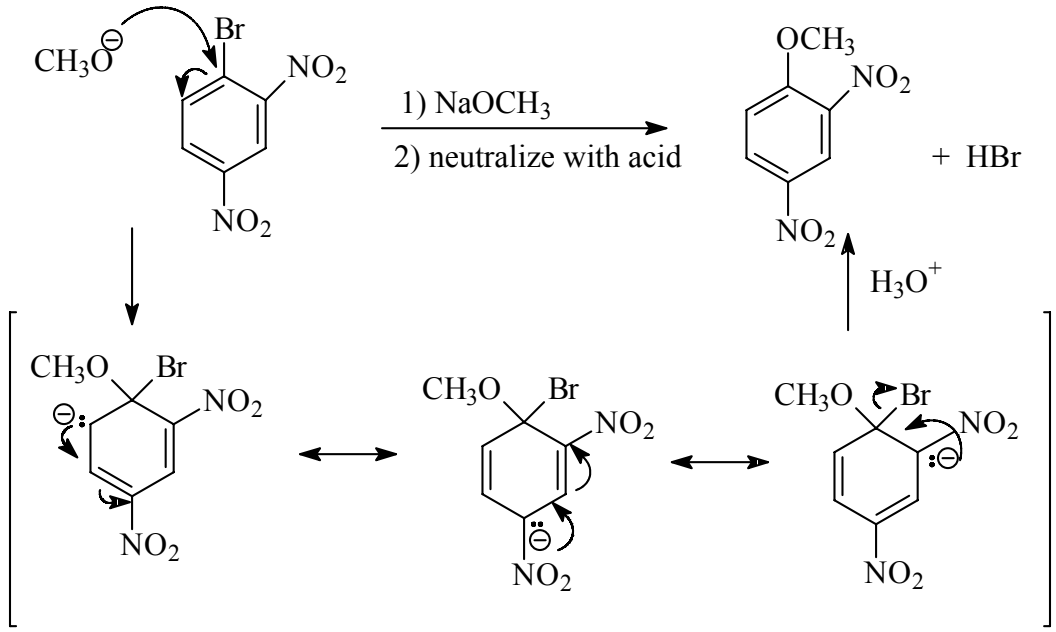
Nucleophilic Aromatic Substitution

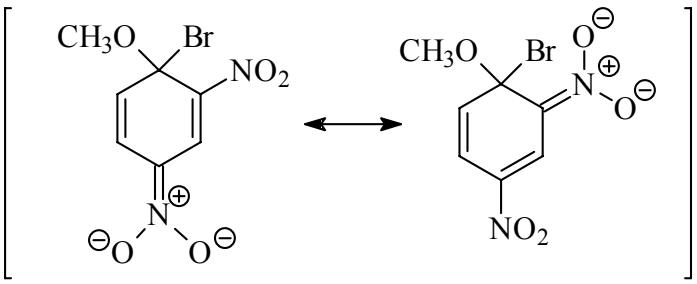
Dramatically different conditions when compared with the electrophilic aromatic substitution (EAS):

- Leaving group is necessary
- Electron deficient aromatic rings react fastest (deactivated toward EAS)
- Strong base is used as the nucleophile
- This can be thought of as an addition-elimination reaction



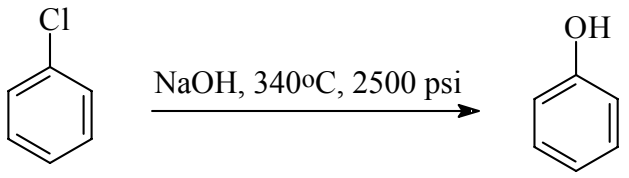
EWG ortho and para to leaving group is optimum:

additional resonance stabilization by withdrawing electrons into nitro groups



Benzyne Reaction

Aromatic rings without strong electron withdrawing groups will not react with nucleophiles unless at *very* high temperatures and pressures. Chemists at Dow first observed this reaction in 1928 in their large-scale preparation of phenol from chlorobenzene and sodium hydroxide at 340°C and a pressure 2500 psi.



Radio-labelling studies suggest that the mechanism involves a peculiar intermediate call **benzyne**.