

Background: In this third week of class, we will explore the oddly beautiful naming conventions for organic compounds. This is completely different from the kinds of naming you once did in General Chemistry. Most of the things you will be naming are made up entirely of carbon and hydrogen, and we will need to do it in a way that is completely unambiguous. That is, a single compound should have a single name.

The trick, however, is that Organic Chemistry has two distinct naming conventions (IUPAC, and common). The International Union of Pure and Applied Chemists (IUPAC) is the 'law' when it comes to naming compounds. As a result, molecular names can get very long and confusing, making them impossible to say, even for experts. The common names have come about as a way to capture the 'essence' of a name. We will float between these, and be clear about which convention we are using. Generally, we will deal with IUPAC nomenclature.

The first kind of nomenclature we will encounter deals with alkanes. These are compounds that have only single bonds, and only carbon and hydrogen atoms. Their formula will be something like C_xH_y , which unfortunately doesn't give us a lot of information about their structure. A single formula can have numerous constitutional isomers.

From there, we will go to cyclic compounds, or cycloalkanes. These are very similar to alkanes, since they have only single bonds. They are, however, missing two hydrogen atoms, and have a ring of carbon-carbon bonds. They look like little boxes, pentagons, or hexagons.

This kind of naming gives us a kind of 'backbone' to work from. It also gives us the opportunity to make molecules more complex or interesting by adding in new atoms like oxygen (alcohols and ethers), nitrogen (amines), and halides (alkyl halides). Each of these have specific rules that make it clear to everyone how the structure is related to the formula.

Outcomes: Upon successful completion of the week, students should be able to:

1. Distinguish between formulae and constitutional isomers.
2. Name straight chain and branched alkanes with common and IUPAC names.
3. Name cycloalkanes.
4. Name amines, ethers, alcohols, and alkyl halides.
5. Convert between names and formulae.

Recommended Problems:

3.55, 3.57, 3.59, 3.62, 3.67, 3.70, 3.72, 3.73, 3.80