



## Codexis Glossary of Terms

### **Active Pharmaceutical Ingredient (API)**

The pharmaceutically active substance (molecule) in a drug.

### **Biocatalyst or Biological Catalyst**

A catalyst derived from a living organism. Enzymes and fermentation strains are common biocatalysts. Biocatalysts significantly speed chemical reactions.

### **Biofuels**

Fuels derived from biomass. Biofuels are a renewable energy source. Alcohols such as ethanol and butanol are sometimes called bioethanol and biobutanol when they are derived from biomass.

### **Biomass**

Any living or recently living biological material that can be used to produce fuel. Most often, biomass refers to plant matter that is grown for biofuels. Biomass can be grown sources including switch grass, hemp, willow, corn and sugarcane plants.

### **Butanol**

An alcohol primarily used as a solvent, as an intermediate in chemical synthesis and as a fuel. It can be produced from biomass and fossil fuels and is more similar to gasoline than ethanol. Butanol can be made from the same crops – corn, sugar, wheat and grain – or agricultural byproducts (corn stalks and straw) as ethanol.

### **Chiral**

A chiral molecule is asymmetric, it cannot be superimposed on its mirror image. Many chemicals important to life are chiral. The US FDA requires that the two mirror image forms ('enantiomers') of a chiral compound be treated as different products that must be tested separately. Consequently, there has been extensive research into developing methods for making one or the other of the enantiomers – in other words, making the molecule chirally pure.

### **DNA Shuffling**

A research technique that takes select genes or gene variants and then recombines or "shuffles" the DNA to create new hybrid genes. The resulting gene library is then screened for novel biocatalysts that possess desired properties.

### **Enzyme**

Proteins that act as catalysts, or biocatalysts, in living organisms.

### **Ethanol**

An alcohol created by fermenting biomass high in carbohydrates through a process similar to brewing beer. Most ethanol is made using sugars and starches, but researchers are working to more efficiently make alcohol from cellulose and other polymers in plants. Ethanol made from cellulosic biomass, such as trees, is called bioethanol.

### **Green Chemistry**

Design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.

## Green Engineering

Development and commercialization of industrial processes that are economically feasible and reduce the risk to human health and the environment. The EPA has set out 22 principles of green chemistry and 22 principles of green engineering.

## Intermediate

A material produced during the synthesis of an API. An intermediate undergoes molecular change or purification before it becomes the API. Each reaction step may create one or more intermediates.

## Monomer

A single molecule that may combine with identical or similar molecules into a polymer.

## Mutation (from animation)

A change in the DNA sequence of a gene.

## Pilot Plant (from animation)

A small chemical processing system.

## Racemer (racemic)

A chemical mixture where both enantiomers of the molecule are present in equal amounts.

## Reagent

A chemical substance that is used to start a reaction in combination with some other substance.

## Reducing Agent

A reagent in a chemical reaction that reduces (donates electrons) to another molecule.

## Regulated Starting Material

A raw material, an intermediate, or an API that is used in the production of another API and that is incorporated as a significant structural fragment into the structure of the API. API starting materials normally have defined chemical properties and structure.

## Specific Activity (from animation)

The amount of product formed by a specific amount of enzyme under specific conditions and time.

## Substrate (from animation)

The biological molecule that an enzyme will act upon. Catalysis occurs when the substrate is broken down, combined with another molecule or changed in some way.

## Wild Type (from animation)

The form of an enzyme that occurs in nature.