

Dehydration Synthesis Encyclopedia Article

Dehydration Synthesis

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Dehydration Synthesis

Dehydration synthesis is a chemical reaction in which one or more molecules of water are removed from the reactants to form a new product. These reactions can occur when one of the reactants has a hydroxyl group (OH) that can be cleaved, thus forming the negatively charged hydroxide ion (OH⁻). The other reactant must have a hydrogen atom which can be cleaved to yield a hydrogen, or hydronium, ion (H⁺). In solution, these ions are free to combine and form a water molecule. The respective reactants are then able to form a chemical bond that creates a new compound.

Because of the ready availability of their hydroxyl groups, many alcohols readily participate in dehydration reactions. When an alcohol loses its hydroxyl group it can combine with other electron loving species to form a new reaction product. If the alcohol loses the hydroxyl group in addition to one of its own hydrogen atoms, a new carbon-carbon bond can be formed within the molecule. When this occurs the alcohol is transformed into an unsaturated compound or into an ether. The nature of the reaction depends on the class of the alcohol. For example, ethyl alcohol, or ethanol, undergoes dehydration to form ethylene or diethyl ether. Certain polymers are also formed by this type of reaction. Dehydration synthesis is essentially the opposite of hydrolysis which is the process of breaking down compounds by dissolving in water.