CHE 102 - SG - Biochemical Reactions - S19

Reaction Type	**Reaction**	**How to Recognize**
Substrate Level Phosphorylation (SLP)	$S{-}PO_4 + ADP \longrightarrow S + ATP$ S	Transfer of a PO_4 from substrate to ATP to form ATP
Transfer	$S + ATP \longrightarrow S{-}PO_4 + ADP$	Transfer of a functional group, generally a PO_4 from ATP added to a molecule.
Redox	Alcohol $\underset{[R]}{\overset{[O]}{\rightleftharpoons}}$ Aldhyde/Ketone Alkane $\underset{[R]}{\overset{[O]}{\rightleftharpoons}}$ Alcohol Aldehyde $\underset{[R]}{\overset{[O]}{\rightleftharpoons}}$ CA	Many reactions are Redox reactions, look for redox-coenzymes in a reaction. NAD^+, NADH, $NADP^+$, NADPH, FAD, and $FADH_2$ For all redox reactions you will have to identify what molecules is reduced and what molecule is oxidized.
Dehydrogenation ($-H_2$)	Alkane $\longrightarrow$ Alkene Alcohol $\longrightarrow$ Alkane Alcohol $\longrightarrow$ Ketone	Look for enzymes named "dehydrogenase" (not always present). It usually is also a redox reaction.
Hydrogenation ($+H_2$)	Alkene $\longrightarrow$ Alkane	Addition of H_2 across a C=C.
Dehydration ($-H_2O$)	Alcohol $\longrightarrow$ Alkene	Intermolecular removal of H_2O from an alcohol to form an alkene
Hydration ($+H_2O$)	Alkene $\longrightarrow$ Alcohol	Generally an oxidation reaction.
Hydrolysis ($+H_2O$)	Thioester $\longrightarrow$ CA + Thiol	Breaks two molecules apart
Isomerization	Same Formula Diff. Structure	Recognize the enzyme "isomerate" or "mutase".
Elimination		Combines several types of reactions into a single mechanism - Dehydrogenation ($-H_2$) and Dehydration ($-H_2O$)
Addition		Combines several types of reactions into a single mechanism - Hydrogenation ($+H_2$) and Hydration ($+H_2O$)
Decarboxylation ($-CO_2$)	$R{-}COO^- \longrightarrow R + CO_2$	Loss of a CA acid group to form CO_2
Aldol Condensation	Ketone + Ketone $\longrightarrow$ Aldol	Only occurs in 1st step of CAC. Two molecules combine to make 1.
Condensation	2 molec. $\longrightarrow$ 1 molec.	Only occurs in 1 specific reaction (step 2 lipogenesis)
Reverse Decarboxylation ($+CO_2$)	$R + CO_2 \longrightarrow R{-}COO^-$	Only happens for 1 specific reaction (step 0 in lipogenesis acetyl-CoA $\longrightarrow$ maolonyl-CoA)