	C1 Atoms, elements and compounds	
1.	Transition metals	elements found in middle of periodic table
2.	Transition metal properties (compared to alkali metals)	- have ions with different charges - form coloured compounds - useful as catalysts
3.	Compared to Group 1, transition metals have…	-higher melting points -higher densities -greater strength -greater hardness
4.	Reactions with oxygen or water	slow or not at all

	C2 Nanoparticles	
5.	Nanoparticles	particles 1-100nm
6.	Advantages of nanoparticles	Smaller quantities are needed to be effective
7.	Fine particles	diameters between 100 and 2500 nm
8.	Coarse particles	diameters between 1 x 10^{-5}m and 2.5 x 10^{-6}m
9.	Surface area to volume ratio	as the side of cube decreases by a factor of 10 the surface area to volume ratio increases by a factor of 10
10	Nanoparticles uses	- medicine - electronics - cosmetics - sun creams - deodorants - catalysts

	C3 Yield and atom economy	
11.	Yield	the amount of product obtained
12.	Percentage yield	% Yield = (mass of product made / theoretical mass) x 100
13.	some mixture may be lost when ….	• reaction may not go to completion • in production eg. When separating • may react with contaminates
	C3 Atom economy	
14.	Atom economy	the amount of starting materials that end up as useful products.
15.	Percentage atom economy	= (Mr of desired product/ Mr of all reactants) x 100

	C3 Volumes of gases	
16.	Molar Volume	the volume of one mole of any gas at room temperature and pressure (20 °C and 1 atmosphere pressure) is 24 dm^3
17.	Calculating volume of gas	volume = amount in mol × 24

	C4 Titrations	
18.	Titration	method used to find the volume of acid and alkali that react together
19.	Burette	used to add varying but measured volumes of solution during a titration.
	C4 RP. Determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration	
20.	Method	a) use the pipette to add a measured volume of alkali to a conical flask b) add indicator c) fill the burette with acid, note the starting volume d) add the acid to the alkali, swirling to mix e) stop adding the acid when the indicator first permanently changes colour f) note the final volume reading g) determine the concentration of the unknown solution

	C5 Chemical cells	
21	Cells	contain chemicals which react to produce current
22	Making cells	connect two different metals in contact with an electrolyte
23	Batteries	two or more cells, connected in series
24	Non-rechargeable cells	-the chemical reactions stop when one of the reactants has been used up -alkaline batteries are non-rechargeable
25	Rechargeable cells	chemical reactions are reversed when an external electrical currents supplied

	C5 Fuel cells	
26	Fuel cells	supplied by an external source of fuel and oxygen or air. fuel is oxidised electrochemically within the fuel cell to produce a potential difference
27	Hydrogen fuel cell	hydrogen and oxygen are used to produce a potential difference
28	Hydrogen fuel cell equation	hydrogen + oxygen → water $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
29	Hydrogen fuel cell half equation	cathode: $2H_2 + 4OH^- \rightarrow 4H_2O + 4e^-$ anode: $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$
	C5 Evaluating types of cells	

	Type of cell	Pros	Cons
30	Alkaline cell	Cheaper to manufacture	May end up in landfill Expensive to recycle
31	Rechargeable cell	Rechargeable	Costs more to manufacture
32	Hydrogen fuel cell	Easy to maintain Small water is the only product	Very expensive to manufacture need a supply of hydrogen is flammable