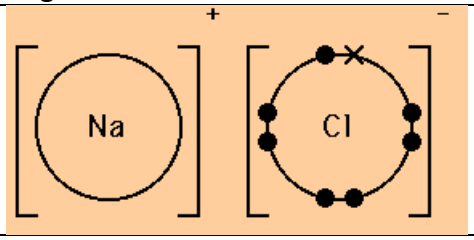
Pearson Edexcel

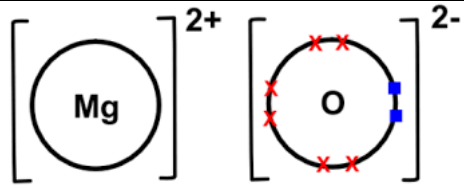
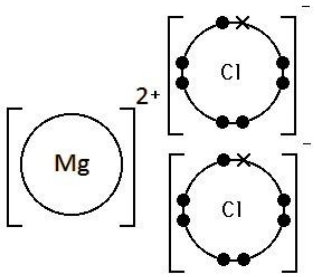
YEAR 10 TRIPLE

Spring Term Knowledge Organiser

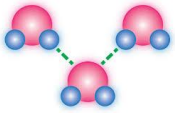
ALDER Community High School

Spring Term

	Ionic bonding, formulae and properties of ionic compounds	
1.	What is an ion?	An atom or group of atoms with a positive or negative charge.
2.	How many outer shell electrons does a group 1 element gain or lose to have a full outer shell?	Loses 1 electron
3.	How many outer shell electrons does a group 6 element gain or lose to have a full outer shell?	Gains 2 electrons
4.	How many outer shell electrons does a group 3 element gain or lose to have a full outer shell?	Loses 3 electrons
5.	How many outer shell electrons does a group 7 element gain or lose to have a full outer shell?	Gain 1 electron
6.	How many outer shell electrons does a group 2 element gain or lose to have a full outer shell?	Loses 2 electrons
7.	What is a cation?	A positively charged ion
8.	Do atoms have to lose or gain electrons to form a positive ion?	Lose electrons (as electron are negatively charged)
9.	Do atoms have to lose or gain electrons to form a negative charge?	Gain electrons (as electrons are negatively charged)
10.	What is an anion?	A negatively charged ion
11.	What is an ionic bond?	A strong **electrostatic force** of attraction between oppositely charged ions
12.	What charge is formed by an ion of a group 3 element?	+3
13.	What charge is formed by an ion of a group 2 element?	+2
14.	What charge is formed by an ion of a group 7 element?	-1
15.	What charge is formed by an ion of a group 1 element?	+1
16.	What charge is formed by an ion of a group 6 element?	-2
17.	What charge is formed by an ion of a group 5 element?	-3
18.	What is a lattice?	A giant 3D repeating pattern
19.	What is an ionic compound?	A compound made of alternating positive and negative ions in a lattice
20.	Draw sodium chloride's dot-and-cross diagram.	

21.	Draw magnesium oxide's dot-and-cross diagram.	
22.	Draw magnesium chloride's dot-and-cross diagram.	
23.	What is the formula of magnesium chloride?	Mg^{+2} Cl^{-1} so it's $MgCl_2$
24.	What is the formula of sodium oxide?	Na^{+1} O^{-2} so it's Na_2O
25.	What is the formula of a hydroxide ion?	OH^{-1}
26.	What is a formula of a sulfate ion?	SO_4^{-2}
27.	What is a formula of a carbonate ion?	CO_3^{-2}
28.	What is a formula of a nitrate ion?	NO_3^{-1}
29.	What is a formula of an ammonium ion?	NH_4^{+1}
30.	What colour flame does Li^+ produce?	red
31.	What colour flame does K^+ produce?	Lilac
32.	What colour flame does Na^+ produce?	Yellow
33.	What colour flame does Cu^{+2} produce?	Green-blue
34.	What colour flame does Ca^{+2} produce?	Orange-red
35.	What is the test for NH_4^{+1} ions (ammonium ions)?	Add sodium hydroxide and heat gently. Fumes of NH_3 will be released. Use damp red litmus paper to test the fumes, it will turn blue.
36.	What is the test for Fe^{+2} ions?	Add sodium hydroxide. A green precipitate of $Fe(OH)_2$ will be produced
37.	What is the test for Fe^{+3} ions?	Add sodium hydroxide. A brown precipitate of $Fe(OH)_3$ will be produced
38.	What is the test for Cu^{+2} ions?	Add sodium hydroxide. A blue precipitate of $Cu(OH)_2$ will be produced
39.	What is the test for Al^{+3} ions?	Add sodium hydroxide. A white precipitate of $Fe(OH)_2$ will be produced
40.	What is the test for Ca^{+2} ions?	Add sodium hydroxide. A white precipitate of $Fe(OH)_2$ will be produced
41.	How do you distinguish between the two ions that produce a white precipitate when reacted with sodium hydroxide?	Add more sodium hydroxide. Al^{+3} – goes colourless, the precipitate dissolves Ca^{+2} – stays a white precipitate
42.	What is the test for CO_3^{-2} ions?	Add hydrochloric acid, and you will see effervescence (gas is formed).

		Bubble gas through limewater and it will turn cloudy (as CO_2 is formed)
43.	What is the test for SO_4^{-2} ions?	Add hydrochloric acid, then add barium chloride. A white precipitate of barium sulfate would be observed.
44.	What is the test for halide ions (F^-, Cl^-, Br^-, I^-)?	Add nitric acid, then add silver nitrate. A precipitate of silver halide would be formed. Cl^- = white precipitate Br^- = cream precipitate I^- = yellow precipitate
45.	Why are flame photometers a better analytical instrument than flame tests?	1. More sensitive 2. More accurate 3. Much faster
	Group 7, group 0 and covalent bonding	
1	What are group 7 elements called?	Halogens
2	What is the colour and state of fluorine at room temperature?	yellow gas
3	What is the colour and state of chlorine at room temperature?	Pale green gas
4	What is the colour and state of bromine at room temperature?	Red-brown liquid
5	What is the colour and state of iodine at room temperature?	Grey solid
6	What happens to the colour and state of the halogens as you go down the group?	The colour gets darker as you go down the group and it becomes more solid at room temperature.
7	How do halogens exist in nature?	They exist as diatomic molecules (2 atoms bonded together) e.g: F_2, Cl_2, Br_2, I_2
8	What is the test for chlorine gas?	Damp blue litmus paper turnss red then bleaches white
9	What bonds are present between fluorine atoms to form a molecule?	Covalent bonds
10	What is the trend in reactivity for group 7 elements?	They are less reactive as you go down the group (F = most reactive, At = least reactive)
11	How many electrons do halogens have in their outer shell?	7
12	Why is fluorine the most reactive halogen?	The outer shell electrons are closer to the nucleus. This means there is a stronger force of attraction between outer electrons and nucleus, so can gain an extra electron easier to form a full shell.
13	Why is astatine the least reactive halogen?	The outer shell in electron is further away from the nucleus. This means there is a weaker force of attraction between outer electrons and nucleus, so will gain an electron more slowly to form a full shell.
14	What kind of elements have covalent bonds between them?	Non-metal elements only
15	What is the definition of a covalent bond?	A shared pair of electrons

16	Why do simple covalent molecules have a low melting and boiling point?	They have weak intermolecular forces between molecules, so little energy is needed to break these weak forces.
17	What are the forces between molecules called? 	Weak intermolecular forces
18	Why are simple molecules poor conductors of electricity?	All atoms have a full outer shell so electrons cannot move freely to carry the current.
19	What does redox stand for?	Reduction and oxidation
20	What does oxidation mean?	**O**xidation **I**s **L**oss of electrons
21	What does reduction mean?	**R**eduction **I**s **G**ain of electrons
22	What happens in the displacement reaction?	When a more reactive halogen takes the place of a less reactive halide.
23	What is a halide?	It is a group 7 element with a negative charge (F^{-1}, Cl^{-1}, Br^{-1}, I^{-1})
24	What happens if chlorine water is placed with potassium bromide solution?	Chlorine displaces bromide to form potassium chloride and bromine. This happens as chlorine is more reactive than bromine.
25	What are group 0 elements called?	Noble gases
26	Why are group 0 elements inert (unreactive)?	They all have a full outer shell so they do not lose or gain electrons.

	Calculations involving masses	
1	How do you calculate relative formula mass?	By adding all the relative atomic masses together of all the atoms of different elements in a molecule
2	Calculate the relative formula mass of CO_2? (Ar: C = 12, O = 16)	CO_2 12 + 16 + 16 = 44
3	What does empirical formula mean?	Empirical formula is the simplest whole number ratio of atoms in a compound
4	What is the empirical formula of C_2H_6?	C_2H_6 can be simplified to CH_2
5	What is the equation for calculating concentration?	Concentration = $\frac{\text{mass}}{\text{volume}}$
6	What is the unit for volume?	dm^3
7	How do you convert cm^3 to dm^3?	Divide by 1000
8	What is the unit for concentration?	gdm^{-3}
9	State the law of conservation of mass	No atoms are lost or made during a chemical reaction Mass of reactants = mass of products
10	How do we show that mass is conserved in chemical reactions?	Balancing symbol equations
11	State one example of when a reaction may APPEAR to lose mass.	When a gas is produced and escapes eg. Thermal decomposition of metal carbonate, producing carbon dioxide

12	State one example of when a reaction may APPEAR to gain mass.	When a gas reacts with a solid adding onto it eg. Oxygen reacting with magnesium to form magnesium oxide
13	State the equation for calculating percentage composition.	% composition = (mass of element/total mass of compound) x 100
14	What is the percentage by mass of hydrogen, in H_2O? Answer to two significant figures. H = 1 H_2O = 18	% composition = ((2 x 1) / 18) x 100 = 11%
15	State the equation for calculating percentage composition.	% composition = (mass of element/total mass of compound) x 100
	Amount of substances (HT)	
17	What are chemical amounts measured in? What is the unit?	Moles Unit = mol
18	One mole of any substance contains how many particles?	6.02×10^{23}
19	What is the name for this number? 6.02×10^{23}	Avogadro's constant
20	Which has more particles – one mole of carbon atoms or one mole of magnesium ions?	They both have the same number (6.02×10^{23})
21	State the equation to calculate number of particles in a given substance	Number of particles = mol x Avogadro
22	One mole of any substance is equal to...	its relative formula mass (M_r) in grams
23	State the equation to calculate moles from mass and M_r	moles = mass / M_r
24	$Mg + 2HCl \rightarrow MgCl_2 + H_2$ How many moles of magnesium react with 20 moles of hydrochloric acid?	10 moles
25	$4Al + 3O_2 \rightarrow 2Al_2O_3$ How many moles of aluminium would form 4 moles of aluminium oxide?	8 moles
26	What is the term for a reactant that gets completely used up in a reaction?	Limiting reactant
27	Why is one reactant often added in excess?	To make sure all the other reactant is used up