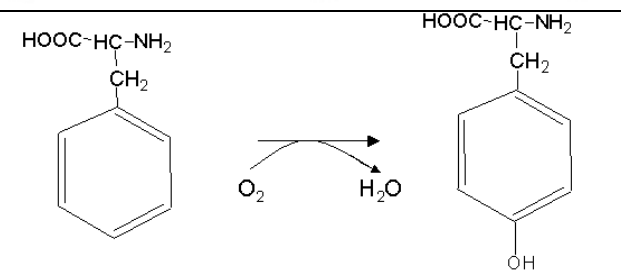
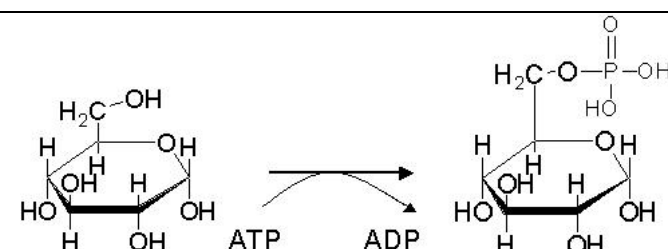


CLASSIFICATION OF ENZYMES (Enzyme Commission-EC)

EC 1. OXIDOREDUCTASES

EC 1 enzyme	Type of redox reaction	Possible reaction type
Succinate-dehydrogenase (citric acid cycle)	C=C formation	$\begin{array}{c} \text{CH}_2\text{COOH} \\ \\ \text{CH}_2\text{COOH} \end{array} \longrightarrow \begin{array}{c} \text{CHCOOH} \\ \\ \text{CHCOOH} \end{array} + 2\text{H}^+$
Alcohol-dehydrogenase	Alcohol-aldehyde conversion	$\text{CH}_3-\text{CH}_2-\text{OH} \longrightarrow \text{CH}_3-\text{C} \begin{array}{l} \text{O} \\ // \\ \text{H} \end{array} + 2\text{H}^+$
Aldehyde-dehydrogenase	Aldehyde-acid conversion	$\text{CH}_3\text{C} \begin{array}{l} \text{O} \\ // \\ \text{H} \end{array} + \text{H}_2\text{O} \longrightarrow \text{CH}_3\text{C} \begin{array}{l} \text{OH} \\ \\ \text{O}-\text{H} \\ \\ \text{H} \end{array} \longrightarrow \text{CH}_3\text{C} \begin{array}{l} \text{OH} \\ // \\ \text{O} \end{array} + 2\text{H}^+$
Phe hydroxylase (monooxygenase)		

EC 2. TRANSFERASES

EC 2 enzyme	Transferred group	Possible reaction type
Acyl-transferase (eg. synthesis of triacylglycerols and phospholipids)	Acetyl, succinyl, aminoacyl	$\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{COOH} + \text{O}=\overset{\text{O}}{\parallel}{\text{C}}-\text{S}-\text{CoA} \xrightarrow{\text{H}_2\text{O}} \text{R}-\overset{\text{OH}}{\underset{\text{CH}_3\text{COOH}}{\text{C}}}-\text{COOH} + \text{HS}-\text{CoA}$
Phospho-transferase (eg. hexokinase, glucokinase)	-H ₂ PO ₃ (phosphoryl)	
Amino-transferase (eg. ASAT, ALAT)	-NH ₂ (amino)	$\text{RC}=\overset{\text{O}}{\parallel}{\text{C}} + \text{NH}_2\text{CH}_2\text{R}' \longrightarrow \text{RCH}_2\text{NH}_2 + \text{O}=\overset{\text{O}}{\parallel}{\text{C}}-\text{R}'$
Sulfo-transferase (eg. GAG synthesis)	-SO ₃ H (sulfuryl)	$\text{R}-\overset{\text{O}}{\parallel}{\text{P}}(\text{OH})-\text{O}-\overset{\text{O}}{\parallel}{\text{S}}(\text{OH})_2 + \text{HOR}' \longrightarrow \text{R}-\overset{\text{O}}{\parallel}{\text{P}}(\text{OH})_2 + \text{HO}-\overset{\text{O}}{\parallel}{\text{S}}(\text{O})_2-\text{OR}'$

EC 3. HYDROLASES

E.C. 3 enzyme	Substrate	bond	Possible reaction type
Esterases (eg. Lipase, phospholipase, acetylcholine esterase)	neutral fats phospholipids acetylcholine	ester	$\text{R}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{O}-\text{CH}_2\text{R}' + \text{H}_2\text{O} \longrightarrow \text{RCOOH} + \text{HOCH}_2\text{R}'$
Phosphodiesterases (eg. cAMP phosphodiesterase)	Nucleotides (cAMP - 5' AMP)	phosphodiester	$\text{RO}-\underset{\text{OH}}{\underset{\parallel}{\text{O}}}{\text{P}}-\text{OR}' + \text{H}_2\text{O} \longrightarrow \text{RO}-\underset{\text{OH}}{\underset{\parallel}{\text{O}}}{\text{P}}-\text{OH} + \text{HOR}'$
Phosphatases (eg. glucose-6-phosphatase)	phosphatester (glu-6-P)	phosphomonoester	$\text{RO}-\underset{\text{OH}}{\underset{\parallel}{\text{O}}}{\text{P}}-\text{OH} + \text{H}_2\text{O} \longrightarrow \text{ROH} + \text{HO}-\underset{\text{OH}}{\underset{\parallel}{\text{O}}}{\text{P}}-\text{OH}$
Glycosidases (eg. amylase, lipase)	polysaccharide disaccharide	glycoside	$\begin{array}{c} \diagup \text{O} \\ \\ \text{RC}-\text{O}-\text{CR}' \\ \quad \\ \text{H} \quad \text{H} \end{array} + \text{H}_2\text{O} \longrightarrow \begin{array}{c} \diagup \text{O} \\ \\ \text{R}-\text{COH} \\ \\ \text{H} \end{array} + \begin{array}{c} \\ \text{HO}-\text{CR}' \\ \\ \text{H} \end{array}$
Proteases Peptidases (eg. trypsin)	proteines peptides	peptide	$\text{R}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{NH}-\text{CH}_2\text{R}' + \text{H}_2\text{O} \longrightarrow \text{RCOOH} + \text{NH}_2\text{CH}_2-\text{R}'$

EC 4. LIASES

E. C. 4...enzyme	Removed group	Possible reaction type
Decarboxylase (eg. amino acid decarboxylase)	CO ₂	$\text{RC}-\text{COOH} \longrightarrow \text{RCH} + \text{CO}_2$ $\text{O} \qquad \qquad \qquad \text{O}$
Aldolase (eg. aldolase A/B)	Aldehyde	$-\overset{5}{\text{C}}-\overset{4}{\text{C}}-\overset{3}{\text{C}}-\overset{2}{\text{C}}-\overset{1}{\text{C}}-\text{O}-\text{P} \rightleftharpoons -\overset{5}{\text{C}}-\overset{4}{\text{C}}=\text{O} + \overset{3}{\text{C}}-\overset{2}{\text{C}}-\overset{1}{\text{C}}-\text{O}-\text{P}$ $\qquad \qquad \qquad $ $\qquad \qquad \qquad \text{H}$
Synthase (eg. Gly synthase)		$\text{CO}_2 + \text{NH}_3 \longrightarrow \text{Gly}$
Dehydratase (eg. cystathionin synthase)	H ₂ O	$\text{RCH}_2\underset{\text{OH}}{\underset{ }{\text{C}}}\text{HR}' \rightleftharpoons \text{RCH}=\text{CHR}' + \text{H}_2\text{O}$
Desaminase (eg. Gln desaminase)	NH ₃	$\text{RCH}_2\underset{\text{NH}_2}{\underset{ }{\text{C}}}\text{HR}' \rightleftharpoons \text{RCH}=\text{CHR}' + \text{NH}_3$

EC 5. ISOMERASES

E. C. 5... enzyme	Isomerated group	Changing position of the group	Possible reaction type
Glucose-6-phosphate-isomerase	carbonyl	C-1 \leftrightarrow C-2	$\text{P-O-C}^6\text{-C}^5\text{-C}^4\text{-C}^3\text{-C}^2\text{-C}^1\text{=O}$ $\text{P-O-C-C-C-C-C-C}^1\text{=O}$
Phosphoglycerate-phosphomutase	phosphoryl	C-2 \leftrightarrow C-3	$\text{HOCH}_2\text{-C}^2\text{HCOOH} \rightleftharpoons \text{C}^3\text{H}_2\text{CHCOOH}$
Epimerase (eg. UDP-Glu UDP-Gal)	hydroxyl	D \leftrightarrow L	$\begin{array}{c} \text{R}'' \\ \\ \text{HO-C-H} \\ \\ \text{R}' \end{array} \rightleftharpoons \begin{array}{c} \text{R}'' \\ \\ \text{H-C-OH} \\ \\ \text{R}' \end{array}$

EC 6. LIGASES

E.C. 6... enzyme	Type of bond	Example
Aminoacyl-tRNS-synthetase	C—O	Activation of amino acid, synthesis of proteins
Glutamine- synthetase	C—N	Biosynthesis of glutamine
Amino acid-ligase	C—N	Synthesis of proteins
Acetyl-CoA-carboxylase	C—C	Fatty acid synthesis (malonylSCoA formation)