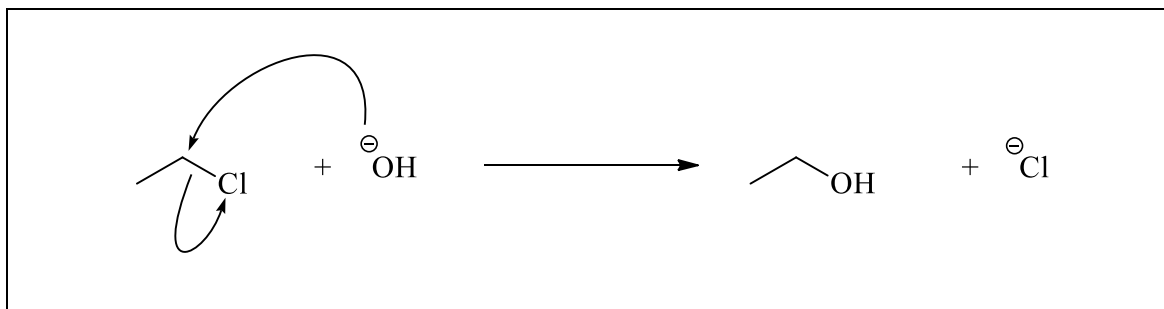


- The hydroxide anion can react with chloroethane via a mechanism that is abbreviated S_N2 , as shown below. Add curly arrows to the reaction scheme to complete a mechanism for this reaction.



Explain what each part of the abbreviation S_N2 means.

S = **substitution**

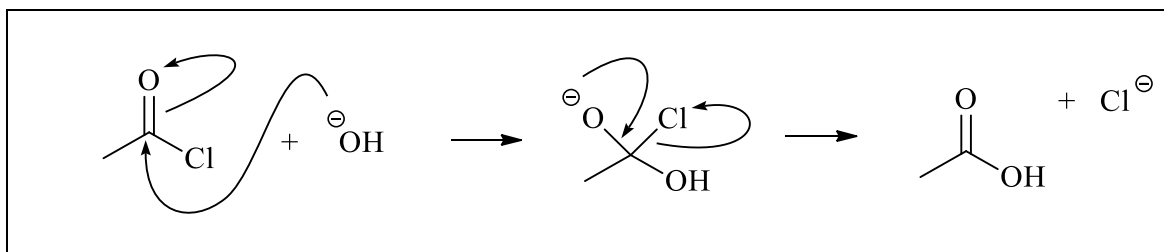
N = **nucleophilic**

2 = **bimolecular**

The hydroxide anion undergoes an apparently similar reaction with ethanoyl chloride:



Draw a mechanism (using curly arrows) for this reaction, thereby demonstrating how it is fundamentally different to the reaction of chloroethane above.



In each of these reactions, a full molecular orbital of the hydroxide anion (the HOMO) interacts with an empty molecular orbital of the organic halogen compound (the LUMO).

Which orbital is the LUMO in chloroethane?

σ^*_{C-Cl}

Which orbital is the LUMO in ethanoyl chloride?

$\pi^*_{C=O}$