Simple Qualitative Analysis

Materials Required for this Experiment for 32 students.

Chemicals
Four 100mL bottles of each of the following 0.25M solutions:

1. Cu(NO₃)₂
2. Ba(NO₃)₂
3. Fe(NO₃)₃
4. NaHCO₃
5. KSCN

Four small bottles with droppers (50mL) 6M NH₄OH (also called NH₃(aq))
Four small bottles with droppers (50mL) 3M Sulfuric Acid
Four small bottles with droppers (50mL) 3M Hydrochloric acid
Four small bottles with droppers (50mL) 3M NaOH

36 unknowns in test tubes using all the chemical solutions above except hydrochloric acid.

Supplies

150 disposable pipettes
blue and red litmus papers (four bottles of each type)
Sixteen 24-well plates
16 test tube racks
32 pieces of nichrome wire
16 small-cut sand papers

Procedure
Using the qualitative analysis scheme provided carry out the tests on all the knowns and on your unknown. Record all observations carefully.

Analysis and Conclusion
Determine the identity of your unknown solution and explain your reasoning in detail.
Qualitative Analysis Scheme

Possible unknown solutions

- Iron (III) Nitrate
- Copper (II) Nitrate
- Barium Nitrate
- Sodium Hydrogen Carbonate
- Sodium Hydroxide
- Sulfuric Acid
- Potassium Thiocyanate
- Ammonium Hydroxide

Litmus Paper Test

**Acidic**

- Sulfuric Acid
- Iron (III) Nitrate
- Copper (II) Nitrate

**Neutral**

- Barium Nitrate
- Potassium Thiocyanate

Iron test
- Add Iron (III) Nitrate

- Blood Red
- Potassium Thiocyanate

**Basic**

- Sodium Hydroxide
- Sodium Bicarbonate
- Ammonium Hydroxide

Odor Test
- Pungent
- Ammonium Hydroxide
- No Odor
- Sodium Bicarbonate
- Sodium Hydroxide

Bubbles Test (add HCl)
- Bubbles
- Sodium Bicarbonate
- No Bubbles
- Sodium Hydroxide

Observed color of solution

- Yellow
- Blue
- Colorless

Iron(III) Nitrate
- Add KSCN
- Blood red
- Confirms iron

Copper(II) Nitrate
- Add ammonia
- Deep blue color
- Confirms copper

Sulfuric Acid
- Add Barium Nitrate
- White ppt confirms sulfate

In addition to the tests in this scheme you can dip a piece of nichrome wire into the solutions and place this in a flame. Different substances have different characteristic colors.