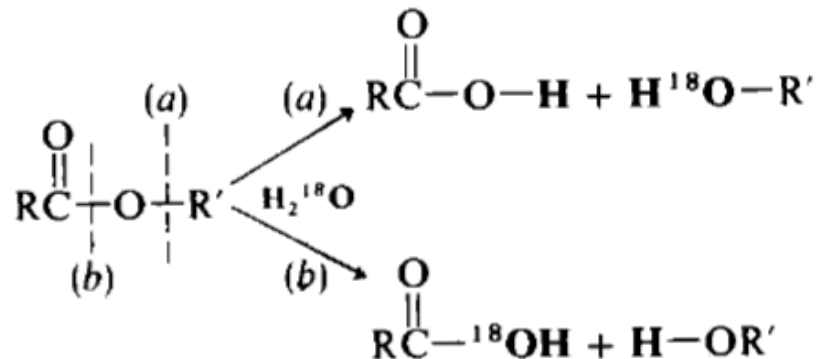


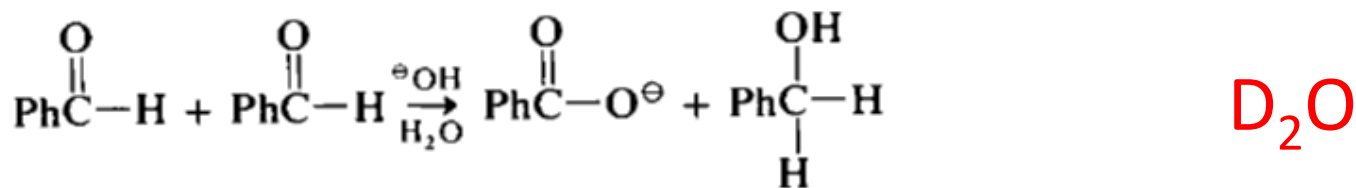
# 5. The Use of Isotopes

## (i) Isotopic Labelling

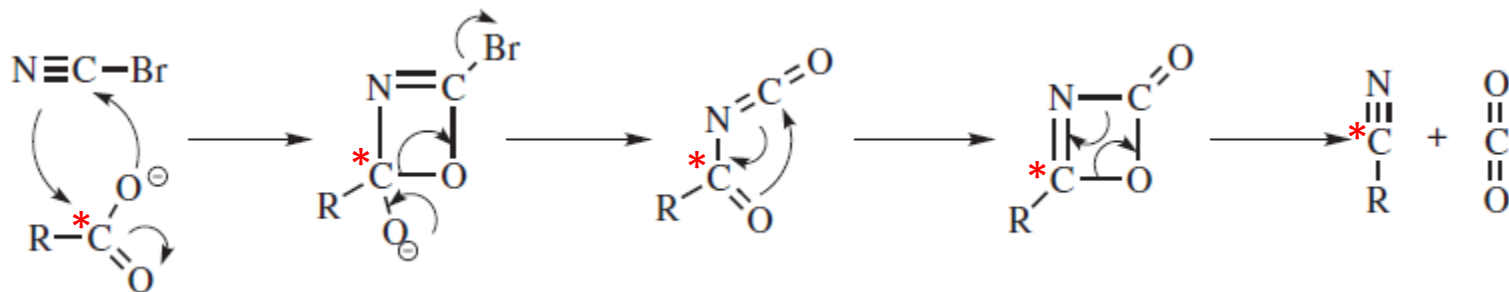
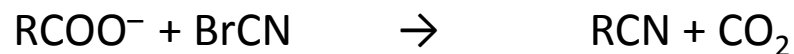
Example 1: Hydrolysis of Ester



Example 2: Cannizzaro reaction



Example 3: The Conversion of Carboxylic Acid Salts to Nitriles



## (ii) Kinetic Isotopic Effect (KIE)

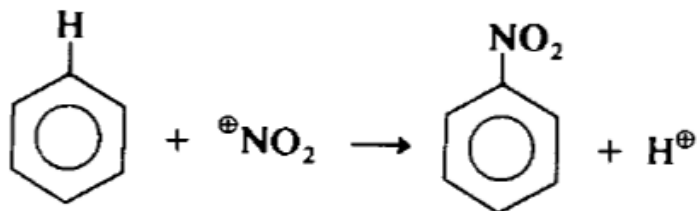
$$\frac{k_H}{k_D} \sim 7$$

C-H bond breaking involves in the rate-determining step. This is called Primary Kinetic Isotopic Effect (PKIE)

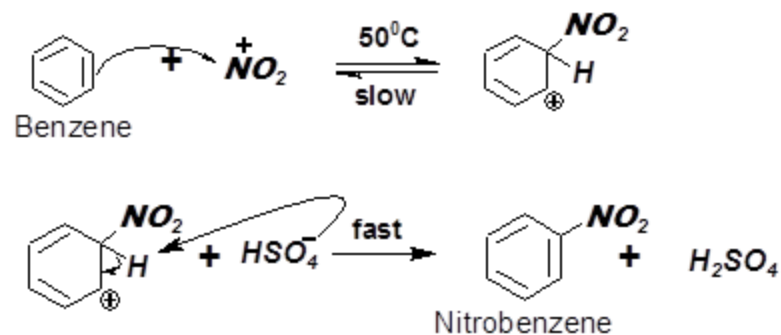
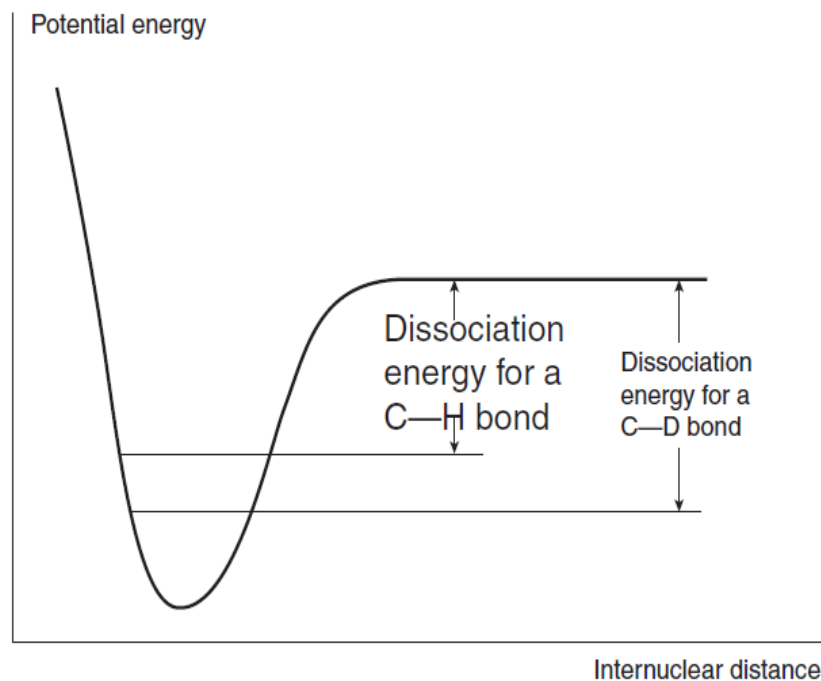
$$\frac{k_H}{k_D} \sim 1$$

C-H bond breaking does not involve in the rate-determining step

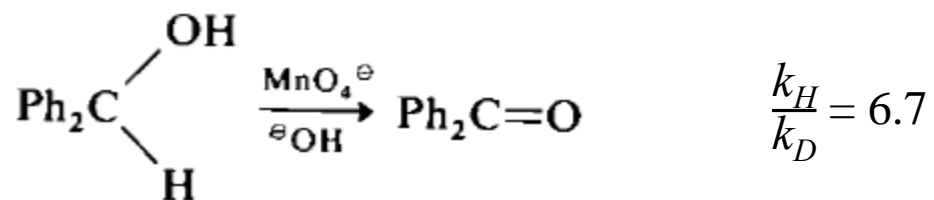
Example 1: Nitration of benzene



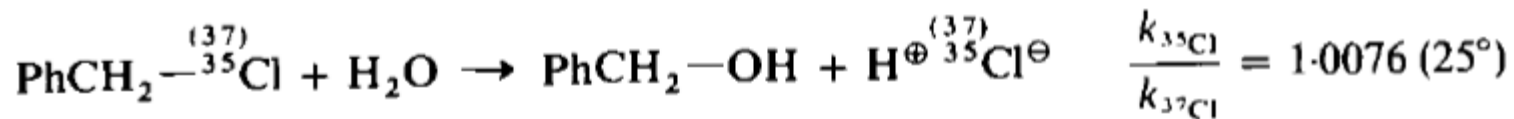
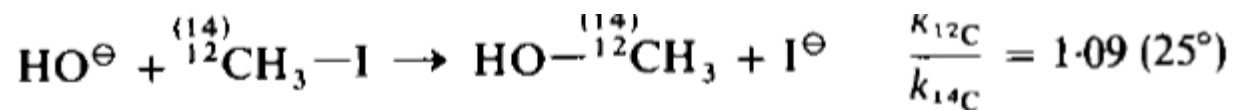
$$\frac{k_H}{k_D} \sim 1$$



Example 2: Oxidation of diphenyl methyl alcohol

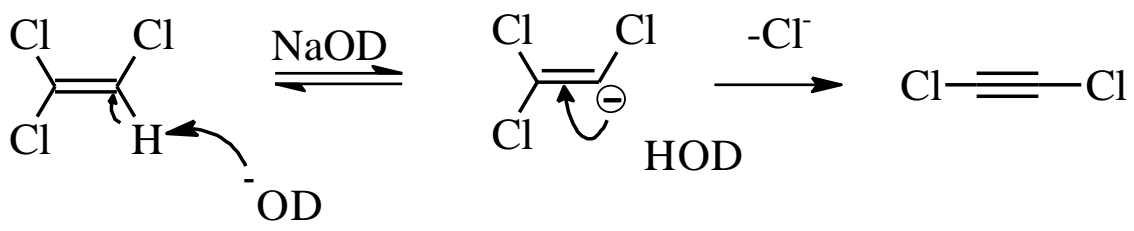


Example 3: Use of other isotopes



(ii) Isotopic Scrambling

Example 1: E1cB<sub>R</sub> reaction



Example 2: Claisen rearrangement

