

The general approach towards carrying out an organic reaction:

- (1) Plan synthesis. Do complete literature search.
- (2) Write out the balanced reaction, using structural formulas. Include by-products.
- (3) Construct a table of relevant data for reactants, products, by-products, solvents, catalysts – e.g., MPs, BPs, MWs, densities, hazardous properties.
- (4) Calculate the correct molar ratios of reactants. Convert moles to grams and milliliters (if liquid).
- (5) Combine correct amounts of reactants, solvents, catalysts in correct order to give specific concentrations. Possibly heat or cool or irradiate with UV light, allow to react for necessary amount of time, possibly follow reaction progress using chromatography (e.g., TLC, GC, HPLC) or spectroscopy (e.g., IR, NMR, UV-VIS).
- (6) After reaction is complete, the reaction mixture is usually a complex mixture of desired product(s), by-products, unreacted starting materials, solvents, catalyst. Product may be light, heat, or air (O<sub>2</sub>) sensitive.
- (7) Separation and purification steps (so-called reaction work-up). Some combination of extractions, distillations, recrystallizations, chromatography, etc are used for the work-up.
- (8) Identify product(s) using spectroscopy (IR, NMR, MS, UV-VIS), X-Ray, chromatography (GC, TLC, HPLC), physical properties (MP, BP, etc), and occasionally chemical tests.