**Common Laboratory Tests**

This is a list of some qualitative laboratory tests that can be used to identify unknowns in lab. These are simple tests leading to the identification of a few [anions](http://library.thinkquest.org/2923/tests.html?tql-iframe#ions) and [cations](http://library.thinkquest.org/2923/tests.html?tql-iframe#ions) and some common gases. Also included here is flame test information for selected [cations](http://library.thinkquest.org/2923/tests.html?tql-iframe#flame).

* + [Testing for anoins](http://library.thinkquest.org/2923/tests.html?tql-iframe#anions)
  + [Testing for cations](http://library.thinkquest.org/2923/tests.html?tql-iframe#cations)
  + [Flame test for cations](http://library.thinkquest.org/2923/tests.html?tql-iframe#flame)
  + [Tests for some common gases](http://library.thinkquest.org/2923/tests.html?tql-iframe#gas)

|  |  |  |  |
| --- | --- | --- | --- |
| **Tests for Anions** | | | |
| Anion | Symbol | Test | Results |
| Bromide | Br- | Add silver nitrate solution to a solution of substance in dilute nitric acid | Pale yellow precipitate, dissolves slightly in ammonia solution. |
| Carbonate | CO32- | a)Add dilute hydrochloric acid to the substance.  b)Add drop of phenolphthalein to a solution of substance. | Carbon dioxide gas is given off.  Turns bright pink (HCO3 turns light pink). |
| Chloride | Cl- | Add silver nitrate to a solution of substance in dilute nitric acid. | Thick white precipitate dissolves in ammonia solution. |
| Hydrogen- carbonate | HCO32- | a)Add dilute hydrochloric acid to the substance.  b)Add drop of phenolphthalein to a solution of substance. | Carbon dioxide gas is given off.  Turns light pink (CO32- turns bright pink). |
| Iodide | I- | Add silver nitrate to a solution of substance in dilute nitric acid. | Pale yellow precipitate, does not dissolve in ammonia solution. |
| Nitrate | NO3- | Add iron(II) sulfate solution followed by concentrated sulfuric acid to the solution | Brown ring forms at the junction of the two liquids. |
| Sulfate | SO42- | Add solution of barium chloride to the solution. | White precipitate, **does not** dissolve in dilute hydrochloric acid. |
| Sulfite | SO32- | Add solution of barium chloride to the solution. | White precipitate, **does** dissolve in dilute hydrochloric acid. |
| Sulfide | S2- | Add lead(II) ethanoate solution to the solution. | Black precipitate |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tests for Cations** | | | |
| Cation | Symbol | Test | Results |
| Aluminum | Al3+ | a)Add dilute sodium hydroxide solution to a solution of the substance.    b)Add dilute ammonia solution to a solution of the substance. | White precipitate that dissolves as more sodium hydroxide solution is added.  White precipitate that does not dissolve as more ammonia solution is added. |
| Ammonium | NH4+ | Add sodium hydroxide solution to a solution of the substance and gently heat. | Ammonia gas is given off. |
| Calcium | Ca2+ | Add dilute sulfric acid to a solution of the substance  Also try [flame test](http://library.thinkquest.org/2923/tests.html?tql-iframe#flame) | White precipitate formed. |
| Copper (II) | Cu2+ | a)Add dilute sodium hydroxide solution to a solution of the substance.  b)Add dilute ammonia solution to a solution of the substance.  Also try [flame test](http://library.thinkquest.org/2923/tests.html?tql-iframe#flame) | Pale blue precipitate that dissolves as more sodium hydorxide is added.\.  Pale blue precipitate, changing to deep blue solution as more ammonia is added. |
| Iron(II) | Fe2+ | a)Add dilute sodium hydroxide solution to a solution of the substance.  b)Add dilute ammonia solution to a solution of the substance. | Pale green precipitate formed.  Pale green precipitate formed. |
| Iron(III) | Fe3+ | a)Add dilute sodium hydroxide solution to a solution of the substance.  b)Add dilute ammonia solution to a solution of the substance. | Red-brown precipitate formed.  Red-brown precipitate formed. |
| Lead(II) | Pb2+ | a)Add dilute sodium hydroxide solution to a solution of the substance.  b)Add dilute ammonia solution to a solution of the substance.  Use [flame test](http://library.thinkquest.org/2923/tests.html?tql-iframe#flame) to distinguish between lead and alumminum. | White precipitate, that **does** dissolve as more sodium hydroxide is added.  White precipitate that **does not** dissolve as more ammonia is added. |
| Magnesium | Mg2+ | a)Add dilute sodium hydroxide solution to a solution of the substance.  b)Add dilute ammonia solution to a solution of the substance. | White precipitate, that **does not** dissolve as more sodium hydroxide is added.  White precipitate that **does not** dissolve as more ammonia is added. |
| Zinc | Zn2+ | a)Add dilute sodium hydroxide solution to a solution of the substance.  b)Add dilute ammonia solution to a solution of the substance. | White precipitate, that dissolve as more sodium hydroxide is added.  White precipitate that dissolve as more ammonia is added. |

|  |  |  |
| --- | --- | --- |
| **Flame Tests** | | |
| Metal | Symbol | Flame Color |
| Barium | Ba | Yellow-green |
| Calcium | Ca | Red |
| Copper | Cu | Green |
| Lead | Pb | Blue |
| Lithium | Li | Pink |
| Potassium | K | Lilac |
| Sodium | Na | Orange |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tests to identify gases** | | | |
| Gas | Symbol | Test | Results |
| Carbon dioxide | CO2 | bubble gas through limewater (calcium hydroxide solution) | Turns limewater cloudy. |
| Hydrogen | H2 | Put a lighted splint into a sample of the gas. | Burns with a "popping" sound |
| Oxygen | O2 | Put a glowing splint into a sample of the gas. | Splint relights. |

**Anion** - An ion with a negative charge, formed when an atom gains electrons in a reaction (it now has more electrons than protons). Non-metals tend to form anions.

**Cation** - An ion with a positive charge, formed when an atom loses electrons in a reaction (it now has more protons than electrons). Hydrogen and metals tend to form cations.