Indicators

Thymolphtalein: deep blue (bases) to colourless (neutral) [Bases are Blue]

Methyl Orange : yellow (bases) to orange (neutral)/red (acidic) ROY

Screened methyl orange : green (bases) to grey (neutral)/purple (acidic) [Purple is Poision]

Universal Indicator: blue/purple (bases) to green (neutral) / red (acidic)

Metals

Metal A is more reactive than Metal B. Hence Metal A is able to displace Metal B from its [aqueous salt] to form Metal B and Metal A salt

Remember to be specific about colour. Take note of the colours of the reagents and the products respectively and identify colour change if necessary

Remember to identify if the reaction is exothermic or endothermic (if needed)

Remember to mention changes observed in Metal A as well as the changes observed in the Metal B salt solution.

Use nitric acid when possible

Qualitative Analysis

Cation Test: Use NaOH and NH4OH, Observations to be taken note of is the colour of ppt after 2/3 drops of reagent as well as the solubility of that ppt in excess reagent (Amphoteric hydroxides are soluble in ex NaOH/ Zn and Cu precipitates are soluble in NH4Cl/ Ca forms no precipitate in NH4Cl/ NH4+ ion test in NaOH, need to test for NH3 gas upon heating

Anion Test: Carbonate ion tested through presence of carbon dioxide/ Sulfate with barium nitrate/Chloride and iodide with silver nitrate/Nitrate with NaOH, aluminum foil and heating

Use of HNO3 in anion tests: To remove any **interfering ions** that can form precipitate with the added reagent and produce a false positive result

Describing effervescence: Colour/odour of gas

Titration

Burette: 2dp/ Pipette: 25.0 cm3 (Remember to rinse both with respective reagents before starting titration) Conical Flask (particular about shape as conical shape is optimal to prevent spillage of reagents-->possible SOE if beaker was asked to be used) Wash conical flask with distilled water

Titration (cont)

Final burette reading/cm3, Initial burette reading/cm3, Volume of (solution of unknown concentration) used/cm3, Best Titration results (tick the ones within appropriate range and use only these readings when calculating average volume)

Write complete steps when doing mole calculations

Iodometric titration: Burette filled with sodium thiosulfate/pipette with iodine-->titrate until solution in conical flask turns yellow, then add starch indicator(solution turns grey colour) continue titration until solution becomes colourless)

Redox titration: Burette contains KMnO4/ Pipette contains reducing agent--> solution in conical flask will turn pale pink (if its the other way round end point should be colourless)

Titrate A against B: B has unknown concentration (burette), A will have known concentration (pipette)

Speed of reaction

Concentration: Experiment number, Volume of (solution), volume of distilled water, time for reaction to stop

Speed of reaction (cont)

Mass change: Mass of empty vessel, mass of vessel + powder before heating, mass of powder before heating, mass of vessel + powder after heating, mass of powder after heating, change in mass of powder

When using stopwatch, always round to 2dp unless otherwise stated

Always make reference to frequency of effective collisions between reactant molecules to form products at a faster/slower rate

Analyze chemical equation and identify limiting reactant. If increasing volume/concentration/mass of a limiting reactant, more/less products may be formed (If question specify amount then use that data in your answering rather than more/less-->use terms like 2 times **greater/smaller** than

AMOUNT IS TOO VAGUE, USE TERMS LIKE VOLUME/ CONCENTRATION/MASS

In planning questions, state the end points of reactions (ppt no longer dissolves/ all the ppt has dissolved to form a solution/ no more effervescence being produced/ 2 consistent mass readings)

Gas collection

Insoluble gases collected through displacement in water method (H2,CO2, O2)

Soluble gases: Delivery method (Upward when Mr<29/ Downward when Mr>29)

Drying agent: Conc. H2SO4 (dry acidic gases) Fused calcium chloride (neutral) Calcium oxide (basic gases)

Gas syringe is used to collect accurate amount of gas (Connect delivery tube to nozzle of syringe)

Deliver desired gas into the gas syringe and wait until there is no further change in gas volume in the syringe

Separation Techniques

Crystallization:For thermally unstable compounds (sugar) Saturation point-->when solid no longer dissolves, the moment saturation point is reached, allow the solution to cool and form crystals (more time taken to cool down--> larger crystals)

Evaporation to dryness-->thermally stable compounds/salt (do not use glassware, instead use a crucible or an evaporating dish)

Filteration: clean residue with cool distilled water and dry in between sheets of dry filter paper/ filtrate collected can be used to crystallize

Separation Techniques (cont)

Paper chromatography: Draw line in pencil/ solvent level below start line/ dot substance with toothpick/ do a cylindrical shape

Simple distillation: Solution in distillation flask heated with marble/boiling chips to allow smooth boiling, at boiling point vapour will rise and flow into condenser where it cools to form pure liquid

Condenser: Provides a constant cool environment for vapour to condense into liquid (water in at bottom, water out at top)

Bulb of thermometer placed at top of distillation near condenser-->accurately measure temperature of vapour entering the condenser

Organic reactions

Bubbling gaseous alkene into aqueous bromine--> discoloration of aqueous bromine

Carboxylic acid reactions: with base/ metal/ metal carbonate/ with alcohol to form sweet smelling esters

Salt Preparation

Precipitation: soluble reagent + soluble reagent = insoluble salt (X nitrate + sodium Y), mix both soluble reagents, filter off, obtain residue, clean residue with cool distilled water and dry between sheets of dry filter paper

Salt Preparation (cont)

Excess insoluble compound + acid = soluble salt (not SPA salt) Mix until no more dissolving, heat till saturation point, allow to cool slowly to form crystals, wash crystals in cold distilled water and dry between sheets of dry filter paper

Acid + Alkali = soluble salt (SPA salt), titrate acid against alkali until endpoint with suitable indicator, repeat without indicator, obtain the aqueous salt,heat till saturation point, allow to cool slowly to form crystals, wash crystals in cold distilled water and dry between sheets of dry filter paper

Appropriate Gas Tests

Hydrogen: Acid with metal reaction (test with lighted splint)

Ammonia: Nitrate and Ammonium ion test (damp red litmus turn blue)

Chlorine: red litmus bleached (Chlorine compound)

SO2: Potassium manganate turn colourless/ potassium dichromate turn green

Oxygen: rekindle glowing splint (decomposing metal oxides)

Describe colour and odour of the effervescence if its a known gas

CO2: carbonate test, decomposition --> Bubble gas into test tube of limewater (shake test tube to allow continuous bubbling)

Bunsen Burner

Close the airhole to produce luminous flame

Hold boiling tube containing reaction mixture/wooden splint at 45 degree angle from the flame

Gentle heating-->Slowly remove reaction mixture near and far away from the flame

Strong heating-->hold the reaction mixture at hottest part of flame

Decomposition

As the reactivity of the metal increases, the more stable the metal carbonate, more harder to decompose it to constituent substance

Metal Carbonate + heat -->metal oxide +carbon dioxide

Use a crucible as strong heating is required

Take note of colours of substances provided and formed after the decomposition