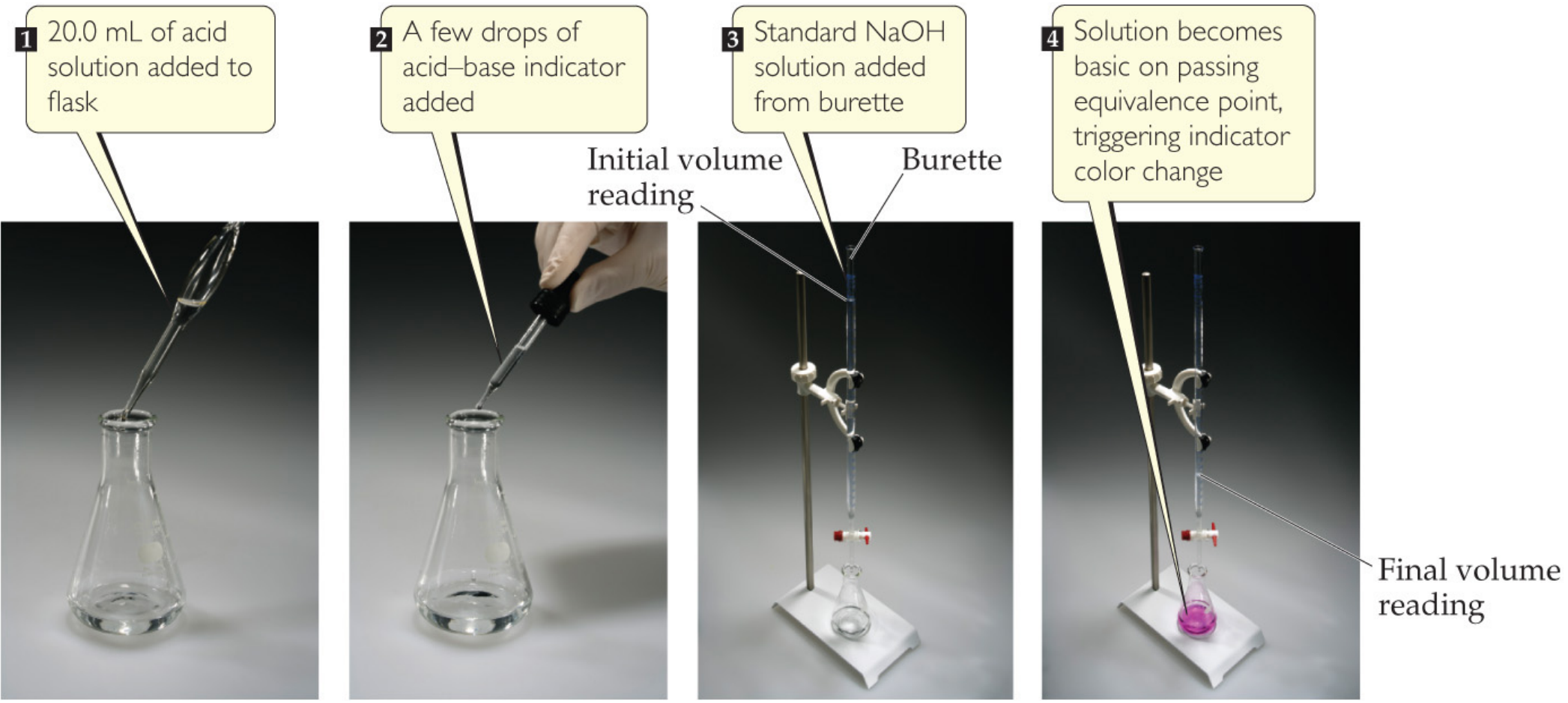
Outline for Today
Monday, Oct. 1

- Chapter 4: Aqueous Reactions and Solution Stoichiometry
  - Acid-Base Reactions
  - Reduction-Oxidation Reactions

Titrations Example Problem

- 50.0 mL of 0.50 M of HCl is added to 20.00 mL of NaOH to reach the equivalence point and neutralize all of the NaOH. What is the concentration of the original NaOH solution?


1 20.0 mL of acid solution added to flask
2 A few drops of acid–base indicator added
3 Standard NaOH solution added from burette
4 Solution becomes basic on passing equivalence point, triggering indicator color change
Initial volume reading
Burette
Final volume reading

Determining Oxidation Numbers

Species	Oxidation Number
Elemental Atoms	0
Monoatomic Ion	Charge on Ion
Hydrogen Bonded to Nonmetal	+1
Hydrogen Bonded to Metal	-1
Oxygen	Usually -2
Fluorine	-1
Other Halogens	Usually -1
Neutral Molecule	Sum of Oxidation Numbers is 0
Polyatomic Ion	Sum of Oxidation Numbers is Ion charge

Balancing Redox Reactions

1. Separate total reaction into two *half reactions.*
2. Assign Oxidation Numbers to each atom
3. Balance each half reaction:
    A. Balance all elements other than H and O
    B. Balance O by adding H_2O
    C. Balance H by adding H^+
    D. Balance charge by adding e^-
4. Multiply half reactions by integers so that half reactions have equal number of electrons
5. Add the half reactions and simplify!

Balancing Redox Half Reactions (Section 20.2)

- Example 1. Balance:

$Cu(s) + NO_3^- \rightarrow Cu^{2+}(aq) + NO_2(g)$

- Example 2. Balance:

$MnO_4^-(aq) + C_2O_4^{2-}(aq) \rightarrow Mn^{2+}(aq) + CO_2(g)$