National 5 Chemistry

Pupil Progress Checks

Name:

National 5 Unit 1a – Rates of Reaction- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✖☹
1	I can define the rate of reaction as how quickly the reactant is used up or a product is formed.			
2	I can carry out an experiment to measure changes in volume or mass.			
3	I can calculate average rates of reaction.			
4	I can plot graphs to represent the progress of a chemical reaction.			
5	I can interpret graphs to state the rate of a chemical reaction at a given time or calculate the rate of reaction.			
6	Define the average rate of reaction as the total product formed over the total time.			
7	State the effects of changing the concentration of reactants(s), particle size (surface area) or temperature on the rate of reaction.			
8	I can state that a catalyst alters the rate of a chemical reaction without being used up.			

National 5 Unit 1b – Atomic Structure- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that atoms are made up of sub-atomic particles called protons, electrons and neutrons			
2	I can identify an element by its atomic number.			
3	I can use the atomic number to deduce the number of protons and electrons of an atom			
4	I can state that the mass number is the number of protons + neutrons in an atom.			
5	I can use the atomic number and mass number to work out the number of neutrons.			
6	I can interpret nuclide notation to determine the numbers of protons, neutrons and electrons in an atom.			
7	I can draw diagrams to show the structure of the first 20 elements.			
8	I can write the electron arrangements for the first 20 elements			
9	I can state the charges and masses of protons, electrons and neutrons			
10	I can explain why atoms are neutral.			
11	I can state that isotopes are atoms with the same atomic number but different mass numbers. (number of neutrons)			
12	I can define the relative atomic mass as the average mass of all the naturally occurring isotopes of an element.			
13	I can calculate the relative atomic mass given appropriate data.			
14	Given the relative atomic mass of an element I can determine the most common isotope.			

National 5 Unit 1bii – Bonding and Structure- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that ions are charged particles.			
2	I can state that ions are formed when metal atoms lose electrons to become stable or non-metal atoms gain electrons to become stable.			
3	I can describe an ionic bond as the electrostatic attraction between oppositely charged ions.			
4	I can use the electronic structure of an atom to work out the charge on the ion.			
5	I can describe the lattice structure of ionic compounds			
6	I can work out the chemical formula of an ionic compound including those which contain group ions.			
7	I know that ionic bonds are strong.			
8	I can state that electrolysis is the decomposition of a molten/aqueous ionic compound using electricity.			
9	I can use electrolysis to decompose an ionic compound and identify the products.			
10	I can state that covalent bonds occur between two or more non-metal atoms			
11	I can explain how covalent bonds arise by the sharing of electrons by atoms to gain full outer shells.			
12	I can explain how atoms are held together by covalent bonds			
13	I can explain the difference between single, double and triple covalent bonds.			
14	I can draw dot and cross diagrams to represent covalent bonds			
15	I can state that a small groups of atoms joined with covalent bonds is called a molecule.			

16	I can define diatomic molecules as those made up of 2 atoms.			
17	I can explain why hydrogen, nitrogen, oxygen, fluorine, chlorine, bromine and iodine are diatomic.			
18	I know that covalent bonds are strong.			
19	I can state and explain why covalent substances can be solid, liquids or gases at room temperature.			
20	I can draw diagrams to represent the shapes of covalent molecules) linear, bent, pyramidal and tetrahedral).			
21	I can name covalent molecular compounds from formulae using prefixes and deduce formulae from names			
22	I can state that most covalent molecular substances are insoluble in water but do dissolve in some other solvents			
23	I can state that covalent molecular substances do not conduct electricity in every state.			
24	I can state that a covalent network is a giant lattice of covalently-bonded atoms and state some examples.			
25	I can state that covalent network substances do not conduct electricity (except for graphite)			
26	I can state that covalent network substances are insoluble in water.			
27	I can state that covalent networks are very strong and have high melting points			

National 5 Unit 1c – Formulae and Reaction Quantities- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✗☹
1	I can write formula equations to represent chemical reactions			
2	I can balance formula equations			
3	I can state that the gram formula mass is the mass of 1 mole of a substance.			
	I can state that the mole is a very large number that allows atomic mass units to be converted to grams			
4	I can calculate the gram formula mass (GFM) of any compound using the relative formula masses of the constituent elements.			
5	I can calculate the number of moles (n) of a substance using the relationship n = m/GFM			
6	I can define the concentration of a solution as the number of moles of solute dissolved in 1 litre of solvent. (units = mol l^{-1})			
7	I can calculate the concentration of a solution given its volume and the number of moles of solute present			
8	I can calculate the concentration of a solution from the mass of a solute and volume of a solution.			
9	I can calculate the mass of solute present given the concentration and volume of the solution.			
10	I can calculate the volume of a solution given its concentration and mass of solute present.			
11	I can use concentration calculations to prepare standard solutions.			

National 5 Unit 1d – Acids and Bases- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	*I can state the names and chemical formulae of common laboratory acids and alkalis*			
2	*I know that acids have a pH less than 7, alkalis have a pH greater than 7 and neutral substances have a pH of exactly 7.*			
3	*I can describe properties of acids and bases.*			
4	I can describe the difference between a base and an alkali.			
5	I can state examples of bases			
6	I can state that acids dissociate in water to release hydrogen ions.			
7	I can write equations to represent the dissociation of acid molecules in water			
8	I can state that alkalis dissociate in water to release hydroxide ions.			
	I can write equations to represent the dissociation of alkali molecules in water.			
9	I can determine the pH of a solution using universal indicator or pH paper			
10	I can define pH as the measure of concentration of H^+ ions in a solution.			
11	I can state that acidic solutions have a greater concentration of hydrogen ions than hydroxide ions.			
12	I can state that alkaline solutions have a greater concentration of hydroxide ions than hydrogen ions.			
13	I can state that in a neutral solution the concentrations of hydrogen ions and hydroxide ions are equal.			
14	I can write an equation to show the dissociation of water and can use this to explain why water is neutral.			

15	I can state that soluble metal oxides produce alkaline metal hydroxide solutions when added to water because they increase the concentration of hydroxide ions			
16	I can state that soluble non-metal oxides produce acidic solutions when added to water because they increase the concentration of hydrogen ions			
17	I can describe the effect dilution has on an acid or alkali and relate this to the concentration of hydrogen/hydroxide ions in each			
18	*I can state that in a neutralisation reaction between and acid and an alkali a neutral salt and water are produced.*			
19	*I can state that in a neutralisation reaction between and acid and a metal, a neutral salt and hydrogen are produced.*			
20	*I can state that in a neutralisation reaction between and acid and a metal oxide, a neutral salt and water are produced.*			
21	*I can state that in a neutralisation reaction between and acid and a metal carbonate a neutral salt, carbon dioxide and water are produced.*			
22	I can name the salt formed in any neutralisation reaction.			
23	I can represent any of the neutralisation reactions using word or formulae equations.			
24	I can write balanced ion equations for each type of neutralisation reaction and identify the spectator ions.			
25	I can carry out experiments to isolate the salts produced in neutralisation reactions.			
26	I can carry out a titration of an acid and an alkali to obtain two constant titres.			
27	I can use volumetric titration to determine the concentration or volume of an unknown acid or alkali.			

National 5 Unit 2a – Homologous Series- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state the general formula of alkanes, alkenes and cycloalkanes			
2	I can name and draw the full and shortened structural formula for the first 8 straight chain alkanes			
3	I can interpret and explain the changes in mps and bps with increasing chain length of alkanes.			
4	I can construct balanced word and formula equations for the complete combustion of hydrocarbons			
5	I can state that insufficient oxygen leads to the formation of CO and C.			
6	I can state examples of where combustion of alkanes is useful in society.			
7	I can state that an isomer is a substance with the same molecular formula but a different structural formula.			
8	I can draw different isomers given a molecular formula			
9	I can name branch chain isomers of alkanes			
10	I can name and draw the full and shortened structural formula for the first 8 cycloalkanes			
11	I can state uses of cycloalkanes as solvents and raw manufacture of other chemicals.			
12	I can state that saturated hydrocarbons contain single bonds only.			
13	I can name and draw the full and shortened structural formula for the first 8 straight chain alkenes			
14	I can state that cycloalkanes and the corresponding alkenes are isomers.			

15	I can name different alkene isomers to show the position of branches and the double bond			
16	I can state that hydrocarbons with 1 or more C=C are known as unsaturated			
17	I can test a hydrocarbon for the presence of a C=C with bromine water			
18	I can explain why the addition of bromine water is a test for unsaturation			
19	I can write equations to represent the addition reactions of alkenes with hydrogen (hydrogenation), bromine (bromination) and water (hydrolysis).			
20	I can state that addition of thousands of alkene molecules (monomers) to make a long chain molecule(polymer) is known as addition polymerisation			
21	I can describe how hydrogenation is used in the manufacture of margarine			
22	I can describe how hydrolysis is industrially used to form ethanol			
23	I can state that a homologous series is a group of compounds with a shared general formula, gradually changing physical properties and similar chemical properties.			

National 5 Unit 2b – Everyday Consumer Products- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can name and draw the first 8 straight chain members of the alcohol homologous series			
2	I can name branched chain isomers from full structural formulae and vice verca			
3	I can state the general formula for alcohols			
4	I can identify –OH as the functional groups of alcohols.			
5	I can describe and explain the trend in boiling points of alcohols with increasing chain length			
6	I can construct balanced formula equations for the combustion of alcohols.			
7	I can state examples of alcohols used as fuels and solvents			
8	I can explain why alcohols are used as fuels and solvents			
9	I can represent the formation of ethanol by fermentation as a balanced formula equation			
10	I can compare advantages and disadvantages of fermentation and catalytic hydration of ethene as methods of producing ethanol			
11	I can state that alcohols react with carboxylic acids to form esters			
12	I can identify the –COOH group as the functional group of carboxylic acids			
13	I can draw and name the first 8 straight chain carboxylic acids			
14	I can draw and name branch chain carboxylic acid isomers			
15	I can state that carboxylic acids are weak acids and represent their dissociation as ion equations.			
16	I can state examples of naturally occurring carboxylic acids			
17	I can describe and explain the trend in melting and boiling points of carboxylic acids			

	with increasing chain length.			
18	I can describe uses of carboxylic acids in food preservation and cleaning products			
19	I can state that the reaction of carboxylic acids with alcohols is a condensation reaction.			
20	I can name esters given the alcohol and carboxylic acid they form from			
21	I can write word and formula equations for the formation of esters			
22	I can identify the ester link			
23	I can carry out experiments safely to form esters			
24	I can describe the uses of esters as solvent of covalent compounds, as smells in perfumes and flavourings.			

National 5 Unit 2c – Energy From Fuels - Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state fuels burn in oxygen to release energy			
2	I can state that reactions that release energy are called exothermic			
3	I can draw an energy diagram for an exothermic reaction			
4	I can interpret energy diagrams to deduce the energy change in an exothermic reaction			
5	I can state that chemical reactions that take in energy are called endothermic			
6	I can draw and interpret energy diagrams for endothermic reactions			
7	I can carry out an experiment to compare the amount of energy/gram released by 2 different alcohols.			
8	I can state and use the relationship E = mcdeltaT			
9	I can evaluate the comparison of alcohols experiment and suggest improvement.			
10				

National 5 Unit 3ai– Metals- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that the bonding between metal atoms is known as metallic bonding.			
2	I can state that a metallic bonds are the electrostatic attractions of positive metal ions for delocalised electrons.			
3	I can describe the formation of metallic bonds			
4	I can describe and explain properties of metals including their melting points, conductivity of heat and electricity			
5	I can state that metals vary in reactivity and their order is shown in the reactivity series			
6	I can describe how the reactivity series is established by reactions of metals with water, oxygen and dilute acids			
7	I can explain the anomalous behaviour of Al			
8	I can write balanced formula equations for the reactions of metals with H_2O, O_2 and dilute acids			
9	I can define a chemical reaction where an element combined with oxygen as an oxidation reaction			
10	I can state that most metals are found combined with oxygen or other elements in the earth's crust			
11	I can define a mineral as a solid element or compound found naturally occurring in the earth's crust			
12	I can state that an ore is a rock that contains high enough quantities of a mineral for it			

	to be economically viable to extract the metal			
13	I can state that a chemical reaction that involves the removal of oxygen from a compound is called reduction			
14	I can state that the extraction of metals from metal oxides are reduction reactions			
15	I can represent the reduction of haematite (iron ore) and bauxite (aluminium ore) as balanced formula equations			
16	I can write balanced ion equations for the reduction of metal oxides			
17	I can state OIL RIG as alternative definitions of oxidation and reduction in relation to the movement of electrons.			
18	I can state that reduction and oxidation occur simultaneously and are together known as redox reactions			
19	I can relate the method of extraction of a metal to its position in the reactivity series			
20	I can carry out % composition calculations to determine the % of metal present in a compound			
21	I can define a displacement reaction as the reaction of a less reactive metal form its compound by a more reactive metal			
22	I can write displacement reactions as balanced ion equations			
23	I can identify the species being oxidised and reduced during displacement reactions			
24	I can identify spectator ions in displacement reactions			

National 5 Unit 3aii – Electrochemical Series- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that when 2 different metals are connected via an electrolyte an electrochemical cell is made			
2	I can state that electrons are transferred in an electrochemical cell from the more reactive metal to the less reactive metal			
3	I can carry out an experiment to generate an electrochemical series			
4	I can state that the further apart the metals are in the electrochemical series, the greater the voltage generated			
5	I can use the electrochemical series to predict the direction of electron flow			
6	I can combine reduction ion equations to generate overall redox equations for electrochemical cell reactions involving 2 metals			
7	I can state that a cell is a portable devise that converts chemical energy into electrical energy			
8	I can state that the electrodes in a cell may be made of a metal or carbon			
9	I can explain why carbon is a suitable material for electrodes			
10	I can combine reduction ion equations to generate overall redox equations for electrochemical cell reactions involving non-metals			
11	I can define a battery as 2 or more chemical cells joined together			
12	I can explain why lithium ion and zinc-carbon cells produce a finite amount of energy			
13	I can state that rechargeable cells involve reversible redox reactions			
14	I can state examples of reversible cells e.g. lead/acid and zinc/silver			

15	I can compare properties of different rechargeable cells such as weight, charging time, duration of use, voltage output, cost etc			
16	I can carry out an experiment to charge a lead/acid battery and use it to light a bulb			
17	I can state that rechargeable batteries have a finite life span			
18	I can describe how a hydrogen fuel cell converts oxygen and hydrogen into water and electrical energy			
19	I can state advantages and disadvantages of hydrogen fuel cells			

National 5 Unit 3bi – Properties of Plastic - Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that monomers are small unsaturated molecules			
2	I can state that a polymer is a long chain molecule formed by the joining of thousands of monomers			
3	I can classify polymers as thermoplastics (can be reshaped when heated) or thermosets (cannot be reshaped when heated)			
4	I can state examples of thermoplastics and thermosets			
5	I can state advantages and disadvantages of using thermoplastics over thermosets			
6	I can write word and formula equations to represent the addition polymerisation of alkenes.			
7	Given the monomer I can name the polymer and vice verca			
8	I can identify the repeat unit of an addition polymer			
9	I can state that rubber is the only naturally occurring addition polymer			
10	I can state properties and uses of polymers			
11	I can describe and explain disadvantages associated with polymer use			
12	I can state that condensation polymerisation is the polymerisation of monomers with the release of small molecules such water			
13	I can state that the reaction of dicarboxylic acids with diol is an example of a condensation polymerisation reaction to form polyesters			
14	I can write word and formula equations to represent condensation polymerisation reactions			

15	I can identify the ester link in polyesters			
16	I can identify the repeat unit of a polyester			
17	Given the structure of a polyester I can deduce the structure of the monomers			
18	I can state that PET is an everyday example of a condensation polymer and describe its uses			
19	I can state examples of naturally occurring condensation polymers such as silk, proteins and cellulose			
20	Given the structure of a polymer I can deduce whether it was formed by addition or condensation polymerisation.			

National 5 Unit 3bii – Novel Materials- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can define a novel material as a newly discovered substance that does not resemble any previously known or used materials			
2	I can state that smart materials are those which change in response to their environment			
3	I can state that hydrogels are smart polymers that absorb water depending on the concentration of the ions in the surrounding solutions.			
4	I can describe some everyday applications of hydrogels			
5	I can state that thermochromic pigments change colour in response to temperature changes in their surroundings			
6	I can describe some everyday applications of thermochromic pigments			
7	I can state that polyethyne is a smart polymer that conducts electricity			
8	I can state an everyday use of polyethyne			
9	I can state that some smart alloys change shape at a critical temperature			
10	I can state that nitinol is an example of a smart alloy			
11	I can describe some everyday uses of nitinol			

National 5 Unit 3c – Fertilisers- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that N,P and K are essential elements for plant growth.			
2	I can explain the increase in demand for synthetic (inorganic) fertiliers			
3	I can explain why synthetic fertilisers need to be soluble			
4	I can explain why plants cannot use nitrogen directly from the air			
5	I can write a balanced formula equation for the formation of NH_3 from N_2 and H_2			
6	I can describe the industrial production of ammonia in the Haber process			
7	I can explain why the direct combination of N_2 and H_2 is difficult			
8	I can state the conditions needed in the Haber process to optimise production of NH_3			
9	I can explain the conditions used in the Haber process			
10	I can describe, using balanced formula equations how NH_3 is converted into HNO_3 in the Ostwald Process			
11	I can state uses of ammonia and nitric acid			
12	I can state that many fertiliers are made through neutralising ammonia solution with dilute acids			
13	I can write a formula equation to show the reversible dissociation of ammonium hydroxide (ammonia solution) into its ions			
14	I can write balanced formula equations for the reactions between ammonia solution and dilute acids			
15	I can write balanced formula equations for the formation of particular fertilisers to include the essential elements N, P and K.			

16	I can calculate the % N present in a fertiliser			
17	I can describe the impact of the overuse of synthetic fertilisers on the environment			

National 5 Unit 3d –Nuclear Chemistry- Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can state that if the nucleus of an atom is unstable it can emit radiation			
2	I can compare the 3 types of radiation, alpha, beta and gamma in terms of mass, charge and penetrating power			
3	I can construct nuclear equations to represent radioactive decay			
4	I can define the half-life of a particular isotope as the time it takes for the mass of a particular isotope to decrease by half			
5	I can interpret decay curves to deduce the half-life of a radioisotope			
6	I can describe some uses of radioisotopes in medicine, agriculture and archaeology			
7	I can explain how to use carbon dating to calculate the age of a sample			

National 5 Unit 3e – Chemical Analysis - Pupil Progress Check

	Learning Outcomes	✓☺	?😐	✘☹
1	I can carry out a range of analytical practical techniques safely and accurately e.g. titration, flame tests and precipitation.			
2	I can collect and accurately record analytical data			
3	I can identify the presence of metal ions using flame tests and precipitation reactions with $NaOH_{(aq)}$			
4	I can identify the presence of Cl-, Br^- and I^- ions by analysing observations of reactions with $AgNO_{3(aq)}$			
5	I can identify the presence of SO_4^{2-} ions by reaction with $BaCl_{2(aq)}$			
6	I can identify the presence of CO_3^{2-} ions by reaction with $HCl_{(aq)}$			
7	I can identify the presence of NO_3^- ions by reaction with $NaOH_{(aq)}$ and Al powder			
8	I can describe how analytical techniques are used to monitor pollution levels in water			
9	I can state sources of water pollution and their possible consequences			
10	I can analyse experimental data to identify unknown compounds			