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## Functional groups examples pdf

Functional groups are collections of atoms in organic chemistry molecules that contribute to the chemical properties of the molecule and participate in predictable reactions. These groups of atoms contain oxygen or nitrogen or sometimes sulfur attached to a hydrocarbon skeleton. Organic chemists can tell us a lot about a molecule of the functional groups that make up a molecule. Every serious student should memorize as many as they can. This short list contains many of the most common organic functional groups. It should be noted that R in each structure is a wildcard notation for the rest of the molecule's atoms. In organic chemistry, a functional group is a set of atoms within molecules that work together to react in predictable ways. Functional groups undergo the same chemical reactions no matter how large or small the molecule is. Covalent bonds link the atoms within functional groups and connect them to the rest of the molecule. Examples of functional groups are the group hydroxyl, ketone group, amine group and ether group. This is the general structure of a hydroxyfunctional group. Itinerant trader / public domain Also known as the alcohol group or hydroxy group, the hydroxyl group is an oxygen atom bound to a hydrogen atom. Hydroxy groups connect biological molecules via dehydration reactions. Hydroxyls are often written as OH on structures and chemical formulas. While hydroxyl groups are not very reactive, they easily form hydrogen bonds and tend to make molecules containing them soluble in water. Examples of common compounds containing hydroxyl groups are alcohols and carboxylic acids. This is the general structure of the aldehyde functional group. Todd Helmenstine Aldehydes consist of carbon and oxygen double-bonded together and hydrogen bonded to carbon. An aldehyde can be found as either keto or enol tautomer. The Aldehyde Group is polar. Aldehydes have formula R-CHO. This is the general structure of the ketone functional group. Todd Helmenstine A ketone is a carbon atom double-bonded to an oxygen atom that appears as a bridge between two other parts of a molecule. Another name for this group is the carbonyl functional group. Note how the aldehyde is a ketone where an R is the hydrogen atom. This is the general structure of the amine functional group. Todd Helmenstine Amine functional groups are derivatives of ammonia (NH<sub>3</sub>) in which one or more of the hydrogen atoms are replaced by an alkyl or aryl functional group. The beta-Methylamino-L-alanine molecule has the aminofunctional group. MOLEKUUUL/SCIENCE PHOTO LIBRARY / Getty Images The amino functional group is a basic or alkaline group. It is commonly found in amino acids, proteins, and nitrogenous bases used to build DNA and RNA. The amino group is NH<sub>2</sub>, but under acid conditions, it gets a proton and becomes NH<sub>3</sub><sup>+</sup>. Under neutral conditions (pH = 7), the amino group of an amino acid carries the +1 charge, giving an amino acid a positive charge at its amino portion of the molecule. This is the general structure of the amide functional group. Todd Helmenstine Amides are a combination of a carbonyl group and an amine functional group. This is the general structure of an ether functional group. Todd Helmenstine An ether group consists of an oxygen atom that forms a bridge between two different parts of a molecule. Ethers have formula ROR. This is the general structure of an ester functional group. The Todd Helmenstine Ester Group is another group of bridges consisting of a carbonyl group connected to an ether group. Esters have formula RCO<sub>2</sub>R. This is the general structure of the carboxyl functional group. Todd Helmenstine Also known as the carboxyl functional group, the carboxyl group is an ester in which a substituent R is a hydrogen atom. Carboxyl group is usually designated by -COOH This is the general structure of the functional group of tenes. Todd Helmenstine The functional group of thiols is similar to the hydroxyl group except the oxygen atom of the hydroxyl group is a sulfur atom in the thiol group. Thiol functional group is also known as a sulfhydryl functional group. Thiol functional groups have formula -SH. Molecules containing thiols are also called mercaptans. This is the general structure of the phenyl functional group. Todd Helmenstine This group is a joint ring group. It is a benzene ring in which a hydrogen atom is replaced by the R substituent group. Phenyl groups are often designated by the abbreviation Ph in structures and formulas. Phenyl groups have formula C<sub>6</sub>H<sub>5</sub>. Sources Brown, Theodore (2002). Chemistry: The central science. Upper Saddle River, NJ: Prentice Hall. p. 1001. ISBN 0130669970. March, Jerry (1985). Advanced Organic Chemistry: Reactions, Mechanisms and Structure (3rd ed.). New York: Wiley. ISBN 0-471-85472-7. Moss, G. P.; Powell, W.H. (1993). RC-81.1.1. Monovalent radical centers in saturated acyclic and monocyclic hydrocarbons, and the mononuclear EH4 mother hydrides in the coal family. IUPAC recommendations. Department of Chemistry, Queen Mary University, London. This list includes several common functional groups, but there are many more because organic chemistry is everywhere. Several more functional group structures are available in this gallery. Functional groups are groups of atoms found within molecules involved in the chemical reactions characteristic of these molecules. Functional groups can relate to all molecules, but you will usually hear about them in connection with organic chemistry. The symbol R and R' means a fixed hydrogen or hydrocarbon side chain or sometimes to any group of atoms. This is an alphabetical list of important functional groups: Functional groups The acyl functional group is the part of the structure highlighted in green. Todd Helmenstine An acyl group is a functional group with formula RCO- where R is bound to the carbon atom with a single bond. Functional Groups This is the general structure of an acyl halide group where X is a halogen atom. Todd Helmenstine An acylhalogen is a functional group with formula R-COX where X is a halogen atom. The functional group aldehyde has the formula RCHO. It has the prefix aldo and suffix -al. Ben Mills The alkenyl functional group is a type of functional group for hydrocarbons based on an alkene. It is characterized by its double bond. Ben Mills Isopropyl group is an example of an alkyl group. Su-no-G The functional group alkynyl is a functional hydrocarbon group based on an alkyne. It is characterized by its triple bond. Ben Mills The formula for the functional group azide is RN<sub>3</sub>. This is the structure of the functional group azo or diimide. Ben Mills The formula for the functional group azo or diimide is RN<sub>2</sub>R'. The butyl functional group is a functional hydrocarbon group derived from toluene. Ben Mills The functional group Bromo is a bromoalkane characterized by a carbon-bromine bond. Ben Mills This is the chemical structure of the butyl functional group. Todd Helmenstine The molecular formula for the functional group butyl is R-C<sub>4</sub>H<sub>9</sub>. The functional group carbonate tests have the formula ROCOOR and are derived from carbonate. Ben Mills The functional group carbonyl is based on the ketone group. It has the formula RCOR'. The prefix for this group is keto or oxo or its suffix is -one. Ben Mills The urexamide functional group is an amide. Ben Mills The formula for a carboxamide group is RCONR<sub>2</sub>. Vinyl acetate contains the carboxyl group. Basics/Getty Images The formula for the carboxyl function group is RCOOH. It is based on carboxylic acid. The formula for the carboxylate functional group is RCOO<sup>-</sup>. The carboxylate group is based on carboxylate and has the carboxyl prefix or -oate suffix. Ben Mills The chlorofunctional group is a chloroalkane. It is characterized by a carbon-chlorine bond. Ben Mills The formula for the functional group cyanate is ROCN. Ben Mills The formula for the disulfide functional group is RSSR'. InfoCan, Wikipedia Commons The formula for ester functional group is RCOOR'. Ben Mills The general formula for the ether functional group is ROR'. Ben Mills functional groups This is the chemical structure of the ethyl functional group. Todd Helmenstine The molecular formula for the ethyl functional group is C<sub>2</sub>H<sub>5</sub>. The fluorine functional group is a fluorocarbon. It contains a carbon-fluorine bond. Ben Mills The halo functional group refers to any haloalkane, or alkane containing an atom of a halogen, such as chlorine, bromine, or fluoride. The functional group halo contains a carbon-halogen bond. Ben Mills The haloformyl functional group is an acylhalogen characterized by a carbon-oxygen double bond and a carbon-halogen bond. Ben Mills This is the chemical structure of the heptyl functional group. Todd Helmenstine The molecular formula for the functional group heptyl is R-C<sub>7</sub>H<sub>15</sub>. This is the chemical structure of the functional hexyl group. Todd Helmenstine The molecular formula for hexylene hexylene group is R-C<sub>6</sub>H<sub>13</sub>. Functional Groups This is the general structure of hydrazone functional group. Todd Helmenstine The functional group Hydrazone has the formula R<sub>1</sub>R<sub>2</sub>C=NNH<sub>2</sub>. The formula for the hydroperoxyfunctional group is ROOH. It is based on hydroperoxide. The hydroxyl functional group is an oxygenous group based on an alcohol or transparencies group. Ben Mills The formula for the function group for imide is RC(=O)NC(=O)R'. InfoCan, Wikipedia Commons The iodo functional group is an iodine atom with a carbon-iodine bond. Ben Mills The formula for isocyanate functional group is RNCO. Ben Mills The formula for the isothiocyanate group is rncs. Ben Mills This is the general structure of the ketone functional group. Todd Helmenstine Ketone is a carbonyl group bound to two carbon atoms where neither R<sub>1</sub> nor R<sub>2</sub> can be hydrogen atoms. Functional Groups This is the general chemical structure of the methoxyfunctional group. The Todd Helmenstine Methoxy Group is the simplest alkoxy group. The methoxy group is usually abbreviated -OMe in reactions. This is the chemical structure of the methylfunctional group. Todd Helmenstine The molecular formula for methyl functional group is R-CH<sub>3</sub> Nitric acid is the basis of the nitrate group. MOLEKUUUL/SCIENCE PHOTO LIBRARY / Getty Images The general formula for a nitrate is RONO<sub>2</sub>. The formula for the nitrile functional group is RCN. Ben Mills This is the two-dimensional structure of the nitro functional group. Ben Mills The formula for the functional nitro group is RNO<sub>2</sub>. This is the chemical structure of the nonyl functional group. Todd Helmenstine The nonylene molecular formula functional group is R-C<sub>9</sub>H<sub>19</sub>. This is the chemical structure of the octane functional group. Todd Helmenstine The molecular formula for the octyl functional group is R-C<sub>8</sub>H<sub>17</sub>. This is the chemical structure of the functional group pentyl. Todd Helmenstine The molecular formula for the peroxifunctional group is ROOR. The peroxy group is based on peroxide. Ben Mills The phenylfunctional group is a functional hydrocarbon group derived from benzene. Ben Mills This is the two-dimensional structure of the phosphate functional group. Ben Mills The formula for phosphonic functional group is ROP(=O)(OH)<sub>2</sub>. The formula for a phosphine is R<sub>3</sub>P. The phosphodiester group is a type of phosphate. Ben Mills The formula for the phosphodiester group is HOPO(OR)<sub>2</sub>. This is the two-dimensional structure of the phosphonic acid or phosphonic functional group. Ben Mills The formula for the phosphonic oxygen function group is RP(=O)(OH)<sub>2</sub>. A primary amine is one of the amine functional groups. Ben Mills The formula for a primary amine is 2. The formula for the primary ketimine group is RC(=NH)R'. This is a type of primary imine. Ben Mills This is the chemical structure of the propyl functional group. Todd Helmenstine The molecular formula for the functional group propyl is R-C<sub>3</sub>H<sub>7</sub>. Pyridylene group is a derivative of pyridine. Ben Mills The formula for the pyridyl group is RC<sub>5</sub>H<sub>4</sub>N. The location of the nitrogen in the ring varies. The secondary function group aldimine has the formula RC(=NR')H. It is a type of imine. Ben Mills A secondary amine group is a type of amine. Ben Mills The formula for a secondary amine is R<sub>2</sub>NH. The formula for the secondary chemotone functional group is RC(=NR)R'. The secondary ketimine is a type of secondary imine. Ben Mills The formula for sulphide or dithera function group is RSR'. This is the two-dimensional structure of sulfone or sulfonyl functional group. Ben Mills The formula for the functional sulfon group is RSO<sub>2</sub>R'. This is the two-dimensional structure of sulphenic acid or sulfo functional group. Ben Mills The formula for the sulphical acid functional group is RSO<sub>3</sub>H. The formula for the functional group of sulfoxide or sulfinyl is RSOR'. Ben Mills A tertiary amine group is a type of amine. Ben Mills The formula for a tertiary amine is R<sub>3</sub>N. The formula for the thiocyanate functional group is RSCN. Ben Mills The formula for the functional group for thiol or sulfhydryl is RSH. Ben Mills functional groups This is the chemical structure of vinyl or ethyl functional group. Todd Helmenstine The molecular formula for the vinyl functional group is C<sub>2</sub>H<sub>3</sub>. It is also known as the ethylfunctional group. Group.

