**Honors Chemistry II: Colors**

**ION COLORS**

* **Ions with all paired electrons are colorless (Mg+2, Ca+2, Al+3)**
* **Ions with unpaired electrons are often colored:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Cu+2** | **Blue** | **Cr2O7-2** | **Orange** |
| **MnO4-1** | **Purple** | **CrO4-2** | **Yellow** |
| **Ni+2** | **Green** | **CoCl4-2** | **Blue** |
| **Fe+2** | **Yellow or green** | **Co(H2O)6+2** | **Pink** |
| **Fe+3** | **Red or orange** | **Cu(NH3)+2** | **Bright blue** |
| **FeSCN-1** | **Blood red** |  |  |

**COLORS OF PRECIPITATES**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **WHITE** | **BLUE** | **YELLOW** | **BLACK** | **GREEN** | **RED/BROWN** |
| AgCl | Many Copper (II) ppts | AgI | Many sulfides | Many Fe (II) ppts | Many Fe(III) ppts |
| BaSO4 |  | PbI2 | CuO |  |  |
| PbCl2 |  |  |  |  |  |
| TiO2 |  |  |  |  |  |
| Many non-transition metal Hydroxides |  |  |  |  |  |
| May non-transition metal carbonates |  |  |  |  |  |
| Many non-transitional metal sulfates |  |  |  |  |  |
| CuCO3 |  |  |  |  |  |

**FLAME TEST COLORS**

|  |  |
| --- | --- |
| Li+1, Sr+2, Ca+2 | Red |
| Na+1 | Yellow/orange |
| K+1 | Lilac |
| Ba+2 | Green |
| Cu+2 | Blue-Green |

**TRANSITION METAL COLORS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **+1** | **+2** | **+3** | **+4** | **+5** | **+6** | **+7** |
| **Sc** |  |  | Colorless |  |  |  |  |
| **Ti** |  |  | Violet | Colorless |  |  |  |
| **V** |  | Violet | Green | Blue | Yellow |  |  |
| **Cr** |  | Blue | Green |  | Yellow CrO4-2 | Orange Cr2O7-2 |  |  |
| **Mn** |  | Pale pink |  | Brown |  | Dark green | Purple |
| **Fe** |  | Pale green | Yellow/brown |  |  |  |  |
| **Co** |  | Pink | Orange/yellow |  |  |  |  |
| **Ni** |  | Green |  |  |  |  |  |
| **Cu** | Colorless | blue |  |  |  |  |  |
| **Zn** |  | colorless |  |  |  |  |  |

**COLORS OF GASES**

|  |  |
| --- | --- |
| NO2 | Orange/Brown |
| Cl2 | Yellow green |
| F2 | Pale yellow/green |

**COLOR OF HALOGENS**

|  |  |
| --- | --- |
| Br2 | Orange/brown |
| I2 | Dark purple |

**COLOR CHANGES IN REDOX RXNS**

|  |  |  |  |
| --- | --- | --- | --- |
| Before Ion | Before Color | After Ion | After Color |
| MnO4-1  | Purple | Mn+2 | Pale Pink |
| Cr2O7-2 | Orange | Cr+3 | Green |

**COLOR OF ACID/BASE INDICATOR CHANGES**

|  |  |  |
| --- | --- | --- |
|  | **ACID** | **BASE** |
| **Methyl Orange** | Red | Yellow |
| **Methyl Red** | Red | Yellow |
| **Litmus** | Red | Blue |
| **Universal** | Red | Blue/Purple |
| **Phenolphtalein** | Colorless | Pink |