Chemistry Practical Plan.

Aim:

The aim of this experiment is to identify the chemicals below in the solutions A to F using suitable reactants, and also carry out a titration procedure to determine the concentration of aqueous nitric acid.

*Aqueous calcium hydroxide
*Ethanoic acid
*Nitric acid
*Aqueous Potassium Bromide
*Aqueous Sodium Chloride

Safety:

Wear goggles to avoid chemicals getting into eyes.
Immediately clean up spills that might occur.
Use gloves if handling strong chemicals.

Aqueous sodium hydroxide:

Apparatus:

Solutions A to E
Calcium Carbonate
Bunsen burner
Stand and Clamp
Test tube
Conical Flask
Stopper with tube.

Diagram:

Method:

I will set up the apparatus as shown as above. When heating calcium carbonate carbon dioxide gas is released; this gas will go down the tube to the solutions. If the solution is calcium hydroxide, the carbon dioxide will react with it leaving a milky white precipitate.

Equations: $CaOH_{2(aq)} + CO_{2(g)} \rightarrow CaCO_{3(aq)} + H_2O_{(l)}$ Word Count: 134

Ethanoic acid:

Apparatus:

Solutions A to E
Ethanol
Concentrated Sulphuric acid
Bunsen Burner
Stand
Water supply
Round bottom flask
Condenser
Tubes

Diagram:

Method:

I will set up the apparatus as shown above. Warming ethanol with ethanoic acid, and a strong acid catalyst (concentrated sulphuric acid), it forms an ester. The O-H bond in ethanol is broken in the esterification reaction.
Equation: $CH_3COOH_{(aq)} + CH_3OH_{(aq)} \rightarrow CH_3COOCH_2CH_{3\,(aq)} + H_2O_{(l)}$

Nitric acid:

Apparatus:

Solutions A to E
Magnesium nitrate
Bunsen burner
Stand and Clamp
Test tube
Conical Flask
Stopper with tube.
Wooden Splint

Diagram:

Method:

I will set up the apparatus as it is shown above. When Nitric acid is added to Magnesium, Magnesium nitrate and hydrogen if formed. We can test for hydrogen gas by lighting up a splinter, and putting it in the conical flask full of hydrogen gas really quickly (to stop hydrogen escaping), and see if it 'pops'.
Equation: $Mg_{(s)} + 2HNO_{3\,(aq)} \text{ --> } Mg(NO_3)_{2\,(aq)} + H_{2\,(g)}$ Word Count: 146

Aqueous potassium bromide:

Apparatus:

Solutions A to E
Aqueous Chlorine solution
Test tubes.
Plastic Pasteur pipettes

Diagram:

Method:
The apparatus will be set up the way it is shown above. Potassium bromide can be tested by adding aqueous chlorine solution, some of the bromide ions are oxidized to bromine. Some of the bromine molecules combine with the bromine ions to give tribromide ion. This is a displacement reaction, causing the solution to decolorize.
Equation: $2KBr_{(aq)} + Cl_{2\,(aq)} \rightarrow 2KCl_{(aq)} + Br_{2\,(aq)}$

Aqueous Sodium Chloride:

Apparatus:
Solutions A to E
Silver nitrate
Test tubes.

Diagram:

Method:

The apparatus will be set up as shown above.
Aqueous sodium chloride can be tested by adding silver nitrate to the aqueous solution of sodium chloride. We will know that this is sodium chloride when the white precipitate is formed.
Equation: $AgNO_{3\,(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3\,(aq)}$

Word Count: 126

Results table:

Tick the Solution if any of the listed changes occur:

	Solution A	Solution B	Solution C	Solution D	Solution E
Carbon Dioxide forming a white precipitate?					
Sweet Smell of Ester?					
Hydrogen gas formed?					
Decolorization occurs?					
Silver Nitrate forming a white precipitate?					

Titration Procedure:

Apparatus:
Aqueous nitric acid
Aqueous Sodium Carbonate
Methyl Orange indicator
Burette
Conical Flask
Pipette
Clamp and stand
White tile
Funnel

Diagram:

Method:
Set up apparatus as above. Add exactly $25cm^3$ of aqueous Sodium Carbonate into the pipette and into the conical flask. Add three drops of Methyl Orange indicator to the flask. Using the funnel pour the nitric acid solution into a burette, and take off the funnel. Titrate the nitric acid slowly into the conical flask until colour change appears. Do 1 rough titration, and 3 final titrations.

Equation: $NaOH_{(aq)} + HNO_{3(aq)} \rightarrow NaNO_{3(aq)} + H_2O_{(l)}$

Calculations:

Calculating the average titration volume: (Titration Volume 1 + Titration Volume l 2 + Titration Volume 3) / 3

Number of moles in Sodium Carbonate:

Moles = concentration x volume / 1000

Moles = 0.500 x 25 / 1000 = 0.0125 mol^{-1}

From the equation we can see that the ratio is 1:1, therefore the number of moles in nitric acid = 0.0125 mol^{-1}.

Concentration = (Moles/Volume) x 1000.

Concentration of nitric acid = (0.0125/average titration volume) x 1000

Word Count: 86

References:

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