abundance of its isotopes	F	A	212	C11			
3.9		Calculate the relative formula mass of a substance	F	A	103	C31			
4.1	Metals in the periodic table	Describe how Mendeleev arranged the periodic table	F	A	92	C12			
4.2		Explain why something is classified as a metal or non-metal	F	A	101	C18			
4.3		Describe the uses of metals	F	A	101	C18			
4.4		Describe the key properties of the transition metals (chromium, manganese, iron, cobalt, nickel and copper) (triple only)	F	T		C18			
4.5		Define a 'chemical reaction' and give examples	F	A	88	C8			
4.6		Describe corrosion as a reaction and explain how to prevent it (triple only)	F	T		C18			



4.7		Explain what an alloy is and how its properties differ from a pure metal	F	A	101	C18			
4.8		Link the properties and use of different alloys to their composition (bronze, brass, gold, steel, aluminium alloys) (triple only)	F	T		C19			
5.1	Groups in the periodic table	Describe the key properties (state, easy to cut, appearance) of group 1	F	A	92+93	C12+C13			
5.2		Describe and explain how the reactivity changes as you move down group 1 (oxygen, chlorine, water)	F	A	92	C12			
5.3		Describe the key properties (molecular mass, boiling and melting point) of group 7	F	A	93	C13			
5.4		Describe and explain how the reactivity changes as you move down group 7	F	A	93	C13			
5.5		Describe the key properties (boiling point, density, reactivity) of group 0	F	A	92	C12			
5.6		Describe and explain how the reactivity changes as you move down group 0	F	A	92	C12			
5.7		Describe the gas test for carbon dioxide, hydrogen, oxygen and chlorine	F	A	141	C85			

The Knowledge

	Topic:	The Three States (C.1)
1	In which state do atoms have strong bonds between them?	Solid
2	Describe motion of particles in a solid, liquid and gas	S = Vibrating, L = Sliding, G = quick & random
3	In which state can diffusion NOT happen?	Solid
4	In which states, can particles not be compressed?	Solid & liquid
5	Which state is the least dense?	Gas
6	Which state is the most dense?	Solid
7	In which state are there weaker forces between particles?	Gases
8	In which state do particles remain in a fixed position?	Solid
9	What is the name for the change of state when a solid changes to a liquid?	Melted
10	What is the name for the change of state when a liquid changes to a gas?	Evaporation
11	What is the name for the change of state when a gas changes to a liquid?	Condensation
12	What is the name for the change of state when a liquid changes to a solid?	Freezing/solidifying
13	What is the name for the temperature where a liquid turns into a gas?	Boiling point
14	What is the name for the temperature where a solid turns into a liquid?	Melting point
15	Why is there no overall temperature change when a substance is changing state?	The particles are absorbing thermal energy to overcome the forces between them. The particles are absorbing thermal energy to overcome the forces between them. Particles are absorbing the thermal energy to overcome the forces between them.
	Topic:	Elements, compounds (C.2)
1	What is the name for substances made of only ONE type of atom?	Elements
2	What is the name for substances made of two or more types of atoms NOT chemically bonded together?	Mixtures
3	What is the name for substances made of two or more types of atoms chemically BONDED together?	Compounds
4	What is the formula for water?	H ₂ O
5	What is the formula for Methane?	CH ₄
6	Define "alloy"	A mixture of a metal and at least one other element
7	Why are alloys harder than pure metals?	Different sized atoms distort the regular rows so that the layers can't slide over each other
8	What is the word for an element that always exists as two atoms bonded together?	Diatomic



9	Is an alloy an element, compound or mixture?	Mixture
10	What is the formula for glucose?	$C_6H_{12}O_6$
11	Which elements exist diatomically?	N_2 , H_2 , O_2 and all of group 7
12	How many electrons can be held in the first shell and then second and third shell of an atom?	First shell is TWO, all other shells EIGHT
13	What is the different between A_r (relative atomic mass) and M_r (relative molecular mass)	A_r = for an element M_r = for a compound
14	Define "ion"?	An electrically charged atom that has gained or lost electrons
15	How do you calculate A_r of an element?	Relative atomic mass = $\frac{(\% \times \text{mass}) + (\% \times \text{mass})}{100}$
Topic:		Mixtures (C.3)
1	Define "pure" substance	A single element or compound
2	What temperature is the melting point of water?	0 °C
3	What temperature is the boiling point of water?	100 °C
4	Define "formulation"	A mixture designed as a useful product
5	Give three examples of a formulation	Fuel, paint, alloys
6	Define "soluble"	Can dissolve
7	Define "insoluble"	Cannot dissolve
8	Define "solute"	A solid which can dissolve
9	Define "solvent"	A liquid in which a solid will dissolve
10	Define "solution"	A mixture of a dissolved solute and solvent
11	What is filtration used to separate?	An insoluble solid and a liquid
12	What is crystallisation used to separate?	A soluble solid and a solvent (collect solid)
13	What is simple distillation used to separate?	A soluble solid and a solvent (collect liquid)
14	What is fractional distillation used to separate?	Liquids with different boiling points
15	What is chromatography used to separate?	Different colours of ink or dye
Topic:		Chromatography (C.4)
1	What are the two "phases" in chromatography?	Mobile and stationary phase
2	What is the "mobile phase" in chromatography	The solvent (that travels up the paper)
3	What is the "stationary phase" in chromatography	The paper
4	Why should the start line be drawn in pencil?	Because pencil will not dissolve and affect the results.
5	Why should the start line sit above the solvent?	So that the dots of ink or dye do not wash off the paper
6	Why do the dots of ink or dye need to be the same size?	To make it a fair test
7	How is the R_f value calculated?	$R_f = \frac{\text{distance by dye}}{\text{distance by solvent}}$
8	What does a high R_f value tell us?	The substance is more soluble and travelled further
9	What does a low R_f value tell us?	The substance is less soluble and travelled less distance
10	What should the R_f value always be?	A number between 0 - 1
11	What solvents are used in chromatography?	Water, alcohol, acetone
12	Where should the distance moved by the dye be measured from?	The same place each time (top, bottom or middle)
13	What is chromatography used for?	To separate different coloured compounds(dyes or inks)
14	How will temperature affect the rate of chromatography?	The higher the temperature, the faster the rate
15	How can chromatography be used to identify an unknown substance?	Compare with a known substance
Topic:		Structure of an atom (C.5)
1	What is the charge, relative size and location of a proton?	Charge: 1+, Size = 1, Location = Nucleus
2	What is the charge, relative size and location of a neutron?	Charge: 0, Size = 1, Location = Nucleus
3	What is the charge, relative size and location of an electron?	Charge: -1, Size = 1/2000, Location = Shells
4	What is the radius of an atom?	0.1 nm ($1 \times 10^{-10}m$)
5	What is the radius of a nucleus?	$1 \times 10^{-14}m$
6	Define "atomic number"	No. of protons in an atom
7	Define "atomic mass number"	Sum of protons and neutrons in an atom
8	Define isotope?	Atoms of the same element that have the same number of protons but different numbers of neutrons
9	What was the Dalton model of the atom?	Atoms = tiny spheres
10	Describe Thompson's 'Plum Pudding' model of an atom.	Ball of positive charge with electrons embedded throughout
11	Describe Rutherford's model of the atom	Dense, positive mass in the centre (the nucleus)
12	Describe the Neil's Bohr model of the atom	Positive nucleus orbited by negative electrons
13	Describe Chadwick's 'Nuclear Model' of an atom	Neutrons & protons in a +ve nucleus, -ve electrons in shells
14	What is the name for the current model of the atom?	Nuclear model
15	What 3 things did the alpha scattering experiment prove?	1) Nucleus = positive (deflected & reflected +ve α particles)



		2) Nucleus = dense mass in centre of atom, 3) Rest = empty space
	Topic:	The periodic table (C.6)
1	How are elements arranged in the periodic table?	In order of atomic number (lowest to highest)
2	What does the column (group) in the periodic table tells us?	Number of electrons in the outer shell
3	What are the rows of the periodic table called?	Periods
4	What did Mendeleev do when creating the modern periodic table?	Left gaps to make the pattern fit
5	Where are alkali metals found in the periodic table?	Group 1
6	Where are non-metals found in the periodic table?	Right
7	Name the groups in the periodic table (1, 7, 0)	1 = Alkali metals, 7 = Halogens, 0 = Noble gases
8	State 3 properties of group 7	Non-metal, highly reactive, diatomic
9	What happens to reactivity as you move down group 7?	They become less reactive - it is harder to gain an electron
10	What is the name of the elements found in the middle of the periodic table that are not part of a group?	Transition metals
11	Give 4 properties of metals	1) High melting point, 2) Good thermal and electrical conductors, 3) Ductile, 4) Malleable
12	Give 3 properties of non-metals	1) Low melting point, 2) Poor thermal and electrical conductors, 3) Brittle
13	Give 5 properties of the alkali metals	1) Highly reactive, 2) Low melting and boiling points, 3) Low density, 4) Shiny when cut, 5) Soft
14	What is formed when alkali metals react with water?	Alkaline metal hydroxide
15	What happens to reactivity as you move down group 1?	They become more reactive - it is easier to lose their outer electron.
	Topic:	Metals and alloys (C.23)
1	What is Corrosion? (triple only)	Destruction of materials by chemical reactions with substances in the environment
2	Give three ways of preventing corrosion (triple only)	Apply a coat that acts as a barrier (greasing, painting, electroplating)
3	Why doesn't aluminium rust? (triple only)	It is covered in a layer of aluminium oxide
4	What is it called when a less reactive metal is coated with a more reactive metal to prevent corrosion? (triple only)	Sacrificial protection
5	Give two conditions necessary for rusting (triple only)	Water and air (oxygen)
6	Which metals are contained within bronze? (triple only)	Copper and tin
7	Which metals are contained within brass? (triple only)	Copper and zinc
8	When gold is used in jewellery, which metals is it normally mixed with? (triple only)	Silver, copper, zinc
9	What carat is pure gold? (triple only)	24 carat
10	Which elements do steel contain? (triple only)	Iron + carbon and other metals
11	State two properties of high carbon steel (triple only)	Strong but brittle
12	State two properties of low carbon steel (triple only)	Soft and easy to shape
13	Which elements do stainless steels contain? (triple only)	Iron, chromium and nickel
14	Give two properties of stainless steel. (triple only)	Hard and resistant to corrosion
15	State one property of aluminium alloys (triple only)	Low density
	Topic:	RP: Chromatography (C6) (C.40)
1	What is the aim of the experiment?	Investigate the colours that are found within a mixture of food colourings
2	What is the independent variable?	Dye/ink colour
3	What is the dependent variable?	R _f value
4	Name 3 controls variables	1) Start point of the colour 2) Size of the coloured dot 3) Start point of the solvent
5	Name 3 sources of error	1) Starting line drawn in ink 2) Solvent above the starting line 3) Dots too close together or too big
6	Why is a pencil used to draw the starting line?	To avoid any dye in a pen also moving up the paper
7	Name 3 types of solvent that can be used	Water, alcohol and acetone
8	How should the distance of the dye be measured?	Use a ruler to measure the distance between the starting line and the centre of the dye
9	How should the distance moved by the solvent be measured?	Use a ruler to measure the distance between the starting line and the top of the solvent line/curve
10	How is the R _f value calculated?	R _f value = distance moved by dye / distance moved by solvent
11	How do you use the R _f value to identify the unknown substance?	Compare with a known value from a data base
12	How could you identify the unknown substance visually?	Observe which known colours the unknown dye lines up with on the chromatography paper



13	What is used to transfer the dyes to the chromatography paper?	Capillary tube
14	What are the units for the R_f value?	No units
15	What are possible variations in this method?	Investigate whether this pen is a pure colour or a mixture.

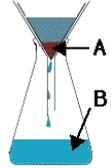


Homework 1
Throwback to Key Stage 3 – Separation Techniques

A. Multiple Choice – circle the correct answer

1. The diagram shows apparatus for separating soil from water. What are parts A and B called?

- a. A = residue, B = distillate
- b. A = residue, B = filtrate
- c. A = distillate, B = filtrate
- d. A = filtrate, B = residue

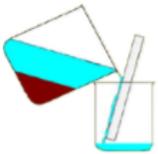


2. Which of the following methods is used to separate colours in food dyes?

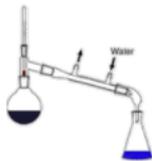
- a. Decanting
- b. Distillation
- c. Chromatography
- d. Filtration

3. Which of the following diagrams shows the separation technique of evaporation?

a.



b.



c.

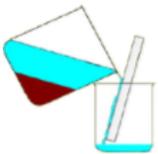


d.

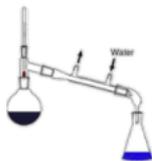


4. Which of the following diagrams shows the separation technique of distillation?

a.



b.



c.



d.



5. In a mixture of salt dissolved in water what the salt and water called?

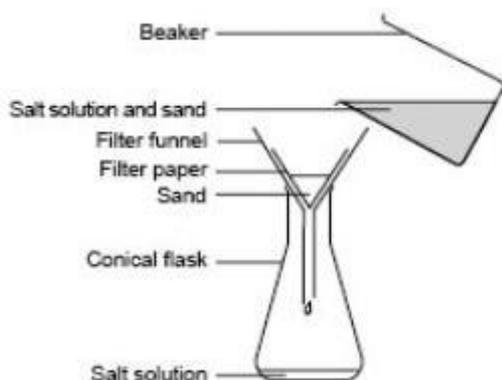
- a. salt = solvent, water = solute
- b. salt = solute, water = solvent
- c. salt = distillate, water = solvent
- d. salt = distillate, water = solute

B. Comprehension Exercise – use the following information to answer the questions below.

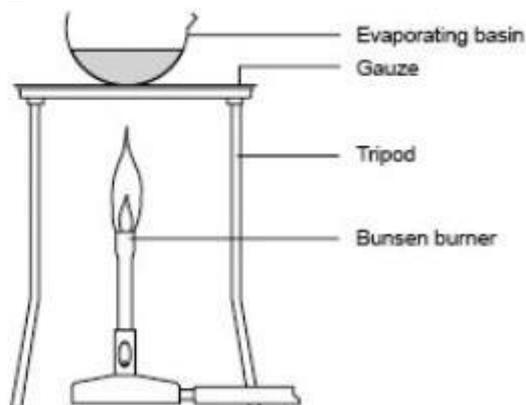
You are provided with a mixture of salt, sand and water. The water is not required at the end. To separate both the salt and sand from the water the following steps are required:

1. Separate the sand from the salt and water by filtration
Procedure – Pour mixture into filter with filter paper. Wait for filtrate (salt and water mixture) to be collected in conical flask. Sand (residue) will stay in filter paper.
2. Separate the salt from water by evaporation.
Procedure – pour salt water mixture into crucible. Place crucible on gauze/tripod. Light crucible burner and turn to roaring flame. Place Bunsen burner under crucible and wait for water to evaporate. Be careful: crucible water can spit from crucible during evaporation, it will be hot for a while after Bunsen burner has been turned off.

Step 1



Step 2



- i) In step 1, name two pieces of equipment that are used

- ii) In step 2, name three pieces of equipment that are used

- iii) What is collected in the filter paper in step 1?

- iv) What is collected in the conical flask in step 1?

- v) What safety precautions are necessary for carrying out step 2?

- vi) In step 1 what is the residue and what is the filtrate?

- vii) Is filtration a physical or chemical process?

- viii) In the salt and water mixture, salt is dissolved in the water. Which is the solute and which is the solvent?

ix) What technique could be used for step 2, if we wanted to collect the water as well?



Extension questions

Student A and Student B are asked to make a salt solution. Student A is given a teaspoon of salt and half a glass of water, while Student B is given twenty teaspoons of salt and half a glass of water.

- a) What would Student B have to do to dissolve as much of the twenty teaspoons of salt as possible?

- b) Which student would have a more concentrated solution?

- c) In order for student A and student B to have the same concentration of salt, what could they do?

- d) Which student would be able to prepare a saturated solution?



Homework 2

A. States of Matter

1. Draw the particle diagrams for each state of matter

Solid



Liquid



Gas



2. Tick the correct state of matter for each property (you can tick more than one box)

Property	Solid	Liquid	Gas
Evaporates when heated			
The least dense form of matter			
Weakest attraction between particles			
Exert pressure in all directions.			
Particles move freely but stay in contact.			
Has the most kinetic energy			
Cannot be squashed.			
Particles strongly attracted to each other.			

3. Use the table below to answer the questions

Substance	Boiling Point (°C)	Melting Point (°C)
Aluminium	2,519	660.3
Calcium	1,484	842
Carbon Dioxide	-57	-78
Ethanol (Alcohol)	78.4	-114
Helium	-268.9	-272.2
Iodine	184.3	113.7
Mercury	356.7	-38.8
Methanol	64.7	-97.6
Water	100	0

- a. Which substance has the lowest boiling point?

- b. Which substance has the high boiling point?

- c. Name one substance that is a solid at 25°C?

- d. Name one substance that is liquid at 10°C?

- e. Name one substance that is a gas at 550°C?

- f. What is the freezing point of Calcium?



B. Elements, Compounds and Mixtures

1: Read the following information on elements, compounds and mixtures and fill in the blanks.

Elements:

- A pure substance containing only one kind of _____.
- An element _____ be separated into simpler materials (except during nuclear reactions).
- Over 100 existing elements are listed and classified on the _____.

Compounds:

- A pure substance containing two or more kinds of _____.
- The atoms are _____ combined in some way.
- They come together to form groups of atoms called _____.
- Compounds _____ be separated by physical means.
- Separating a compound requires a _____ reaction.
- The properties of a compound are usually _____ than the properties of the elements it contains.

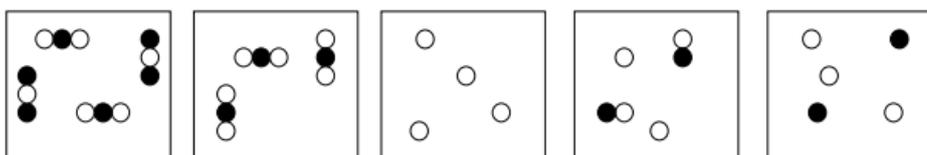
Mixtures:

- Two or more _____ or _____ NOT chemically combined.
- Mixtures can be separated into their components by chemical or _____ means.
- The properties of a mixture are _____ to the properties of its components.

2: Classify each of the following as elements, compounds or mixtures. Tick the appropriate box.

Substance	Element	Compound	Mixture
Sugar ($C_6H_{12}O_6$)			
Iron (Fe)			
Air			
Sulphuric acid (H_2SO_4)			
Krypton (K)			
Concrete			
Salad dressing			

3: Match each diagram with its correct description. Diagrams will be used once.



A

B

C

D

E

- ___ Pure Element – only one type of atom present.
- ___ Mixture of two elements – two types of uncombined atoms present
- ___ Pure compound – only one type of compound present.
- ___ Mixture of two compounds – two types of compounds present.
- ___ Mixture of a compound and an element.

Extension questions

1. What are three limitations of the particle model for representing the three states of matter?

i) _____

ii) _____

iii) _____

2. Use the particle model to explain why gases can be compressed by solids and liquids cannot. You can draw a diagram to help you answer.



Homework 3

A. Chemical Formulae

1. Complete the table. The first row has been done for you

Element	Symbol	Group in periodic table	Charge of Ion	Ionic Symbol	Name of ion
e.g. Potassium	K	1	+1	K ⁺	Potassium ion
Oxygen					
	Mg				
				Cl ⁻	
				S ²⁻	Sulfide ion
Bromide					
	Li				

2. Write the formulae for the following compounds. This first one has been done for you

- a. Sodium Chloride e.g. NaCl
- b. Magnesium Oxide _____
- c. Lithium Bromide _____
- d. Calcium Oxide _____
- e. Potassium Oxide _____

B. Protons, Neutrons and Electrons

Write out the number of protons, neutrons and electrons in the atoms of the following elements. The first one has been done for you

Element	Number of protons	Number of neutrons	Number of electrons
Beryllium	4	5	4
Potassium			
Boron			
Phosphorous			
Fluorine			
Neon			
Oxygen			

C. Separation techniques

Match the separation technique with its correct definition

Chromatography
Distillation
Filtration
Crystallisation

Separates liquids with different boiling points
Separates a liquid and solid by boiling off the liquid
Separates liquids of different colours
Separates a soluble solid from an insoluble one



Extension questions

1. Name the following compounds:

- a. KCl _____
- b. CaF_2 _____
- c. Al_2O_3 _____
- d. HBr _____

2. Which separation technique should be used for the following?

- a. Separating ethanol (boiling point = $^{\circ}\text{C}$) and methanol (boiling point = $^{\circ}\text{C}$) _____
- b. Separating butane (boiling point = $^{\circ}\text{C}$) from heptane (boiling point = $^{\circ}\text{C}$) _____
- c. To find out how many different dyes are used in making black-coloured ink _____
- d. To separate a mixture of sand and salt water _____
- e. To retrieve salt from brine _____

3. Use the table below to answer the questions below

Element	Number of protons	Number of neutrons	Number of electrons
A	6	6	6
B	17	18	17
C	2	2	2
D	17	20	17
E	3	4	3

a. Which element has atomic number 6?

b. Which element has mass number of 4?

c. Which two elements are isotopes?

d. Which element in the periodic is element E?

e. Which element(s) has the largest atomic number?

f. Which element(s) has the largest mass number?



Homework 4

A. Protons, neutrons and electrons in ions

Write out the number of protons, neutrons and electrons in the following ions. The first one has been done for you.

Ion	Number of protons	Number of neutrons	Number of electrons
Oxide, O^{2-}	e.g 8	8	10
Fluoride, F^-			
Calcium ion, Ca^{2+}			
Sodium ion, Na^+			
Sulphide, S^{2-}			
Lithium ion, Li^+			
Potassium, K^+			

B. Relative atomic mass and relative formula mass

1. Calculate the relative atomic mass for the following elements. Show your working by following the same procedure laid out for part *i* below.

i. Nitrogen

$${}^{14}_7N = 99.63\%$$

$${}^{15}_7N = 0.37\%$$

$${}^{14}_7N: \text{number of protons: } 7, \text{ number of neutrons: } 14 - 7 = 7$$

$$\rightarrow \text{total mass} = \text{number protons} + \text{number neutrons} = 7 + 7 = 14$$

$${}^{15}_7N: \text{number of protons: } 7, \text{ number of neutrons: } 15 - 7 = 8$$

$$\rightarrow \text{total mass} = \text{number protons} + \text{number neutrons} = 7 + 8 = 15$$

$$A_r = \frac{\text{total mass of all atoms of an element}}{\text{total number of atoms of that element}}$$

$$= \frac{(99.63 \times 14) + (0.37 \times 15)}{(99.63 + 0.37)}$$

$$= 14.0037$$

$$= 14$$

ii. Boron

$${}^{10}_5B = 19.90\%$$

$${}^{11}_5B = 80.10\%$$

iii. Magnesium

$${}^{24}_{12}Mg = 78.99\%$$

$${}^{25}_{12}Mg = 10.00\%$$

$${}^{26}_{12}Mg = 11.01\%$$

iv. Silicon

$${}^{28}_{14}Si = 92.23\%$$

$${}^{29}_{14}Si = 4.68\%$$

$${}^{30}_{14}Si = 3.09\%$$

2. Calculate the relative formula mass (M_r) of the following. Show your working.

You will need a periodic table to help you with these

i. O_2 e.g. ${}^{16}_8O \rightarrow M_r = 16$ therefore M_r for $O_2 = 2 \times 16 = 32$

ii. CO_2 _____



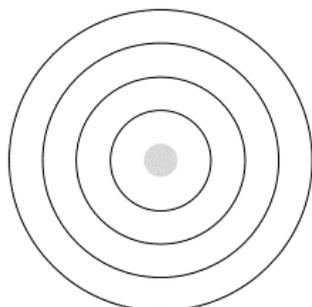
- iii. NH_3 _____
- iv. KOH _____
- v. Al_2O_3 _____
- vi. Fe_2O_3 _____
- vii. CaCO_3 _____

C. Electronic Configuration

For the questions below fill in the number of protons, neutrons, electrons, electronic structure, periodic table group and complete the diagrams. The first one has been done for you.

B ¹¹₅

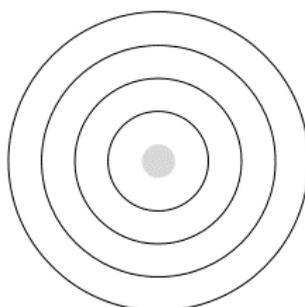
Protons= 5
Neutron= 6
Electrons= 5



Electronic Structure = 2.3
Periodic Table Group = 5

N ¹⁴₇

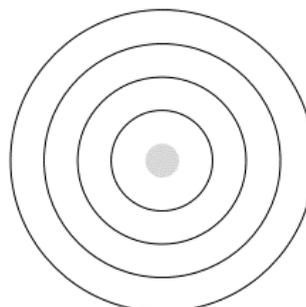
Protons= 7
Neutron= 7
Electrons= 7



Electronic Structure =
Periodic Table Group =

H ¹₁

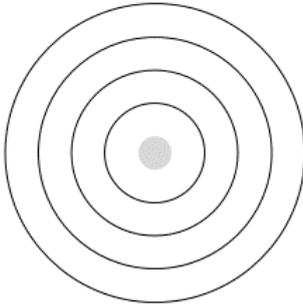
Protons=
Neutron=
Electrons=



Electronic Structure =
Periodic Table Group =



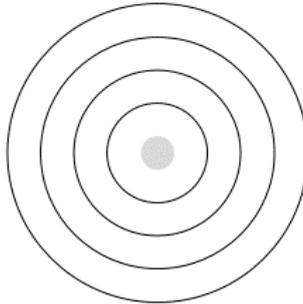
Protons=
Neutron=
Electrons=



Electronic Structure =
Periodic Table Group =



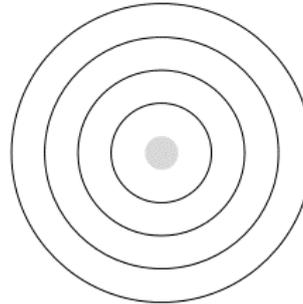
Protons=
Neutron=
Electrons=



Electronic Structure =
Periodic Table Group =



Protons=
Neutron=
Electrons=



Electronic Structure =
Periodic Table Group =

Extension questions

1. Use the table below to answer the following questions

Substance (atom or ion)	Number of protons	Number of neutrons	Number of electrons
A	20	20	20
B	8	8	10
C	20	20	18
D	6	6	6
E	19	20	18
F ⁻	9	10	10
G	6	8	6

a. Which substance(s) are atoms and which are ions?

b. Which substance(s) are positive ions?

c. Which substance(s) are negative ions?

d. What is the electronic configuration of substance C?

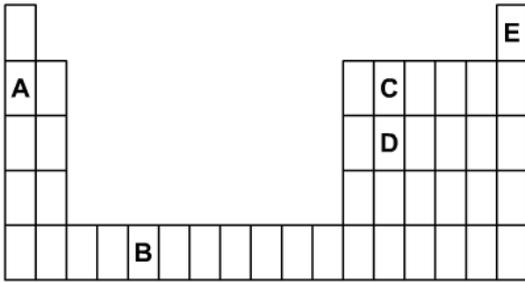
e. Which two substance(s) are the same element but one is the neutral atom and one is its ion?

f. Which two substance(s) are isotopes of the same element?

Homework 5

A. Periodic Table

1.



Which letters shown on the diagram are:

- (i) Two elements in the same group? _____
- (ii) Two elements in the same period? _____
- (iii) Two elements that are metals? _____
- (iv) An unreactive gas? _____

2. What type of elements usually have alkaline oxides?

3. An element is in group 7, what does this tell us about the number of electrons in their outer shell?

4. Why are alkali metals stored under water?

5. Do group 1 elements get more or less reactive as you go down the group?

6. How many electrons do the members of Group 7 have in their outer shell?

7. Which halogens are gases at room temperature?

8. Which halogen is liquid at room temperature?

9. Do group 7 elements get more or less reactive as you go down the group?

10. Do the boiling points get higher or lower as you descend group 7?

11. Do metals form positive or negative ions?

12. Do non-metals form positive or negative ions?

13. What is the name of the attractive force between the positive nucleus and negative electrons?

14. Why do the noble gases exist monatomically (as single atoms)?

B. Gas Tests

Match the gas with the correct test

Chlorine
Carbon dioxide
Oxygen
Hydrogen

Relights a glowing splint
Burns with a squeaky pop
Bleaches damp litmus paper
Turns limewater cloudy



Extension Questions:

1. Name three differences between the properties of alkali metals and transition metals?

2. Name three similarities between the properties of alkali metals and transition metals?

3. Why are the alkali metals more reactive than the transition metals?

