

# Organic Lab Primer

Research in **ORGANIC SYNTHESIS** revolves around the successful execution of experiments as follows:

**I. DESIGN:** Experiments are designed in response to a problem to be solved or a goal to be met.

**(a) BACKGROUND:** In order to understand these problems or goals prior work in the area must be appreciated.

**(b) MECHANISTIC RATIONALE:** A working mechanism or a reaction serves as a foundation for the interpretation of the experiment.

**II. PERFORMING THE EXPERIMENT:** Five operations constitute the actual act.

**(a) SET UP:** This means physical preparation for the reaction. Glassware, reagents, solvents, etc. should be assembled and made ready for use. Special precautions should be taken if warranted by (a) and (b) under **DESIGN**.

**(b) THE ACTUAL REACTION:** Once the reagents and starting materials are combined, the course of the reaction must be monitored, if possible, by an appropriate method (TLC, NMR, or IR, etc.). Physical changes should be noted as well (color, temperature, phase, etc.).

**(c) WORKUP:** Termination (quenching if applicable) of the reaction and preparation for final purification (extraction, filtration, etc.).

**(d) PURIFICATION:** The product(s) is(are) to be isolated using an appropriate technique (crystallization, distillation, or chromatography) if necessary. The purity must be assayed via TLC, NMR, boiling or melting range, etc.

**(e) CHARACTERIZATION:** Product(s) must be characterized using the appropriate analytical tools ( $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, IR, TLC (vs. authentic co-spot), HPLC (vs. authentic co-injection, etc.)). Satisfactory HRMS (oils) or combustion analyses (recrystallized solids) must be obtained for all new substances.

**III. INTERPRETATION OF RESULTS:** Once the product(s) of a reaction have been isolated and identified, the relation of these results to the initial expectations (if any) should be noted and modifications implemented (new **DESIGN**) if necessary.

