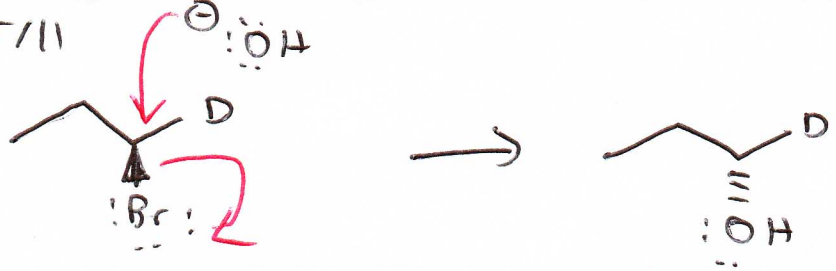
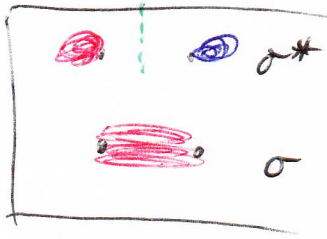
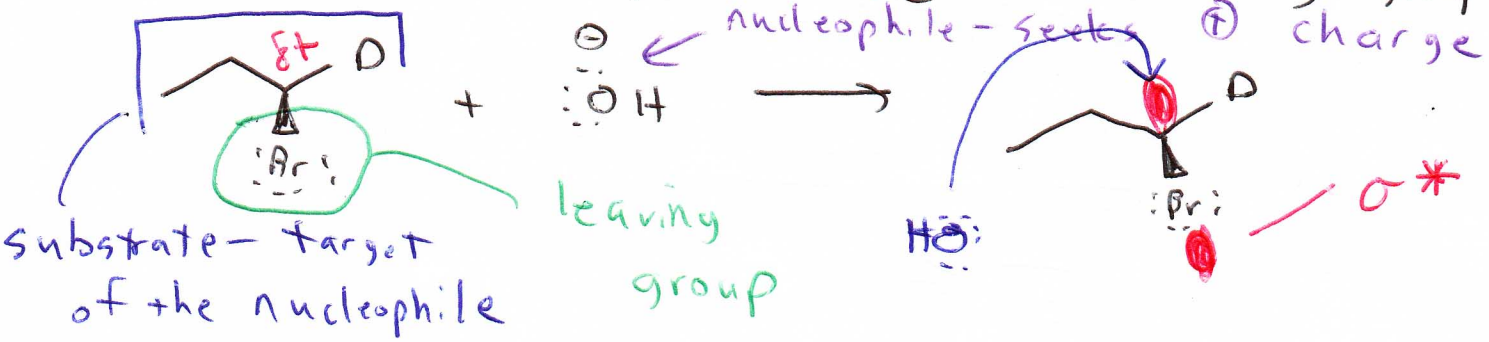


1) synthetic utility: alkyl halide → alcohol
ether
thiol

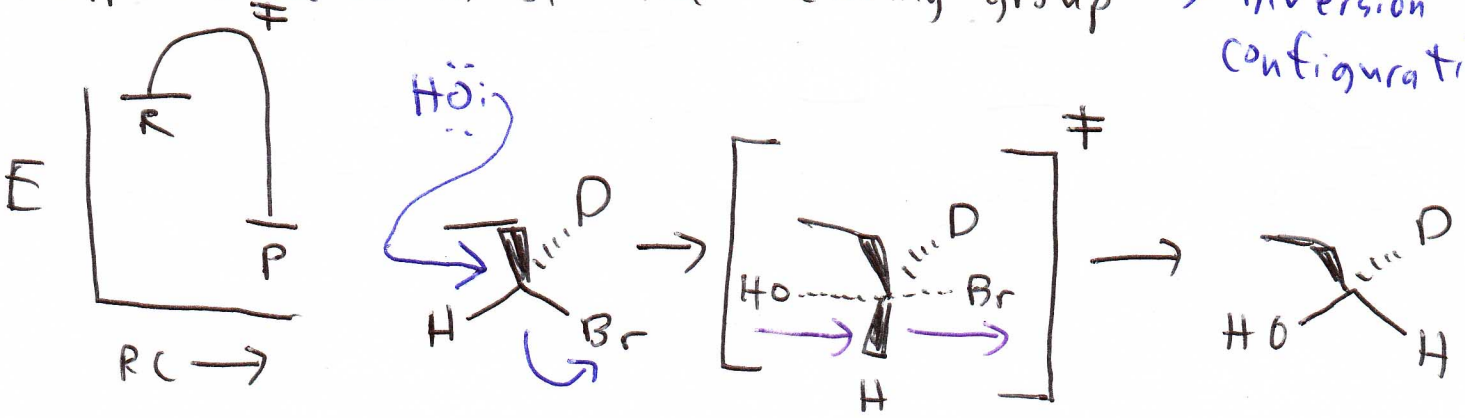
2) reagents: basic nucleophile
ex: NaOH, $NaOCH_3$, NaCN



3) conditions: polar aprotic solvent
4) mechanism: anionic, concerted
5) stereochemistry: inversion of configuration
6) regiochemistry: specific (@ site of leaving group)



In S_N2 rxns, the nucleophile attacks by adding into the σ* bond of the leaving group. Since e⁻ are added into the antibonding orbital, the bond with the leaving group breaks. This allows a new bond with the nucleophile to form, but in the exact opposite direction of the leaving group → inversion of configuration



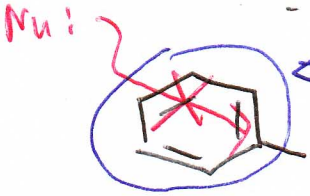
Factors that affect an S_N2 rxn

1) Substrate

	CH_3–Br:			
Relative rates	1200	40	1	~0 (non-reactive)

Since the S_N2 rxn depends on the nucleophile directly attacking the carbon bearing the leaving group, steric hinderance around that position will slow the rate of rxn (or prevent it)

no substitution (incredibly slow)



phenyl ≡ benzene substituent

phenyl halides do not undergo S_N2 because of too much steric hinderance (attack would have to occur through the ring),

2) Nucleophiles

Nucleophilicity – how strongly does a compound seek ⊕ charge,

Ex: H_2O vs. OH^-

hydroxide is much more nucleophilic because it has a ⊖ charge on it,

basicity – how able is a compound to remove H^+

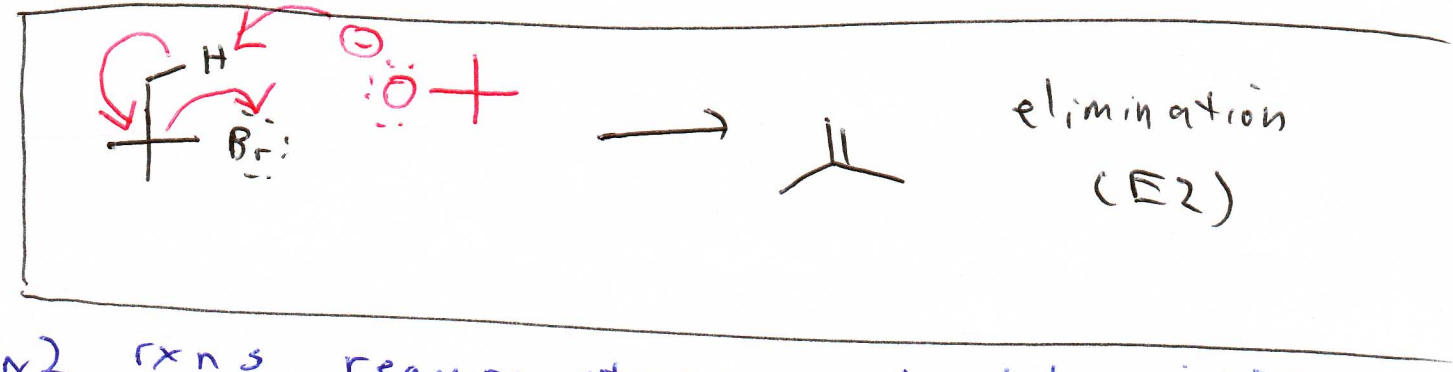
Ex: $:\ddot{O}R^{\ominus}$ alkoxide (alkyl + oxide)

OH^- vs SH^- | H_2O pka = 15.74, H_2S pka = 7.00

Stronger base — stronger nucleophile

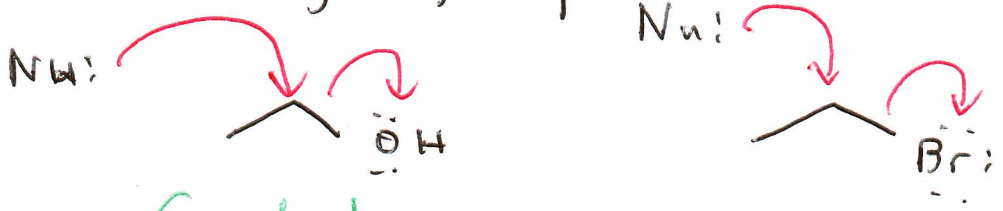
polarizability - able to become polarized - larger ions are "squishier," meaning that electron density can be more easily displaced.

Since sulfur is more polarizable than oxygen, the process of forming a bond occurs more easily - and therefore more quickly - for sulfur versus oxygen → sulfur is more nucleophilic than oxygen (in similar molecules).



S_N2 rxns require strong nucleophiles, which are often, but not always, basic. * Extremely basic nucleophiles, especially sterically hindered ones, can undergo elimination versus substitution.

3) leaving group



Good leaving groups are conjugate bases of strong acids.