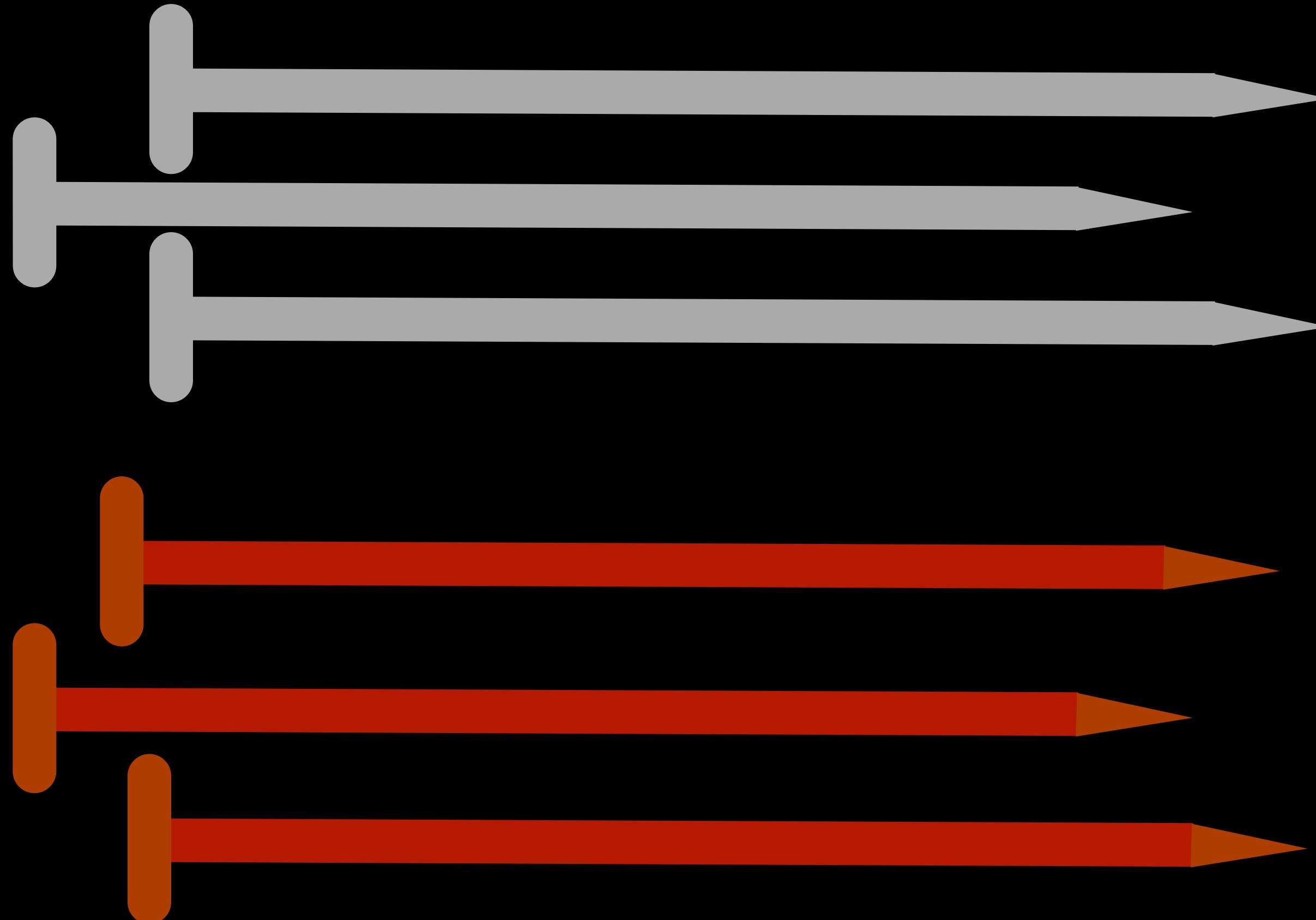
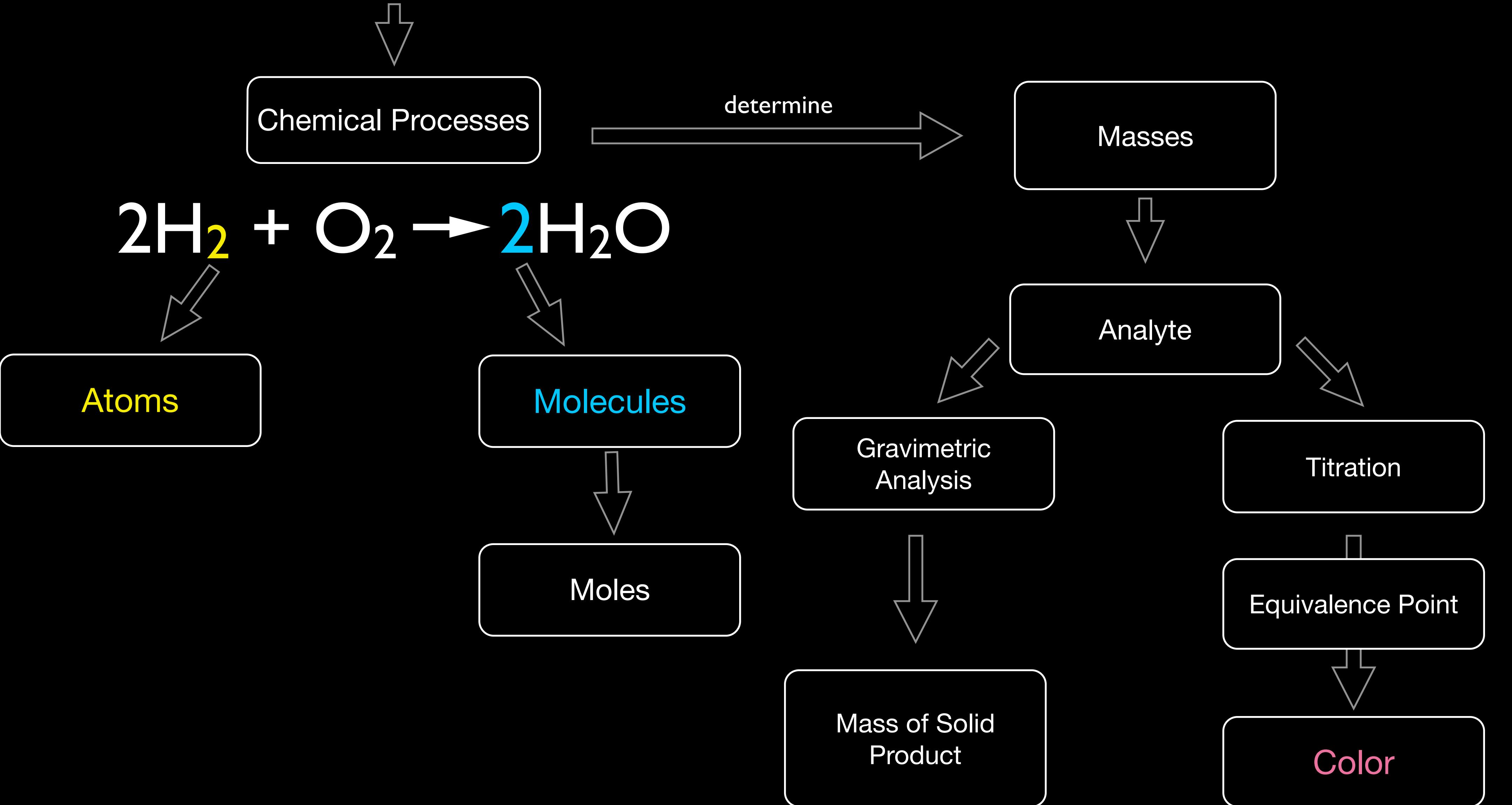
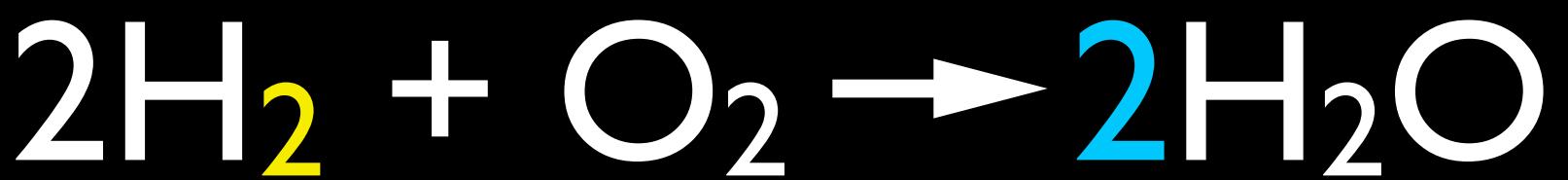


# Conservation of Atoms

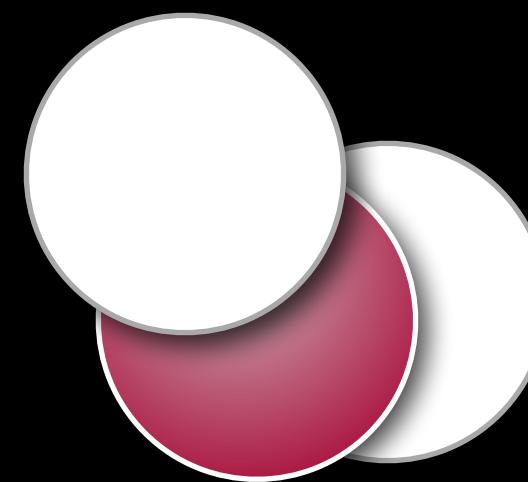
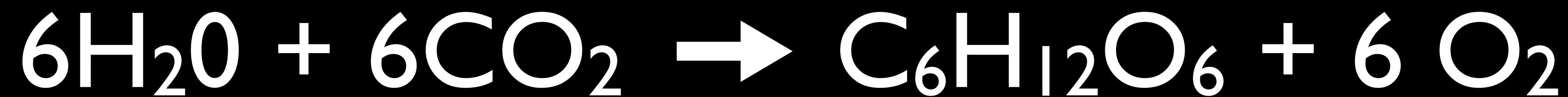


Chemistry Essentials - 012

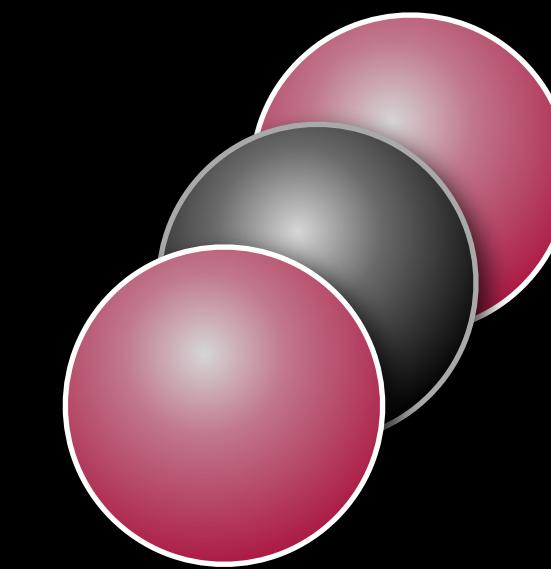
# Conservation of Atoms



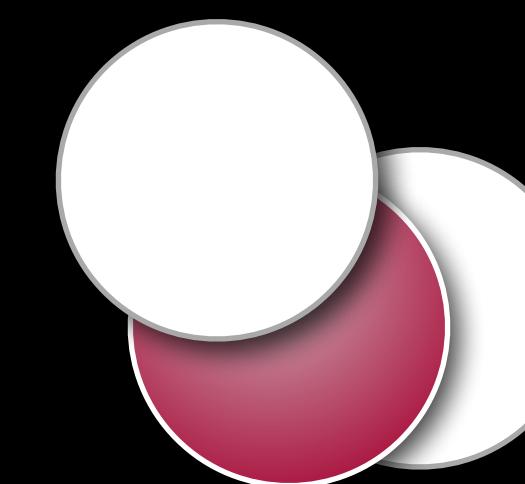
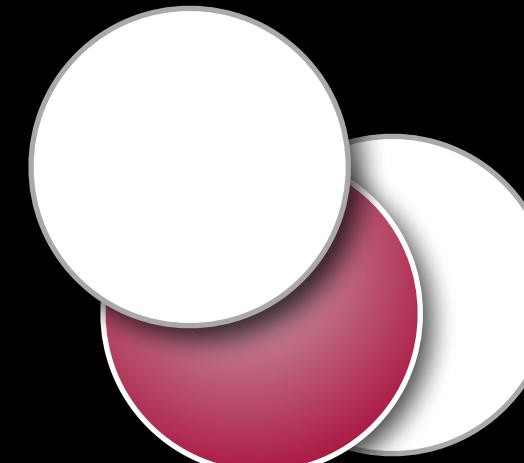
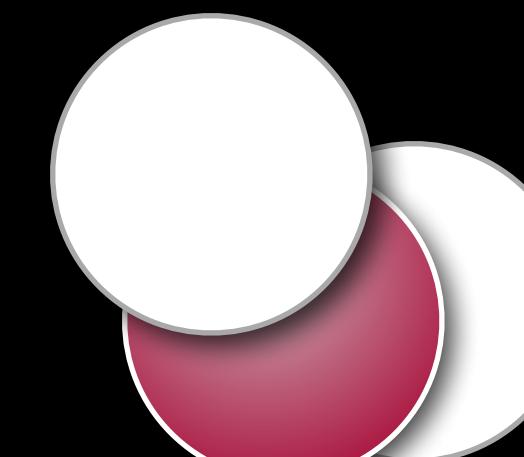
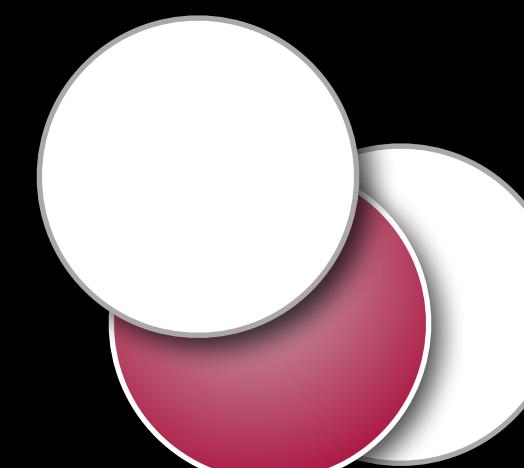
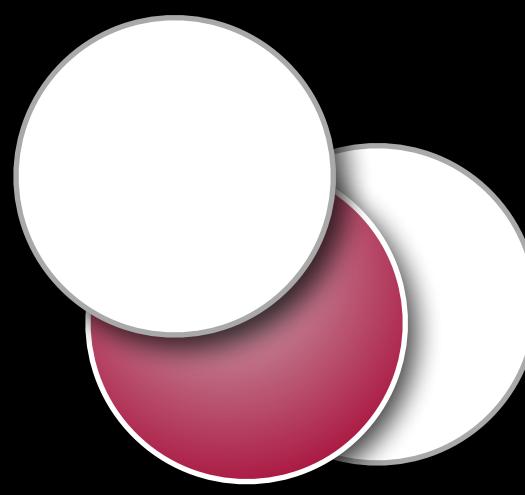
# Chemical Reaction

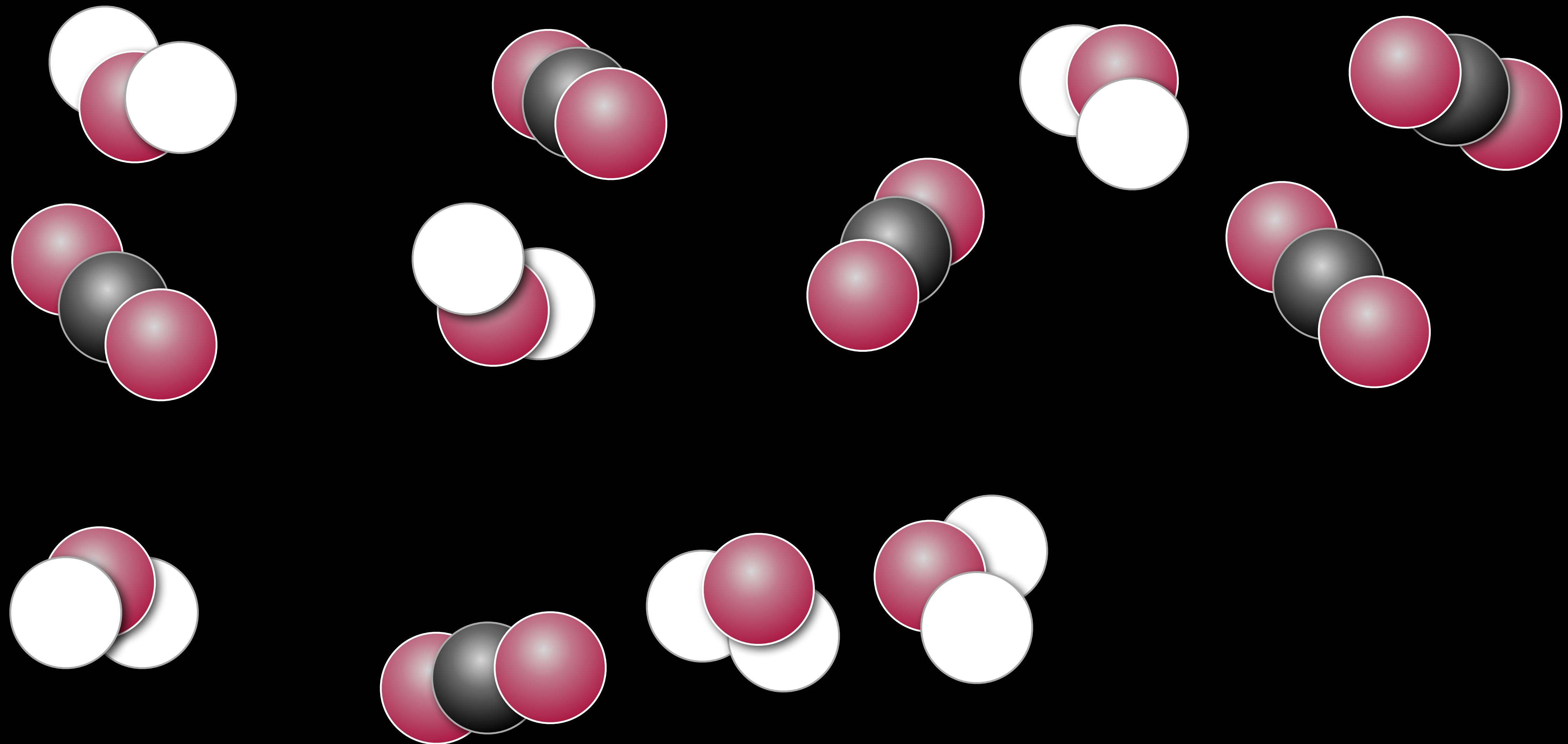
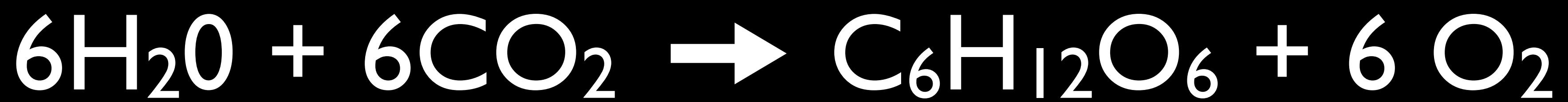


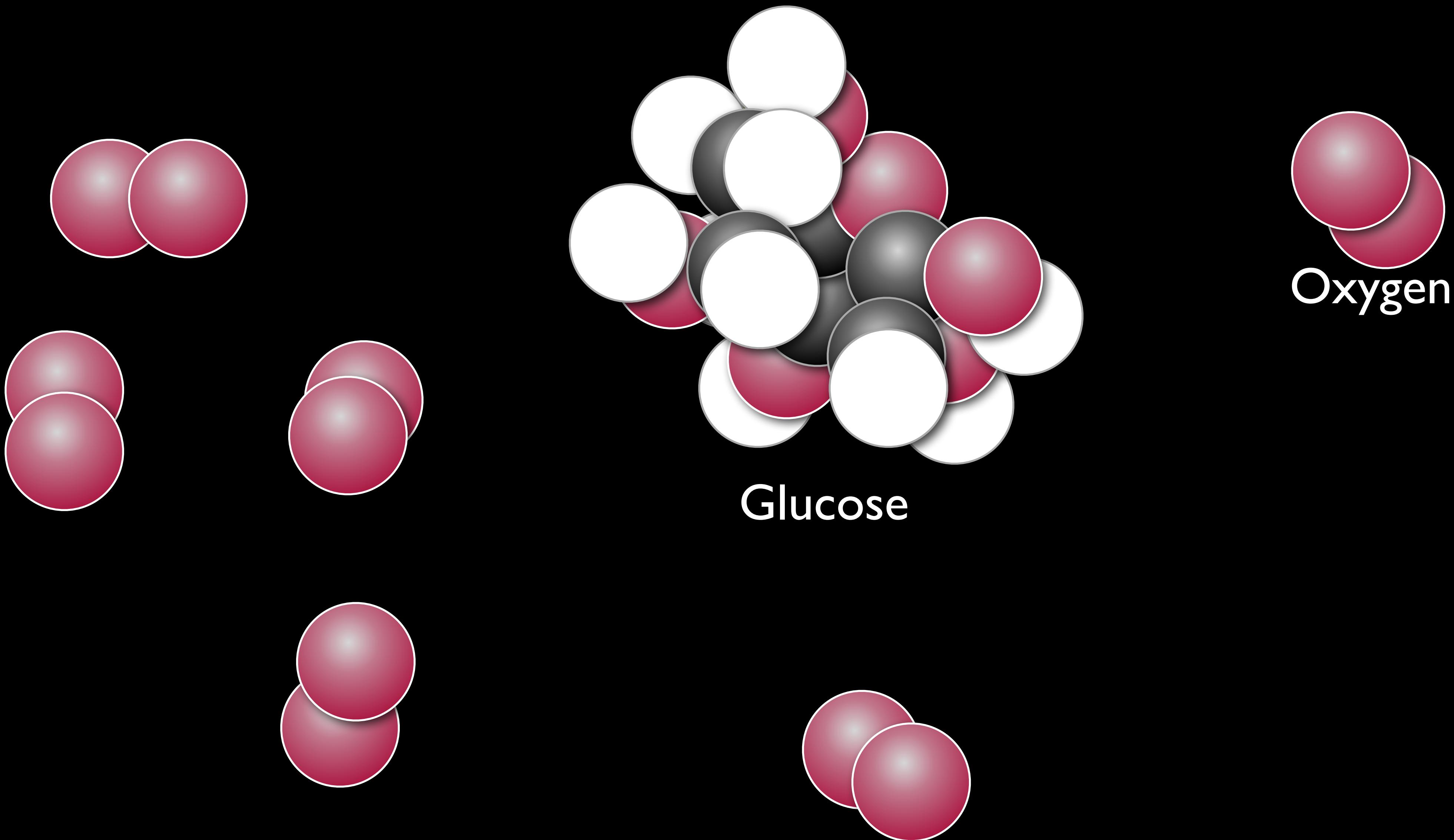
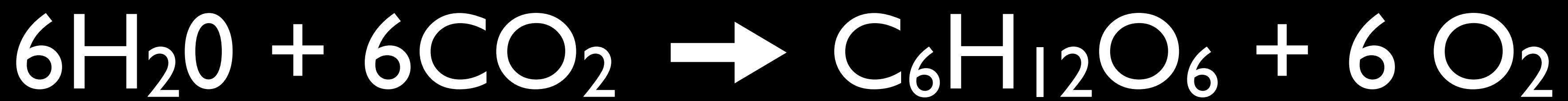
Water



Carbon Dioxide



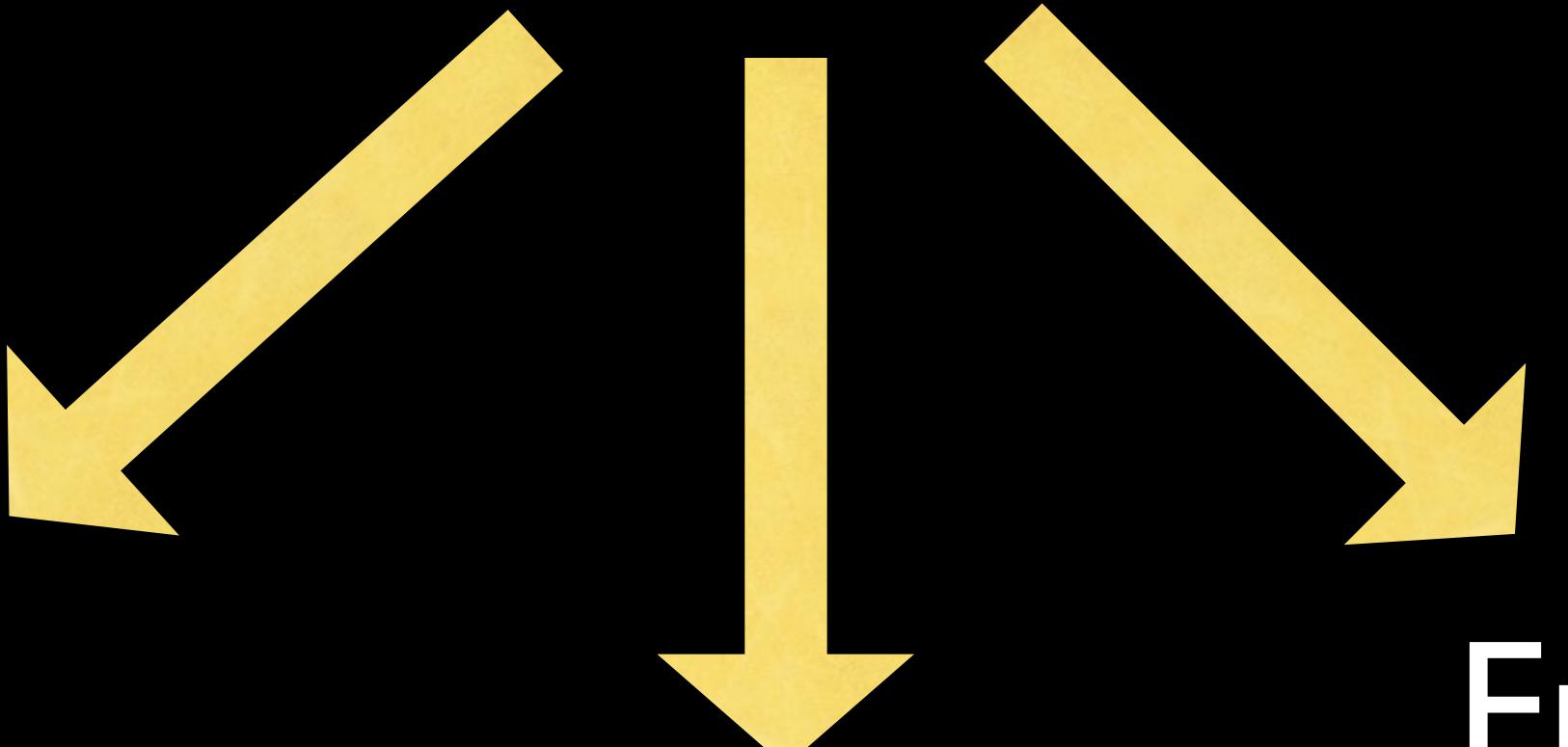




**MOLE**  
 $6.02 \times 10^{23}$

1	H	2	A
1.01	Hydrogen		
3	Li	4	Be
6.94	Lithium	Boron	9.01
5	Mg	6	Al
22.99	Sodium	Magnesium	13.00
7	Si	8	P
24.31	Phosphorus	Sulfur	16.00
9	Cl	10	Ar
30.97	Chlorine	Argon	39.95
11	Na	12	He
22.99	Sodium	Aluminum	4.00
13	Ca	14	Ne
40.08	Calcium	Carbon	10.81
15	Sc	16	O
44.96	Scandium	Oxygen	16.00
17	Ti	18	F
47.87	Titanium	Fluorine	19.00
19	V	20	Ne
50.94	Vanadium	Neon	20.18
21	Cr	22	He
52.00	Chromium	Helium	4.00
23	Mn	24	He
54.94	Manganese	Helium	4.00
25	Fe	26	Na
55.85	Iron	Atomic number	11
27	Co	28	Element symbol
58.93	Cobalt	Sodium	Na
29	Ni	30	Element name
60.90	Nickel	Hydrogen	1.01
31	Cu	32	Average atomic mass*
63.55	Copper	Zinc	22.99
33	Zn	34	
65.41	Zinc	Gallium	69.72
35	Ga	36	
69.72	Gallium	Silicon	28.09
37	Ge	38	
72.62	Silicon	Phosphorus	30.97
39	As	39	
74.92	Germanium	Sulfur	32.07
40	Rb	41	
80.47	Rubidium	Nickel	59.05
42	Sr	43	
87.62	Samarium	Iron	55.85
44	Y	45	
88.91	Yttrium	Mo	42
46	Zr	47	
91.24	Zirconium	Rhodium	107.87
48	Nb	49	
92.91	Niobium	Ruthenium	102.90
50	Tc	51	
95.94	Techneum	Palladium	106.41
52	Ru	52	
98.95	Ruthenium	Rhenium	114.82
54	Pd	53	
100.21	Palladium	Osmium	118.71
56	Ag	54	
102.23	Argentum	Ruthenium	121.78
57	Cd	55	
102.94	Cadmium	Rhenium	127.80
58	In	56	
103.91	Inertium	Technetium	128.90
59	Sn	57	
103.91	Stannum	Technetium	131.29
60	Te	58	
103.91	Tellurium	Technetium	131.29
61	I	59	
103.91	Iodine	Technetium	131.29
62	Xe	60	
103.91	Xenon	Technetium	131.29
63	Fr	64	
103.91	Francium	Technetium	131.29
65	Ra	66	
103.91	Radioustronium	Technetium	131.29
67	Ac	68	
103.91	Actinium	Technetium	131.29
69	Ce	70	
103.91	Cerium	Technetium	131.29
70	Pr	71	
103.91	Praseodymium	Technetium	131.29
71	Nd	72	
103.91	Neodymium	Technetium	131.29
72	Sm	73	
103.91	Promethium	Technetium	131.29
73	Eu	74	
103.91	Europium	Technetium	131.29
74	Tb	75	
103.91	Terbium	Technetium	131.29
75	Dy	76	
103.91	Dysprosium	Technetium	131.29
76	Ho	77	
103.91	Holmium	Technetium	131.29
77	Er	78	
103.91	Erbium	Technetium	131.29
78	Tm	79	
103.91	Thulium	Technetium	131.29
79	Vb	80	
103.91	Ytterbium	Technetium	131.29
80	Lu	81	
103.91	Lutetium	Technetium	131.29
81	Fr	82	
103.91	Francium	Technetium	131.29
82	Bi	83	
103.91	Bismuth	Technetium	131.29
83	Po	84	
103.91	Poison	Technetium	131.29
84	At	85	
103.91	Antimony	Technetium	131.29
85	Rn	86	
103.91	Radon	Technetium	131.29
86	Tl	87	
103.91	Technetium	Technetium	131.29
87	Pb	88	
103.91	Lead	Technetium	131.29
88	Br	89	
103.91	Bromine	Technetium	131.29
89	Sg	90	
103.91	Singennium	Technetium	131.29
90	Bh	91	
103.91	Berillium	Technetium	131.29
91	Hs	92	
103.91	Hassium	Technetium	131.29
92	Mt	93	
103.91	Moscovium	Technetium	131.29
93	Cf	94	
103.91	Curium	Technetium	131.29
94	Es	95	
103.91	Einsteinium	Technetium	131.29
95	Fm	96	
103.91	Fermium	Technetium	131.29
96	Md	97	
103.91	Mendelevium	Technetium	131.29
97	No	98	
103.91	Nobelium	Technetium	131.29
98	Lr	99	
103.91	Lawrencium	Technetium	131.29

Mass

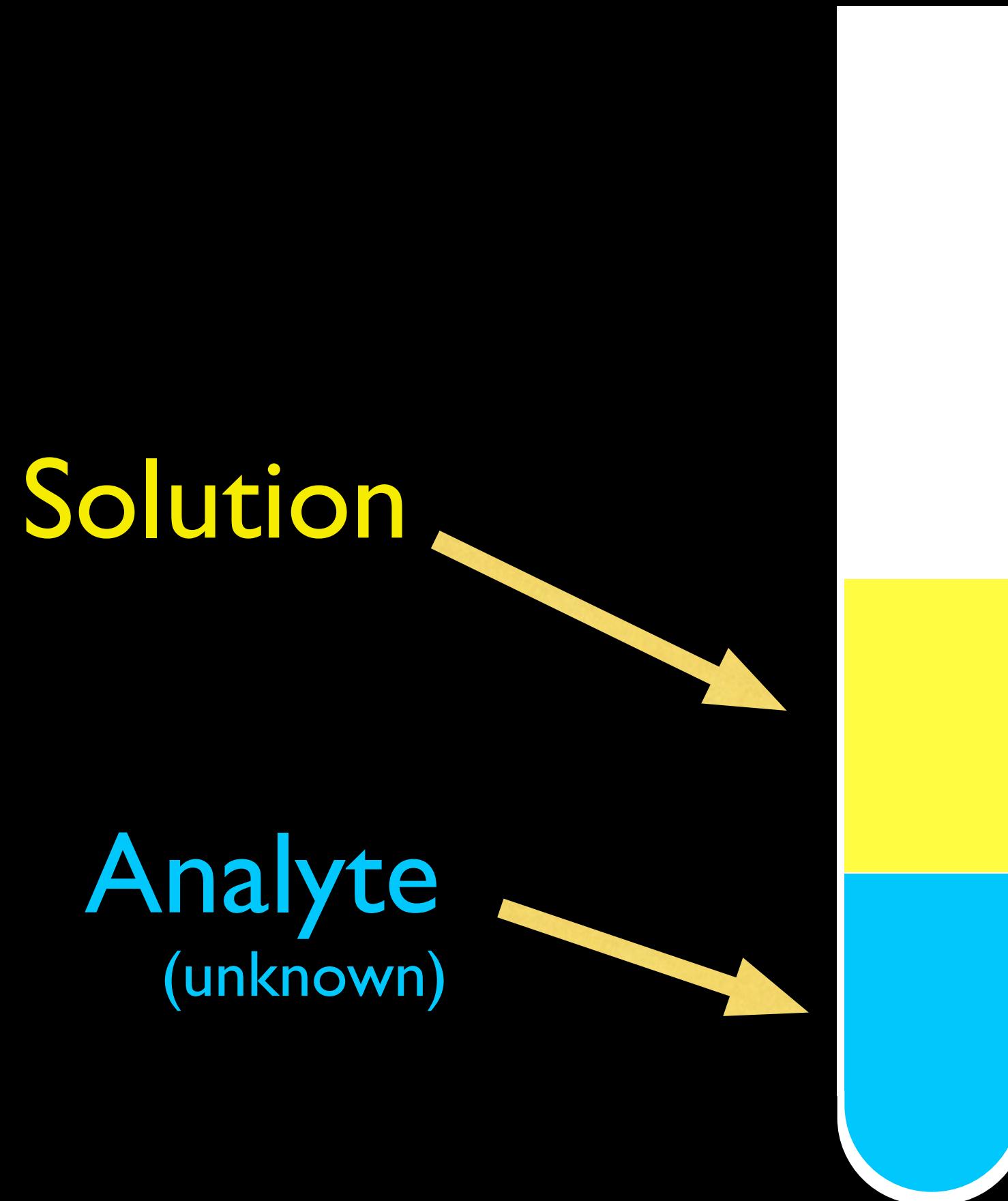


Atoms

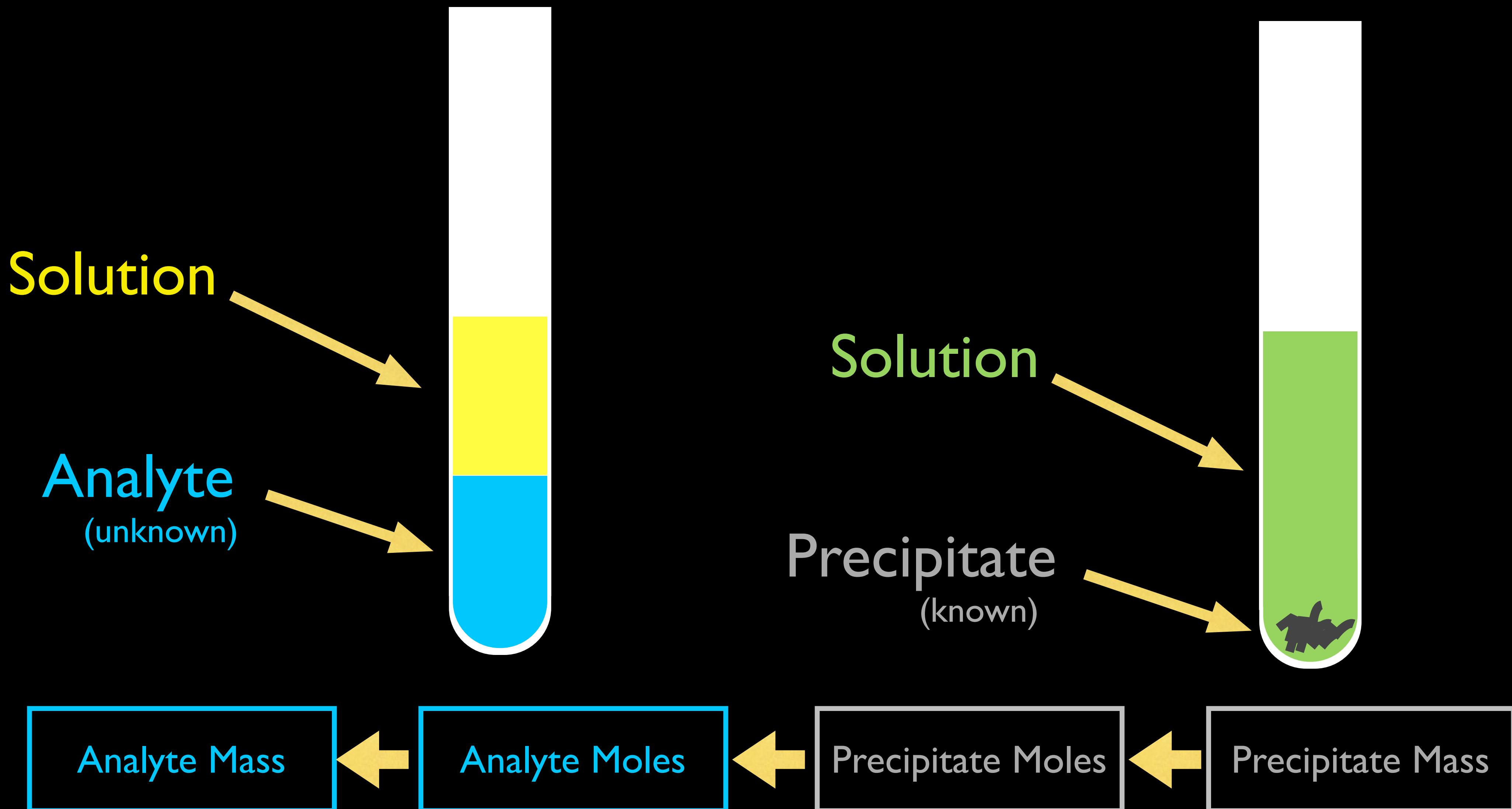
Molecules

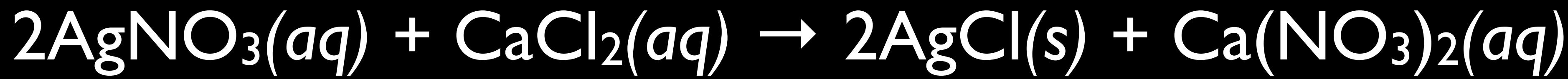
Empirical Formula

# Gravimetric Analysis



# Gravimetric Analysis





Analyte

$$\frac{5.71 \text{ g AgCl}}{1} \times \frac{1 \text{ mol AgCl}}{143.32 \text{ g AgCl}} \times \frac{1 \text{ mol CaCl}_2}{2 \text{ mol AgCl}} \times \frac{110.98 \text{ g CaCl}_2}{1 \text{ mol CaCl}_2}$$

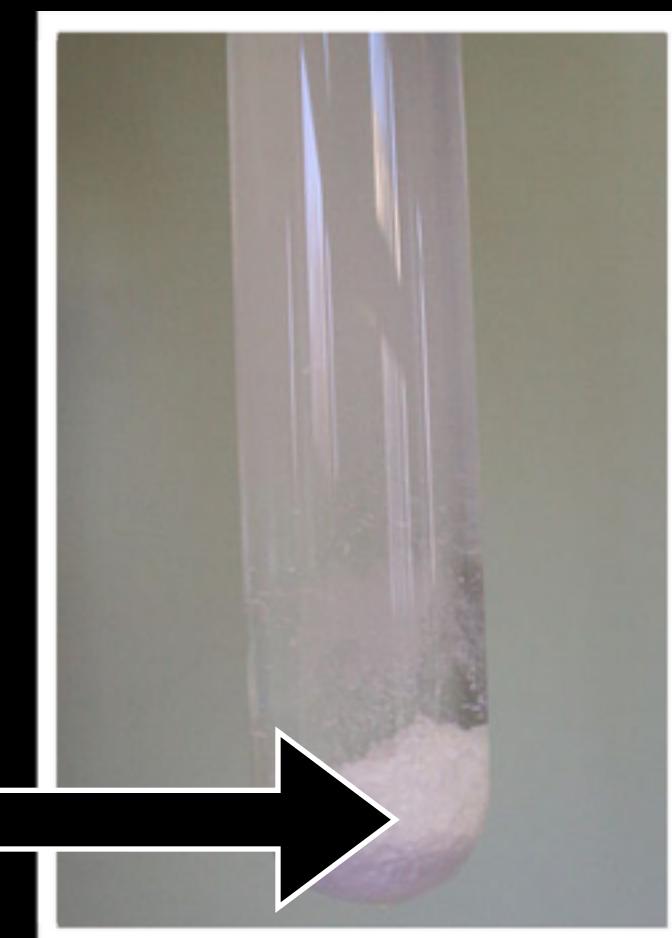
2.21 g CaCl<sub>2</sub>

17  
**Cl**  
Chlorine  
35.45

20  
**Ca**  
Calcium  
40.08

47  
**Ag**  
Silver  
107.87

5.71 g AgCl



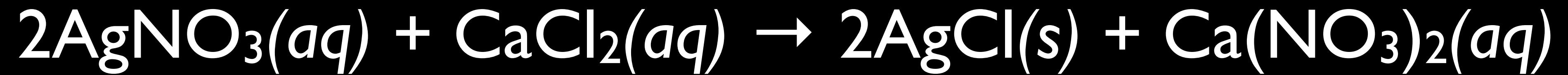
Analyte Mass

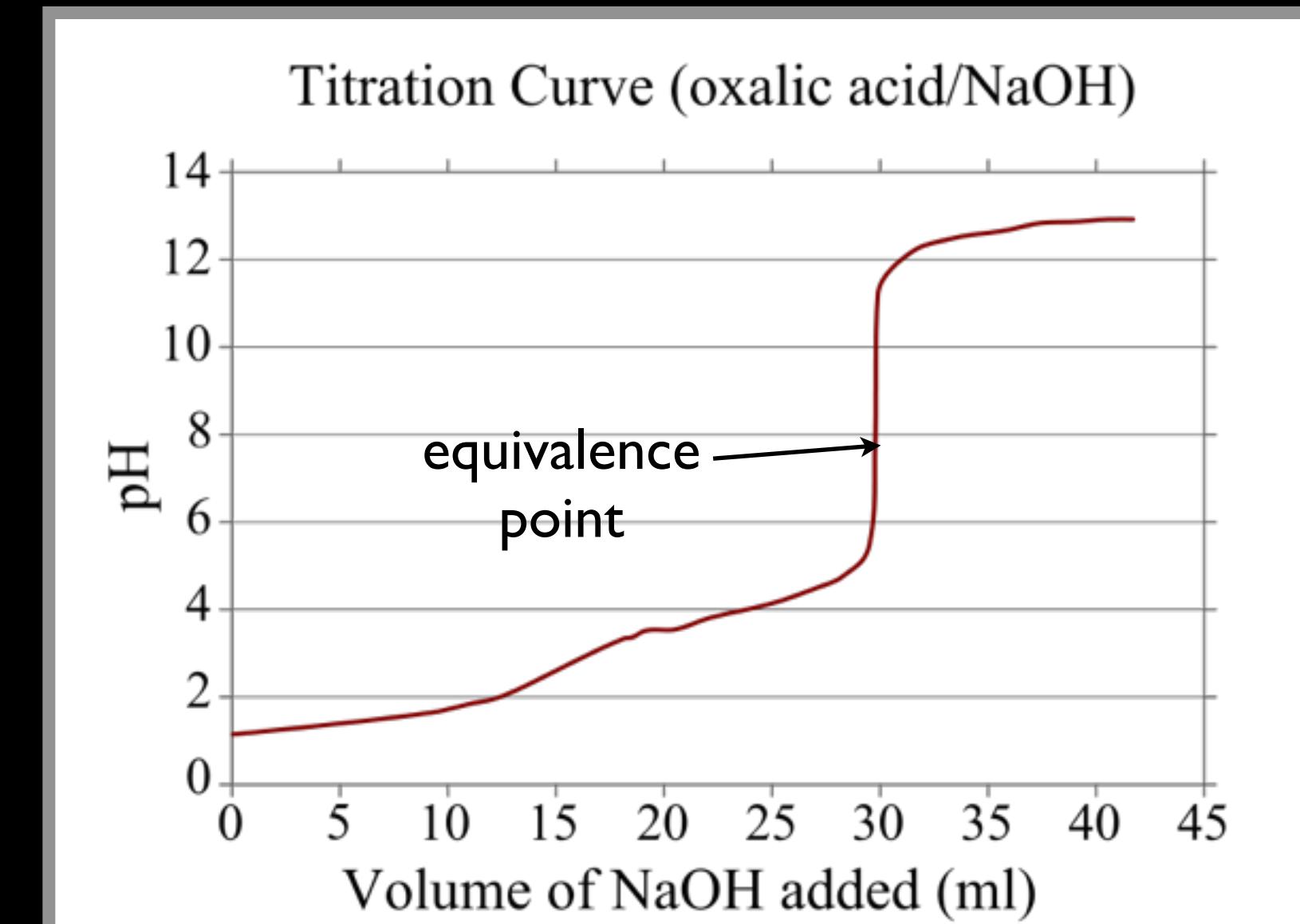
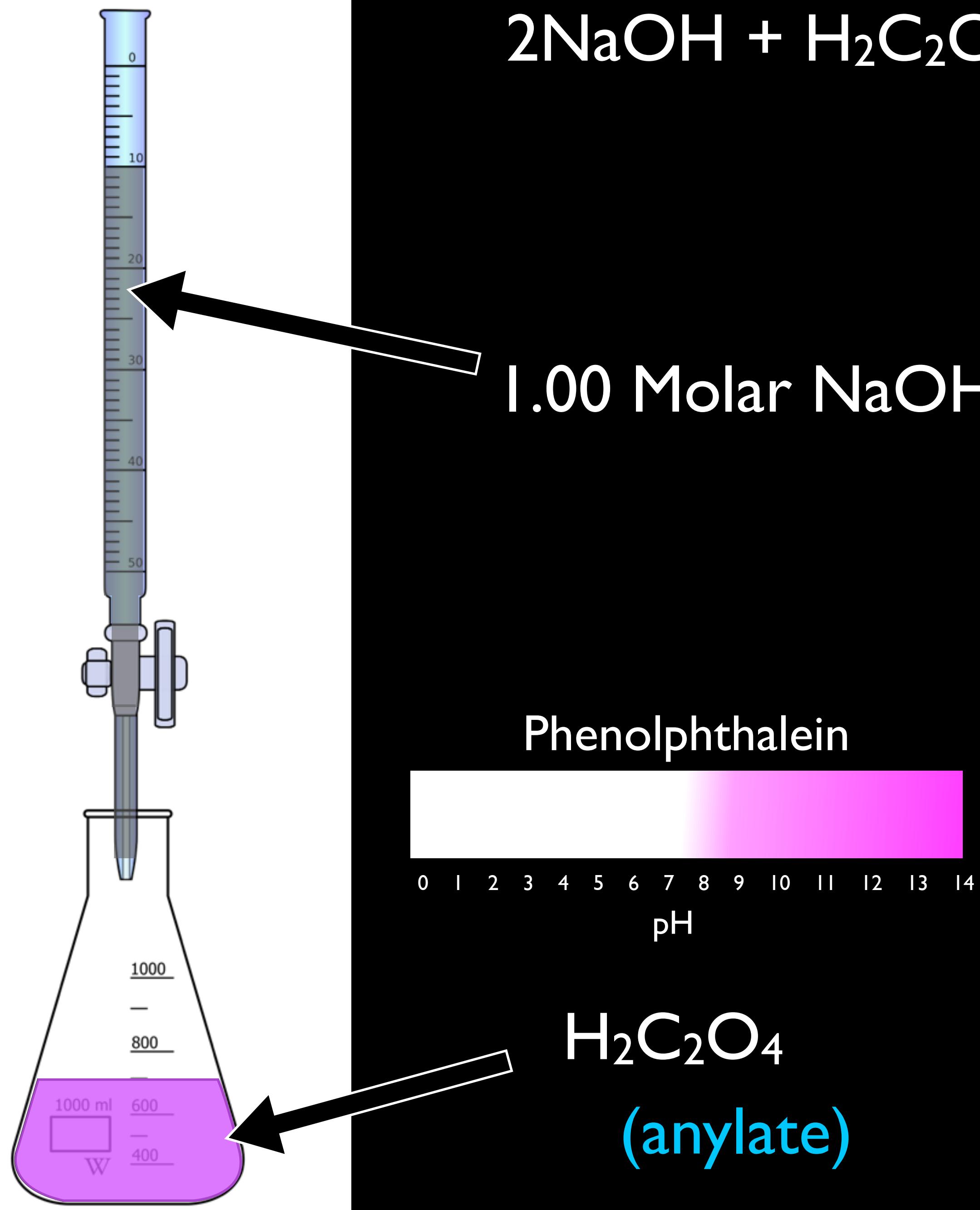
Analyte Moles

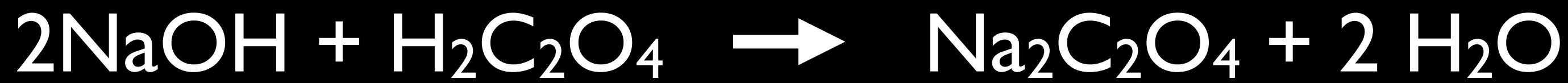
Precipitate Moles

Precipitate Mass

# You Try



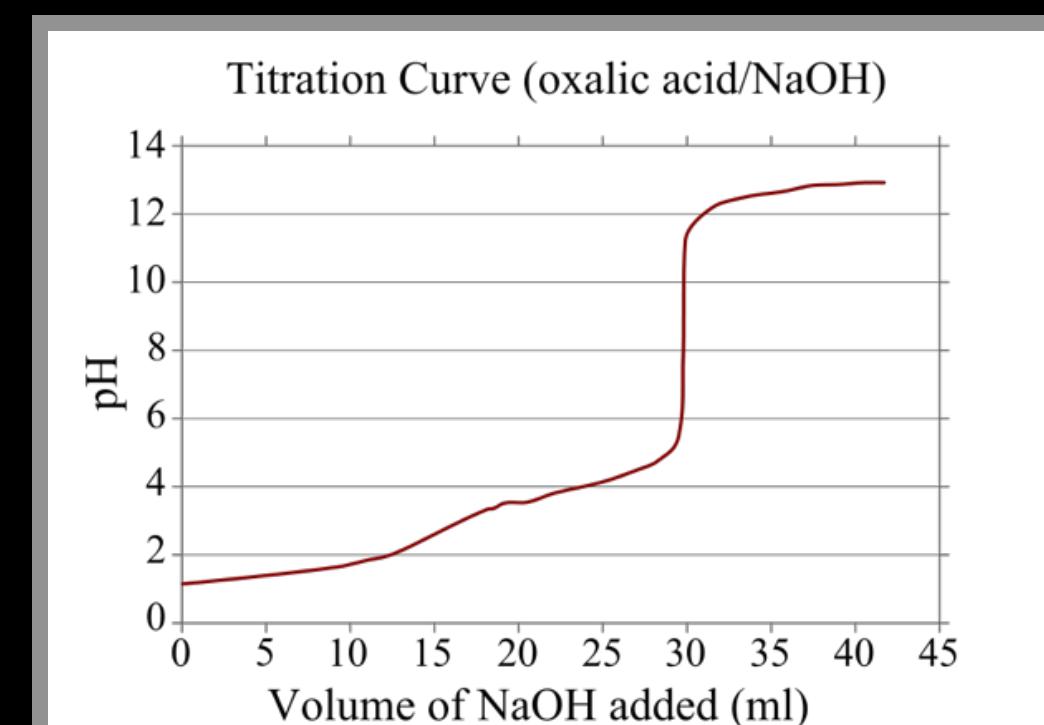




$$\frac{30.0 \text{ mL soln}}{1} \times \frac{1 \text{ Liter soln}}{1000 \text{ mL soln}} \times \frac{1 \text{ mol NaOH}}{1 \text{ Liter soln}} \times \frac{1 \text{ mol H}_2\text{C}_2\text{O}_4}{2 \text{ mol NaOH}}$$

$$\times \frac{90.0 \text{ g H}_2\text{C}_2\text{O}_4}{1 \text{ mol H}_2\text{C}_2\text{O}_4} = 1.35 \text{ g H}_2\text{C}_2\text{O}_4$$

1 <b>H</b> Hydrogen 1.01	6 <b>C</b> Carbon 12.01	8 <b>O</b> Oxygen 16.00
-----------------------------------	----------------------------------	----------------------------------

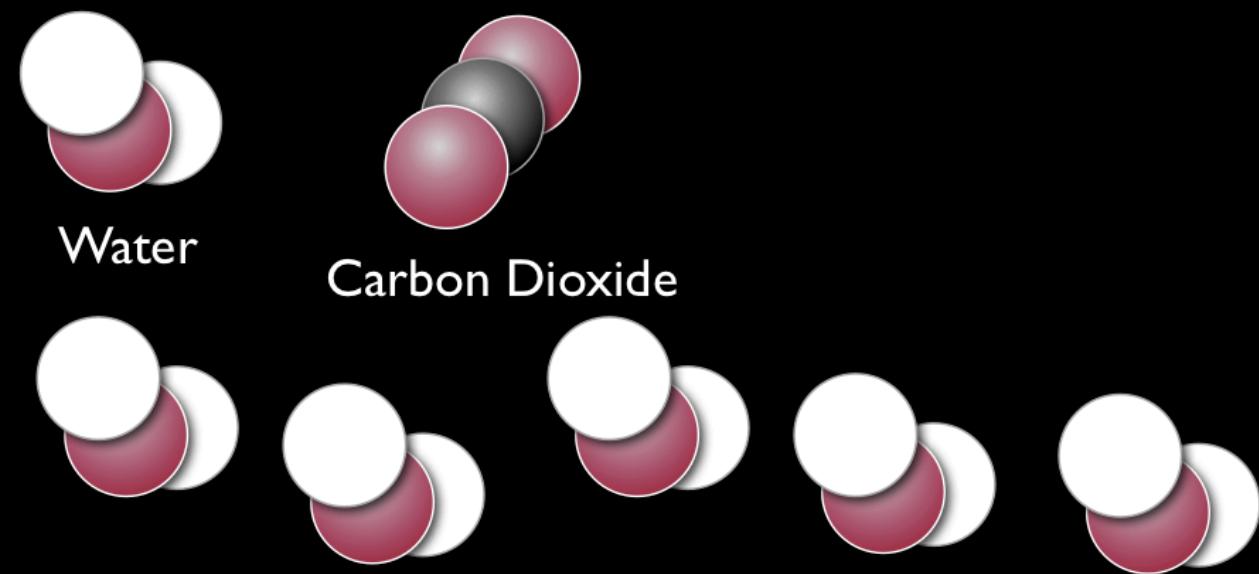
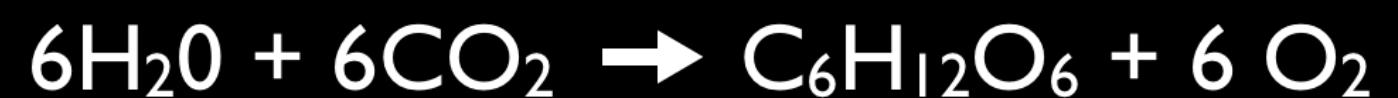


# You Try

How much of the analyte ( $\text{H}_2\text{C}_2\text{O}_4$ ) is present if 25.0 mL of .50 M NaOH is required to reach the equivalence point.

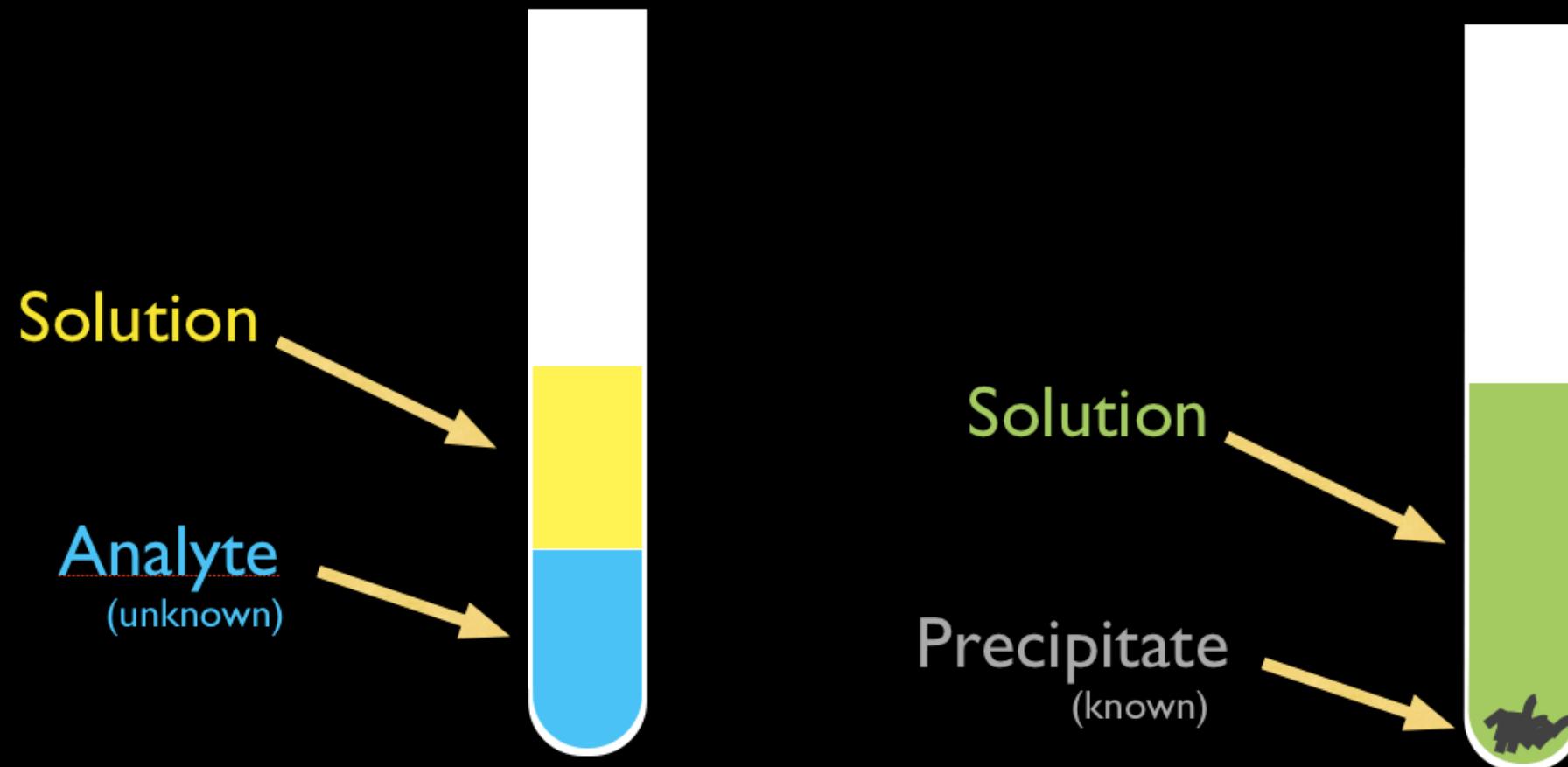
# Did you learn?

## Chemical Reaction



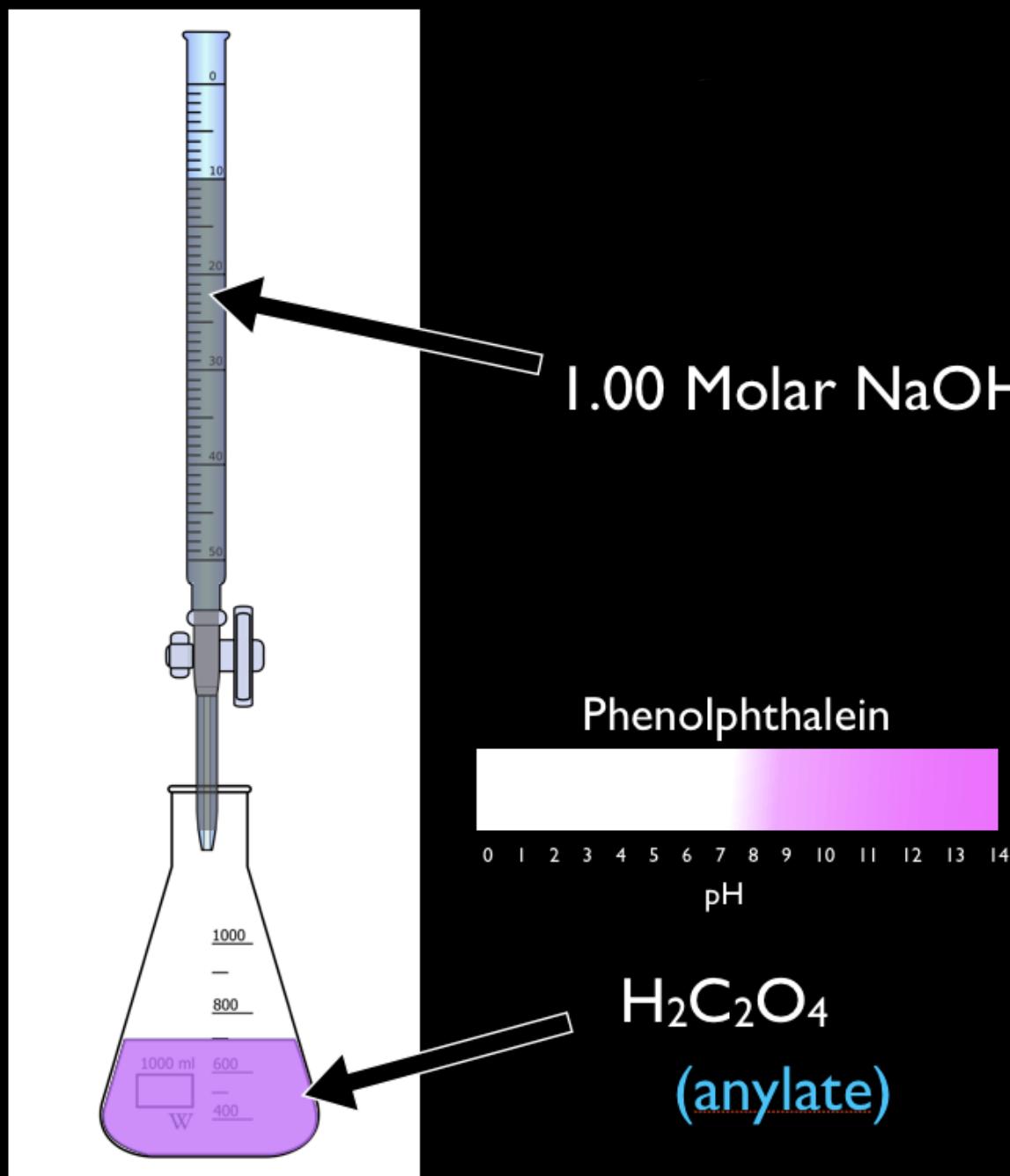
To apply the conservation of atoms in various processes.

# Did you learn?



To use gravimetric analysis to determine the concentration of an analyte in a solution.

# Did you learn?



To use a titration to determine the concentration of an analyte in a solution.

## Acknowledgements

*File:AgCl-Neerslag.jpg*, n.d. <http://commons.wikimedia.org/wiki/File:AgCl-neerslag.jpg>.

Sponk, Erlenmeyer\_flasks\_DE svg: *Deutsch: Verschiedene Erlenmeyerkolben*, September 8, 2010. Erlenmeyer\_flasks\_DE.svg. [http://commons.wikimedia.org/wiki/File:Erlenmeyer\\_flasks\\_FR.svg](http://commons.wikimedia.org/wiki/File:Erlenmeyer_flasks_FR.svg).



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