

4.1: TYPICAL FLOW OF AN ORGANIC CHEMISTRY EXPERIENCE

There are typically three phases associated with an organic chemistry experiment:

phase 1: Set-up and reaction

The reaction apparatus is set up, and the reactants and solvents are measured and mixed together. The reaction mixture is stirred, and heating the reaction mixture is often necessary.

phase 2: Work-up and purification

The reaction mixture is often quenched with water, and then work-up is performed. Work-up can be a combination of the purification techniques discussed in chapter 2, such as extraction, filtration and/or distillation. The aim of this phase is to separate the main product from the other components, and isolate it in high purity.

phase 3: Characterization

The obtained product is analyzed by means of different techniques, such as melting point analyses, and IR spectroscopy. The aim of this phase, is to obtain information about the identity and the purity of the product.

Keeping this organization in mind can be valuable, as it firmly cements the purpose of the experiment. Each phase has distinct purposes, which all funnel into the overall goal of the experiment.

The set-up and reaction phase is all about setting up the conditions of the experiment. We want a certain chemical reaction to take place, and must add reactants in exact proportions, with solvents and potential catalysts. The reaction conditions, i.e. the temperature, the time and other parameters, are usually defined at the outset. This phase is also crucial in determining the success of the experiment. Without weighing out correct quantities of reactants, for example, or heating the mixture to the correct temperature, the desired reaction may not find place, or competing side-reactions might happen instead

The work-up and purification phase usually involves the most skill and technique. After the reaction stage, we have a mixture of potentially unreacted starting materials, products, solvents and byproducts. At this stage, a series of purification techniques are employed to isolate the product, from this mixture.

The analysis and spectroscopy phase has one aim: to establish the identity and the purity of the compound prepared. Several techniques are involved, usually melting point analyses (if the product is a solid), and IR spectroscopy. In some cases NMR spectroscopy is also used in the teaching lab.

Please notice that while information about the final purity and identity of the compound is obtained in phase 3, the actual outcome of the experiment is determined by what took place during the reaction and the purification stage, phases 1 and 2. We will explore this matter further in the next subchapter.

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