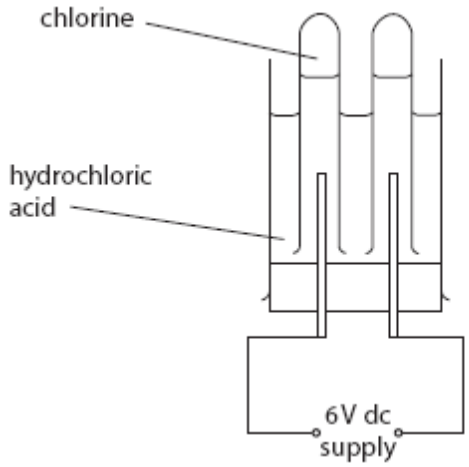
3.1 3.2	a) Name the acid produced in the stomach (1) b) Give two reasons why there is acid in our stomachs (2) • Describe what indigestion is and explain how it can be treated (3)	a) **Hydrochloric acid** (1) b) Kill bacteria (1) & help digestion (1) • Too much acid in the stomach (1), take alkaline indigestion medicine (1) to neutralise acid (1)	
3.3	Plan an experiment to find the best indigestion remedy. a) List the equipment needed (2) b) Identify the independent variable (1) c) Identify the dependent variable (1) d) Identify some control variables (2)	a) Conical flask, burette, measuring cylinder, acid, universal indicator – or pH meter, balance- see picture 3.3 (2) b) Type of indigestion remedy c) pH d) Same volume of acid, same mass of remedy, same temperature, same conc. Of acid	
3.4	a) Name 3 types of metal compounds that can neutralise acids (3) b) Name the salts made in the reactions below (3) c) Name the other products made in the reactions below (3) i) Sodium oxide + nitric acid → ii) Copper hydroxide + sulfuric acid → iii) Zinc carbonate + hydrochloric acid →	a) Metal oxides (1) Metal hydroxides (1) Metal carbonates (1) bi) sodium nitrate (1) bii) copper sulfate (1) biii) zinc chloride (1)	 ci) + water cii) + water ciii) + water + carbon dioxide
3.5	In a neutralisation reaction what will the salt end in if: a) Hydrochloric acid is used? (1) b) Nitric acid is used? (1) c) Sulfuric acid is used? (1)	a) Chloride b) Nitrate c) sulfate	
3.6	a) What is electrolysis? (1) b) Name the products made when electrolysis is carried on hydrochloric acid (2)	a) A process that uses electricity to **decompose** (break down) a **compound** (1) (it must be **direct current** electricity) b) **hydrogen** gas (1)& **chlorine** gas (1)	

3.7	Plan an investigation into the electrolysis of dilute hydrochloric acid. a) Name equipment used (2) b) Describe how to set up equipment – a labelled diagram could be used. (2) c) Describe what measurement could be taken (1)	a) Power pack, leads, crocodile clips, beaker, carbon rods (**electrodes**), acid, gas collection tubes. b) Connect DC power supply to 2 carbon rods, put rods in a beaker of **hydrochloric acid**, as shown below.  c) Measure volume of gas given off (1)
3.8 3.9 3.10	• Describe the test for hydrogen gas (1) • Describe the test for chlorine gas (1) • Name a product from the electrolysis of sea water (1)	• Lit splint makes a squeaky pop (1) • **Blue litmus paper** goes red then white (1) • **Chlorine** gas (1)
3.11 3.12	a) Name the hazard associated with chlorine gas (1) b) Describe how to reduce hazards associated with large scale production of chlorine gas. (1) • I can name two uses of chlorine gas (2)	a) **Toxic** (can kill you) (1) b) Ensure the gas does not escape, sealed container (1) • Bleach (1), polyvinyl chloride (a type of plastic) (1)
3.13 3.14	• Name the products formed when electrolysis is carried out on water (2) • Describe the test for oxygen gas (1)	• **Hydrogen** gas (1), **oxygen** gas (1) • Glowing splint is relit (1)

4.1	a) What name is given to rocks that metals can be extracted from (1) b) Explain why some metals are found as pure elements (1) c) Name a metal that is found as the pure element	a) **Ores** (1) b) Some **metals** are so **unreactive** they do not form **compounds** (1) c) Gold (1)
4.2 4.3	• Name two methods used to extract metals from their ores and give examples of metals extracted by each method (4) a) Explain how the method used to extract a metal is related to its position in the reactivity series b) Explain why electrolysis is more expensive than reduction with carbon(2)	• **Reduction** with **carbon** (1), example **iron** (1) and **electrolysis** (1), example **aluminium** (1) a) Metals below carbon in the **reactivity series** are **extracted** by **reduction with carbon** (1), metals above carbon are extracted using **electrolysis** b) **Fuel** burnt to produce heat to melt the **ore** (1) AND uses **electricity** to power **the electrolysis**
4.4	Describe how to carry out an investigation into methods for extracting metals from its ore a) Name equipment needed (2) b) Describe how to set up the experiment (2) c) What would you record and what would this tell you about the reactivity of the metal?(2)	a) Bunsen burner, tripod, gauze, crucible, metal oxide, carbon powder b) Measure set mass of metal oxide and carbon powder into the crucible. Put crucible on tripod over Bunsen burner and heat. c) Has a reaction taken place producing a metal? If yes the metal is less reactive than carbon.
4.5 4.6 4.7	• Define the terms oxidation and reduction (2) • I can name the general type of reaction that produces metals from metal ores (1) • Name a problem caused when metals are oxidised (1)	• **Oxidation** is gaining oxygen (1), *(eg carbon is oxidised to carbon dioxide)* **Reduction** is the loss of oxygen (1) *(eg Iron oxide is reduced to iron)* • **Reduction** (1) • **Corrosion** (1)

4.8 4.9	• Describe how a metals reactivity is linked to its position in the reactivity series. (1) • Describe the advantages of recycling metals (4)	• The lower in the **reactivity series** a metal is the less likely it is to **corrode**.(1) *(eg gold is unreactive and does not corrode)* • Saves **raw materials** & helps to preserve **metal ores** (1), less energy used to **recycle** (1), less waste goes to **land fill** (1), less **carbon dioxide** produced as less **fuel** burnt to release energy (1)
4.10	Name a use for each metal below and link this to a property of the metal: a) Aluminium (1) b) Copper (1) c) Gold (1) d) Steel (1)	a) Drink cans- **unreactive**/ Aeroplanes- **low density** (1 b) Wires- good conductor of electricity Pipes- unreactive (1) c) Jewellery- unreactive (1) d) Cars- strong (1)
4.11 4.12	a) What is the definition for an alloy? b) Describe two properties that make alloys more useful than pure metals • Use a model to explain why alloys are harder than pure metals	a) **Mixture** of metals (1) b) Stronger (1) better resistance to corrosion(1) • Different sized atoms from different elements (1), distort the regular layered structure (1), so its' harder for layers of atoms to slide past each other (1)
4.13	**a) Describe how alloying changes the properties of gold and explain why this is useful (2)** **b) Describe special properties of shape memory alloys** • **Give an example of uses of smart or shape memory alloys like nitinol and explain how their properties link to the use.**	a) Gold alloy is stronger than pure gold (1),jewellery keeps it's shape better (1) b) They change shape when heated or cooled past a threshold temperature (1) • Braces for teeth (1) heat of mouth changes metal shape to pull teeth into position (1)/ Stent- tube for keep a blood vessel open (1)- heat of body makes tube keep it's shape (1)/ glasses frames (1)- return to original shape when heated slightly