

# IUPAC Organic Nomenclature Overview



## Metamerism

### Definition:

Metamerism is a type of structural isomerism in organic chemistry where compounds have the same molecular formula but different arrangements of alkyl groups on either side of a functional group. This functional group can be an ether (-O-), amine (-NH-), thioether (-S-), etc. The key characteristic of metamerism is the variation in the alkyl chains attached to the polyvalent atoms or functional groups.

### Key Features:

- **Same Molecular Formula:** Metamers have the same molecular formula.
- **Different Alkyl Groups:** They differ in the nature and length of the alkyl chains attached to the central functional group.
- **Functional Group:** The central functional group remains the same.

### Examples:

#### 1. Ethers (R-O-R')

- **Diethyl Ether:**  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
- **Methyl Propyl Ether:**  $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$

#### 2. Amines (R-NH-R')

- **Ethyl Methyl Amine:**  $\text{CH}_3\text{CH}_2\text{NHCH}_3$
- **Dimethyl Amine:**  $\text{CH}_3\text{NHCH}_3$

#### 3. Thioethers (R-S-R')

- **Ethyl Methyl Sulfide:**  $\text{CH}_3\text{CH}_2\text{SCH}_3$
- **Dimethyl Sulfide:**  $\text{CH}_3\text{SCH}_3$

### Characteristics of Metamerism:

- **Similar Chemical Properties:** Metamers generally exhibit similar chemical properties because they contain the same functional group.
- **Different Physical Properties:** The physical properties such as boiling points, melting points, and solubilities can vary due to differences in the alkyl chain lengths and branching.
- **Occur in Compounds with Polyvalent Atoms:** Metamerism is common in compounds containing polyvalent atoms or groups such as oxygen (ethers), nitrogen (amines), sulfur (thioethers), etc.

### Summary:

Metamerism is a type of structural isomerism where compounds with the same molecular formula have different arrangements of alkyl groups attached to a central functional group. This results in isomers with distinct physical properties but similar chemical properties due to the presence of the same functional group. Understanding metamerism helps in recognizing the diversity and complexity of organic compounds.