Substitution-Elimination Decision Map

When deciding whether a given reaction between a haloalkane and nucleophile/base will occur through an elimination or substitution mechanism you need to classify the haloalkane (methyl, primary, secondary, or tertiary) and the relative nucleophile/base strengths of the nucleophile/base (strong nucleophile, medium nucleophile, weak nucleophile, strong base, very weak base, etc.) as listed in the Table (below left). Once these parameters have been identified, the expected reaction can be predicted from the decision tree (below right).

Table of Nucleophiles

Strong Nucleophiles

Br^-, I^-, $R\text{-}S^-$, $H\text{-}S^-$, $N{\equiv}C^-$, N_3^-

$R\text{-}C{\equiv}C^-$, $R\text{-}O^-$, $H\text{-}O^-$ **Strong Bases**

Medium Nucleophiles

$R\text{-}CO_2^-$, R-S-H, R_2S, NH_3, RNH_2, R_2NH, NR_3

Weak Nucleophiles

$R\text{-}CO_2H$, R-O-H, H_2O **Very Weak Bases**

Special Case

***Tert*-Butoxide ($tBuO^-$) is a strong base, but is not a nucleophile due to non-bonded interaction strain.**