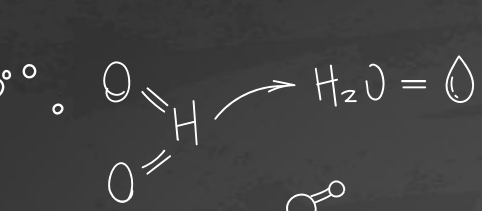
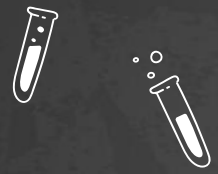
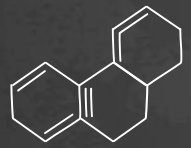
Chemistry - 101

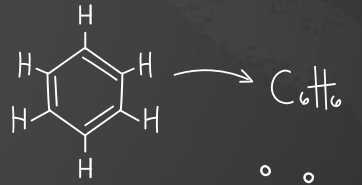
Classes of chemical compounds

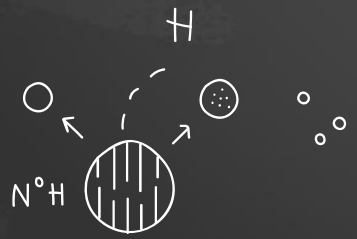
04/18/21

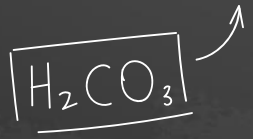


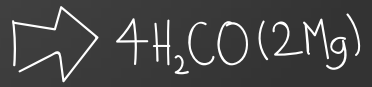




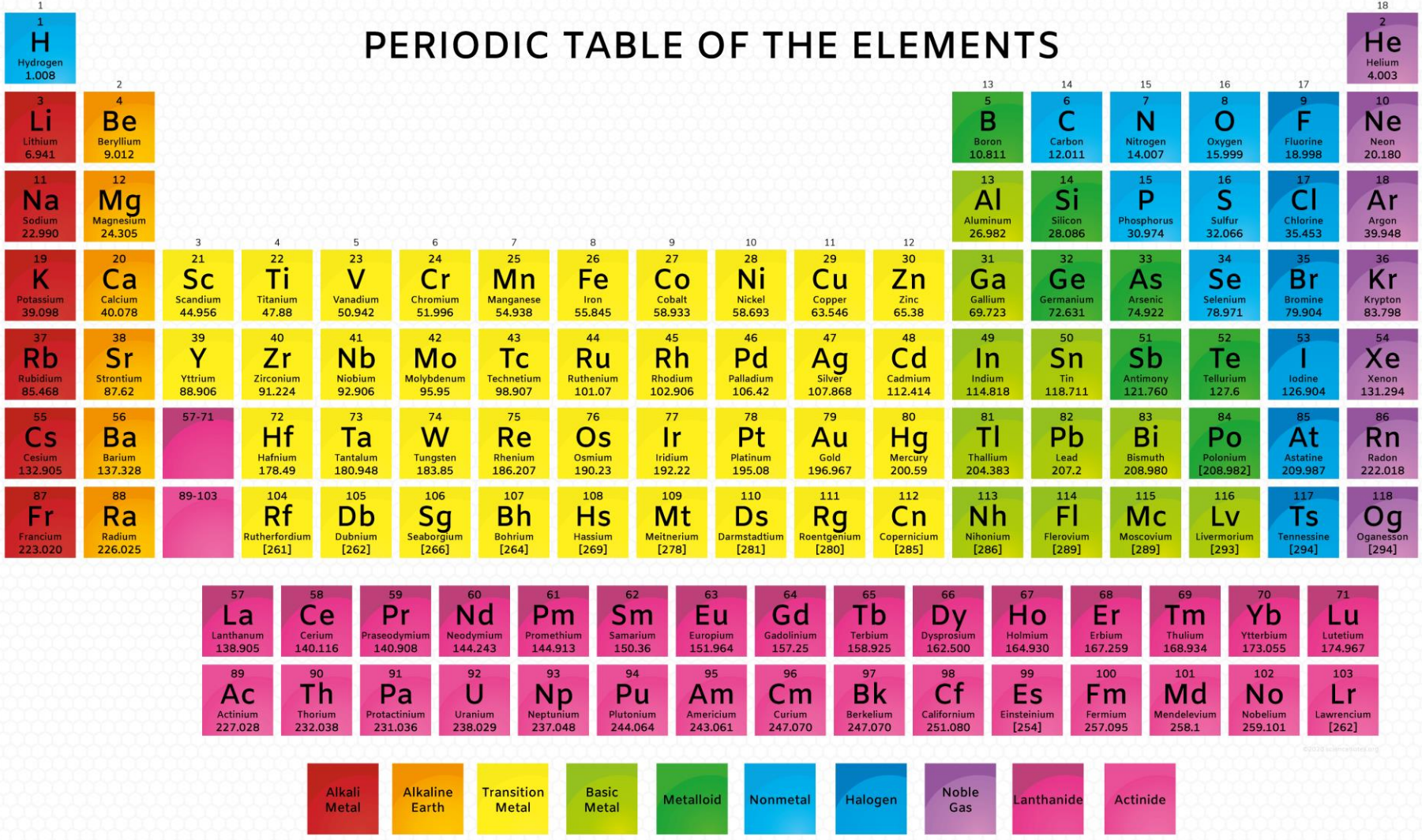








PERIODIC TABLE OF THE ELEMENTS



Oxides

- Sulfur (IV) oxide
- Sulfur (VI) oxide
- Carbon (IV) oxide
- Calcium oxide
- Iron (III) oxide

$S + O_2 \text{-----}\rightarrow SO_2 \text{------}\rightarrow S + H_2O$

$4Fe + 3O_2 \text{-----}\rightarrow 2Fe_2O_3 \text{---}\rightarrow 4Fe + 6\ H_2O$

Acidic and basic oxides

Acidic oxides can form acids:

$SO_2 + H_2O = H_2SO_3$ (sulfurous acid)
$SO_3 + H_2O = H_2SO_4$ (sulfuric acid)
$CO_2 + H_2O = H_2CO_3$ (carbonic acid)

Basic oxides can form bases:

$CaO + H_2O = Ca(OH)_2$

Acids and bases

Acids and bases that form from oxides are also classes of chemical compounds

Acids can provide hydrogen ions to react with other compounds:

$$H_2SO_4 + Zn \rightarrow ZnSO_4 + H_2$$

$$HCl + AgNO_3 \rightarrow AgCl + HNO_3$$

A molecule of each acid consists of hydrogen atoms and the rest of the molecule, which is called a conjugate base.

Acids

H_2SO_4 – sulfuric acid (SO_4^{2-} -- conjugate base)

HCl – hydrochloric acid (Cl^- -- conjugate base)

HNO_3 – nitric acid (NO_3^- -- conjugate base)

Conjugate bases can go from one compound to another without changing

Acids, Bases, and salts

Bases can give their hydroxyl groups to react with other compounds. Hydroxy (hydroxyl group) can move between compounds without change

$$Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O \ (2H\text{-}OH)$$

When acids and bases react, they form SALTS made from an atom (ion) of metal and a conjugate base:

$$HCl + NaOH \rightarrow NaCl + H_2O$$

$$2HNO_3 + Ba(OH)_2 \rightarrow Ba(NO_3)_2 + 2H_2O$$

$$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$$

In Solution

$HCl = H^+ + Cl^-$

$HNO_3 = H^+ + NO^{3-}$

$H_2SO_4 = 2H^+ + SO_4^{2-}$

$NaOH = Na^+ + OH^-$

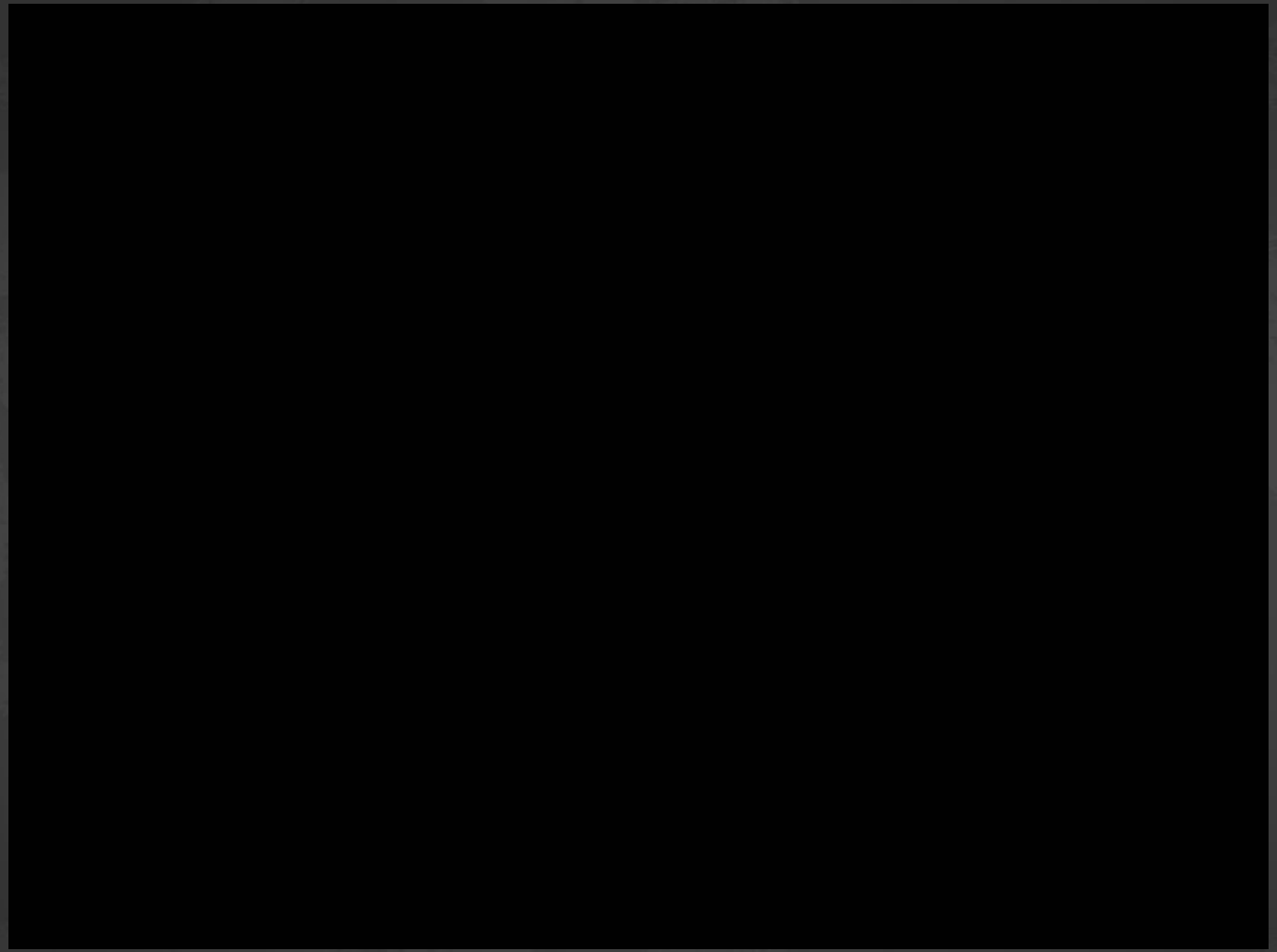
$Ba(OH)_2 = Ba^{2+} + 2OH^-$

$KOH = K^+ + OH^-$

$HCl + NaOH \rightarrow NaCl + H_2O$

$H^+ + Cl^- + OH^- + Na^+ \rightarrow Cl^- + Na^+ + HOH$

Neutralization reaction



This class uses the materials from the following books:
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Manyuilov and Rodionov “Chemistry for children and adults”
Kuzmenko, Eremin, Popkov “Beginnings of chemistry”
http://school-collection.edu.ru (experiments)