Chapter 11

Understanding Nomenclature (Part 2): Naming Molecules That Contain a Carbonyl and/or More Than One Type of Functional Group

Key Concepts

Assigning an IUPAC name to carbonyl compound follows the process described in Chapters 1, 2, and 4. In contrast, the common name of a carbonyl compound generally isn't determined using the format presented in Chapter 3. Instead, it is usually based on the common name of the carboxylic acid that the structure is derived from.

IUPAC and common name nomenclature endings for carbonyl-based functional groups include:

Carboxyl**ic acid**	**IUPAC: -oic acid**	**Common Name: -ic acid**
Ac**yl halide**	**IUPAC: -oyl halide**	**Common Name: -yl halide**
Acid **anhydride**	**IUPAC: -oic -oic anhydride**	**Common Name: anhydride**
Ester	**IUPAC: -oate**	**Common Name: -ate** **–olactone for cyclic esters**

(It may help to remember the phrase…Ester ate oatmeal)

Amide	**IUPAC: -amide**	**Common Name: -amide** **-olactam for cyclic amides**
Aldehyde	**IUPAC: -al**	**Common Name: aldehyde**
Ket**one**	**IUPAC: -one**	**Common Name: -ophen**one** when a phenyl group is on one side **ketone (derived)**
Nitrile	**IUPAC: -nitrile**	**Common Name: -onitrile** **cyanide(derived)**

(Blue highlighting indicates that the common name rules match those discussed in Chapter 3. In other words, a derived name is based on the specific group, with attached carbons named as substituents. A ketone includes the entire C=O group, while a CyaNide group includes the Carbon that is attached to the Nitrogen through a triple bond.)

When a molecule has multiple functional groups, those groups are generally prioritized for the molecule's IUPAC or common name.

The more bonds to oxygen and/or nitrogen within any given functional group, the higher its priority. If two functional groups have the same total number of bonds to oxygen and nitrogen, they are further prioritized based on the number of bonds to oxygen.

Each lower priority functional group is given an alternate name that is alphabetized with any substituent names. Lower priority names include:

- **Amido for amide groups**
- **Oxo for aldehyde or ketone groups**
- **Hydroxy for OH groups**
- **Amino for amine groups**

What You Need to Learn, Understand, and Apply

3. **How to classify carbonyl-based functional groups.**
4. **How to name carboxylic acids using IUPAC and common name nomenclature rules.**
5. **How to name acyl halides, acid anhydrides, esters, lactones, amides, lactams, aldehydes, and ketones using IUPAC and common name nomenclature rules.**
6. **How to name organic molecules that contain more than one functional group.**
7. **The skills needed to apply the material and to avoid common errors.**