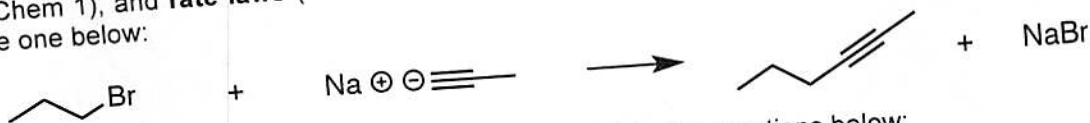


## Substitution Reactions:

Today we will learn two new mechanisms. We will explore concepts of **electronegativity** and solvation (Gen Chem 1), and **rate laws** (Gen Chem 2) to expand our understanding of **substitution reactions**, like the one below:

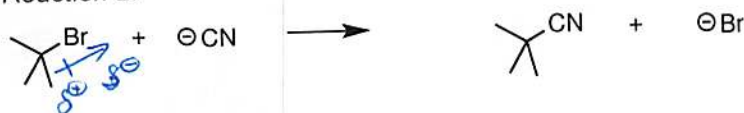


Considering the substitution reactions of acetylides, consider the reactions below:

Reaction 1:



Reaction 2:



1. Draw the dipoles on both of the alkyl halides and add  $\delta^+$  and  $\delta^-$  symbols.
2. What role is the cyanide ion playing? Why do you think it reacts with the alkyl halide?

$\text{CN}^-$  is the nucleophile  
that attacks the electropositive carbon

The rate laws of the same two reactions are given below:

Reaction 1:  $\text{rate} = k' [\text{cyanide}] [1\text{-bromo-4,4-dimethylpentane}]$

Reaction 2:  $\text{rate} = k'' [2\text{-bromo-2-methylpropane}]$

3. What do you think that the rate laws tell you about the rate-limiting step in the mechanism?

Rxn 1 has two species present in the RLS  
(Nucleophile and alkyl halide)

Rxn 2 has only one species present.  $\rightarrow$  depends  
only on conc. of alkyl. halide  
-the  $\text{CN}^-$  is not present in the RLS.

$\therefore$  Different mechanisms for both rxns