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# Organic Chemistry Fundamentals (Quick Study Academic)

**ORGANIC CHEMISTRY FUNDAMENTALS**

**Types of Organic Compounds**

Organic chemistry is the study of natural and synthetic materials that have carbon atoms as the key chemical feature. There are more than one million known organic compounds.

**ALIPHATIC**

- Alkanes:  $C_nH_{2n+2}$
- Alkenes:  $C_nH_{2n}$
- Alkynes:  $C_nH_{2n-2}$

**ADDED**

**ALCOHOL**  $R-OH$

- Methanol:  $CH_3OH$  (methyl alcohol)
- Ethanol:  $C_2H_5OH$
- Isopropanol:  $C_3H_7OH$
- Glycerol:  $C_3H_8O_3$

**ETHER**  $R-O-R$

- Dimethyl ether:  $C_2H_6O$

**SPICY**  $C_2H_4O$

- Oxirane:  $C_2H_4O$  (epoxide)

**PEROXIDE**  $R-O-O-R$

- Acetone Peroxide:  $C_4H_8O_4$

**Aliphatic Peroxide:  $C_nH_{2n}O_2$**

**ESTER**

- Ethyl Acetate:  $CH_3CO_2C_2H_5$
- Other derivatives: Formic acid:  $HCOOH$ , Acetic Anhydride:  $(CH_3CO)_2O$

**AMINE**

- Methyl Amine:  $CH_3NH_2$
- Phenylamine:  $C_6H_5NH_2$  (aniline)
- R-NH<sub>2</sub> (1°), R<sub>2</sub>NH (2°), R<sub>3</sub>N (3°)

**NITRO**  $R-NO_2$

**DIAZO**  $R-N=N$

**NITRILE**  $R-CN$

**Alkene Nitrile:  $C_nH_{2n-3}N$**

**AMIDE**  $CH_3CONH_2$

**SULFUR ADDED**

- Thiol:  $R-SH$
- Thioether:  $R-S-R'$
- Sulfide:  $R-S-S-R'$
- Sulfone:  $R-SO_2-R'$
- Sulfoxide:  $R-SO-R'$
- Sulfonic Acid:  $R-SO_3H$

**HALOGEN ADDED**

- Haloalkane:  $CH_3Cl$  chloromethane
- Haloalkene:  $CH_2=CHCl$
- Chloroalkene:  $CH_2=CHCl$
- Acyl Halide:  $R-CO-X$
- Alkyl Halide:  $Al-X$

**Formulas & Isomers**

**Molecular Formula:** Chemical symbols with subscripts denote the composition of a compound.

**Empirical Formula:** Subscripts denote the relative chemical composition.

**Graphical depiction:**

- Ball Formula:** Diagram all atoms, show bonds as spheres.
- Stick Line Formula:** Half H, carbon atoms are depicted as lines, but other atoms are shown explicitly.

**Newman Projection:** 2-d depiction

**3-dimensional:** Wedges of surface denote structure.

**SUBDIVISIONS OF ISOMERS**

**Isomers:** Different compounds with same molecular formula.

- Constitutional isomers:** Atoms have a different connectivity.
- Structural isomers:** Same connectivity but differ in the arrangement of their atoms.
- Enantiomers:** Mirror images that are not superimposable.
- Diastereomers:** Not mirror images.

**Conformational isomers:** Differ in bond connectivity (e.g. rings, bonds, branching, substituent positions).

**Functional isomers:** Early interconversion structural isomers (e.g. ketone and alcohols).

**Chiral:** Not identical with its mirror image.

**Achiral:** Has a plane of symmetry (i.e., superimposable on its mirror image).

**Enantiomers:** Pair of diastereomers which differ only in the configuration of one atom.

- More than 1 chiral center:
  - 1 chiral center, 2<sup>n</sup> stereoisomers
  - More: 2 chiral centers, 4 isomers, 3 stereoisomers, 1 achiral (meso-form)

**R,S Notation:** The 4 different atoms or groups attached to a central atom are ranked (1, 2, 3, 4) and, with the viewer, the sequence of a line produces clockwise (R) or counter-clockwise (S) configuration.

**C-Hand of Priority Activity:** In the rotation of plane polarized light, R,S opposite effects.

**Resonance:** With rotation of stereocenters (or not optical activity).

**Transformation:** from R,S and (S) to the compound form (e.g. R or trans isomer).

**Isomer Diagram:** Diagram depicts chiral (S, R) structure.

**Molecular Conformations:** Molecule exhibits structural variation due to free rotation about C-C single bond.

**Newman Diagram:** Depict rotation about a C-C bond, **up/down** (high energy), **anti** (low energy), and **gauche** (intermediate energy).

**Common Terms**

**Aliphatic:** Non aromatic.

**Aromatic:** Benzene ring.

**Conjugation:** Sequence of alternating double (or triple) and single bonds.

**Inductive Effect:** Polar solvent influences ion formation.

**Exothermic Reaction:** Chemical reaction that loses energy during the process of the reaction.

**Biomimetic:** Non-carbon atom in the ring structure.

**Hydrocarbon:** Compound of H and C.

**Radical:** Molecule made up of a nonmetalloid bonded to a carbon.

**Monosaccharide:** Carbohydrate that cannot be reduced by hydrolysis into another simple sugar.

**Olefin:** Alkene.

**Paraffin:** Alkane.

**Radioisotope:** Isotope that is radioactive.

**Saturated:** Maximum # of H (all C-C single bonds).

**Unsaturated:** Monosaccharide with four carbon atoms.

**Unsaturated:** At least one C-C multiple bond.

**Zenology:** The study of the process of formation.



## Synopsis

Quick Reference for the core essentials of a subject and class that is challenging at best and that many students struggle with. In 6 laminated pages our experienced chemistry author and professor gathered key elements organized and designed to use along with your text and lectures, as a review before testing, or as a memory companion that keeps key answers always at your fingertips. As many students have said "it's a must have" • study tool. Suggested uses: o Quick Reference " instead of digging into the textbook to find a core answer you need while studying, use the guide to reinforce quickly and repeatedly o Memory " refreshing your memory repeatedly is a foundation of studying, have the core answers handy so you can focus on understanding the concepts o Test Prep " no student should be cramming, but if you are, there is no better tool for that final review

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## Customer Reviews

My wife loves this thing for studying in her chemistry class. She has several of the other BarCharts and likes them all. Sure, you're paying a few bucks for a laminated piece of cardstock with some stuff printed on it, but it is very intelligently laid out.

I used this with the "Organic Chemistry Reactions" Quickstudy to study for the PCAT. It has been over 7 years since I took organic chemistry, and these were my primary resource to brush up on the subject. I love how portable it is and that all the information you need is in one place.

This is good for Orgo 1 topics. It has very few of what is newly encountered in Orgo 2. However, we all know that we need Orgo 1s knowledge so even if you're in Orgo 2, this little quick reference guide is helpful.

This resource sheet is so helpful when studying for organic chemistry. I purchased it before I began the class and it helped to show what I would be doing and using it as a reference when studying further material saves me time from having to look back in the text book. I will definitely hold on to it when starting Organic 2.

This is a great reference tool for my Chemistry class. Having the necessary formulas and notes in one place is very helpful. I will have a good 2 years of Chemistry and Organic Chemistry to get through to complete my degree. Tools like these are a Godsend.

I purchased this product at my school's bookstore and later returned it because it only contained basic information on the first page. The remaining three were dedicated to reactions, which are also on a separate Quick Study folder. So, if you are looking for basic essentials such as definitions and examples, this is not for you.

Organic chemistry is not easy. It never will be. However this really useful study guide will definitely make your time studying for your exams much more bearable and less frustrating. I used it daily as a reference when I was taking Ochem at my uni.

When it arrived, and I saw it was simply a laminated trifold, I felt ripped off. \$7 for a trifold laminate? The text is almost too small (but if you have 10/10 vision like most college students, it might be readable without glasses..). As far as the content goes, it's decent, but far from profound. Maybe I expect too much these days....

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