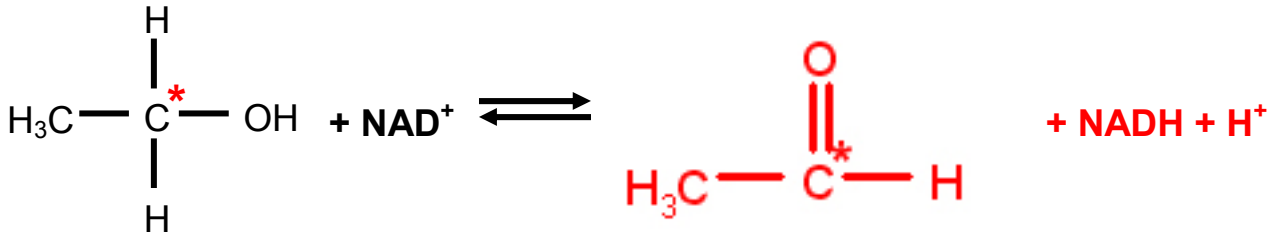
Enzyme Classification

International Commission on Enzymes (1956) - 6 Major Classes

1 Oxidoreductases: oxidation-reduction rxns

Example: *Alcohol Dehydrogenase* (1.1.1.1)

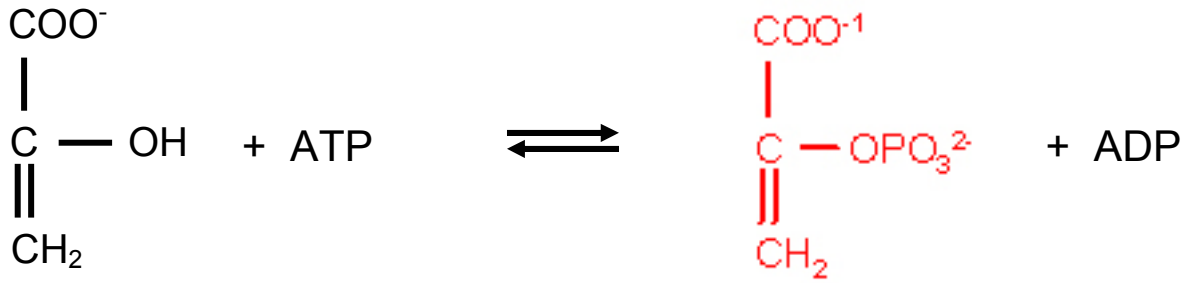


Ethanol **Acetaldehyde**

In this example, NAD^+ removes electrons (oxidizes) from the alcohol carbon.

2. Transferases: transfer of functional groups between 2 molecules

Example: *Pyruvate kinase* (2.7.1.40)



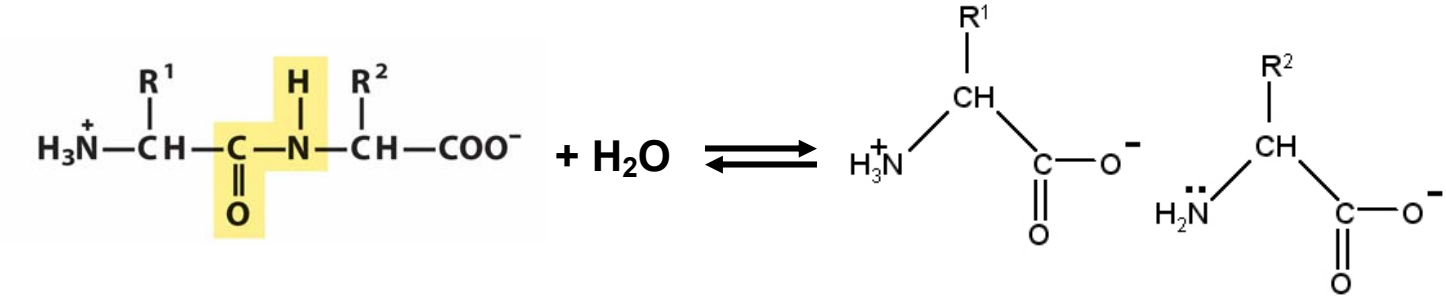
Pyruvate **PEP, Phosphoenolpyruvate**

In this example, a phosphate group is transferred from ATP to pyruvate

3. Hydrolases: hydrolysis rxns

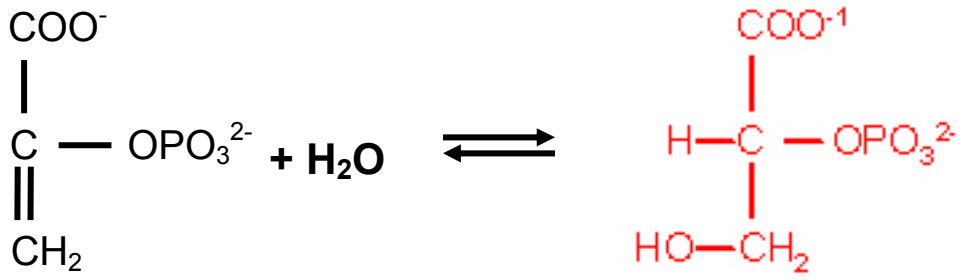
H_2O is consumed while breaking a single bond; this is *not* hydration.

Example: *Trypsin* (3.4.4.4) which cleaves peptides after Lys and Arg residues



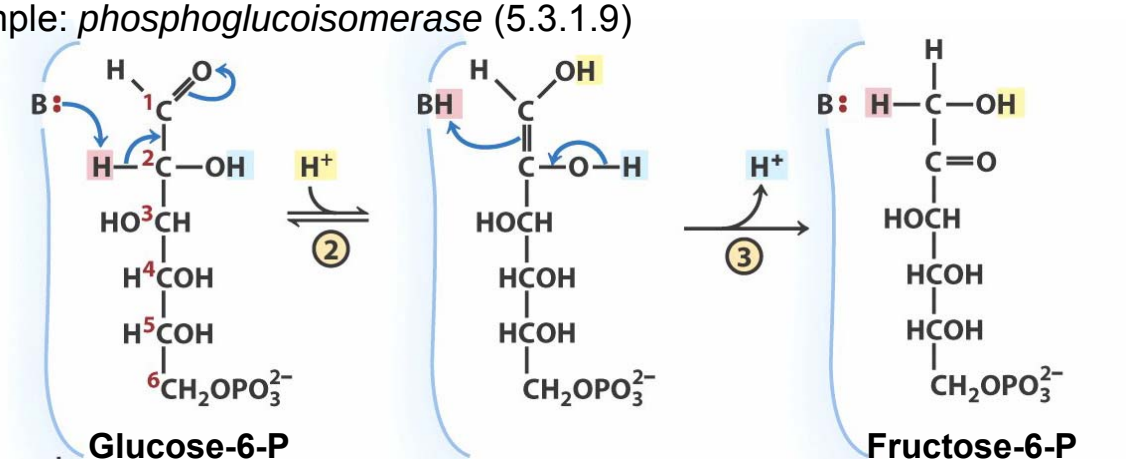
In this example, a H_2O molecule is consumed while breaking a peptide bond.

4. Lyases: Addition to double bond
   This would include hydration which is addition of H_2O to a double bond
   Example: *Enolase* (4.2.1.11)



PEP **2-Phosphoglycerate**

5. Isomerases: Isomerization rxns
A functional group is moved within a molecule.
   Example: *phosphoglucoisomerase* (5.3.1.9)

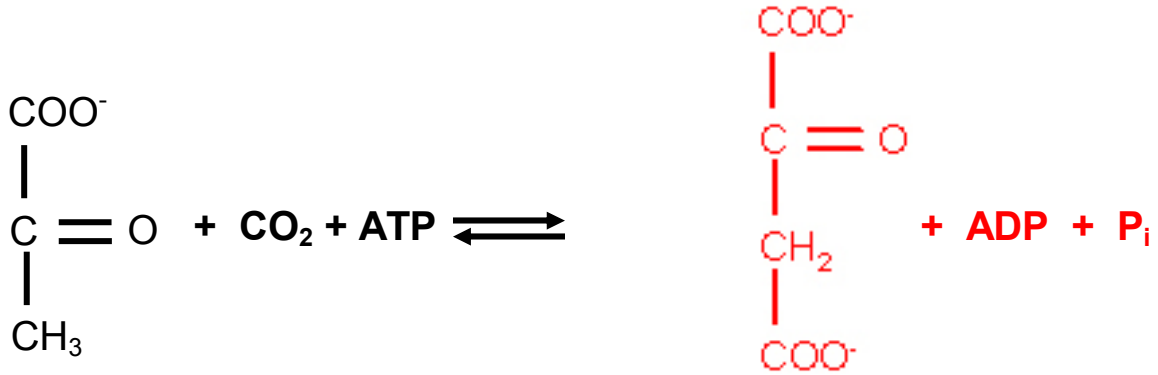


Glucose-6-P **Fructose-6-P**

In this case, the carbonyl functional group is effectively moved from C-1 to C-2

5. Ligases: formation of bonds using energy from ATP hydrolysis

   Example: *pyruvate carboxylase* (6.4.1.1)



PEP **Oxaloacetate (OAA)**

In this example, energy from ATP hydrolysis is used to add CO_2 to PEP.