CH 235 SI Bliss Chang 10/28/13

## Substitution Reactions

- Leaving group + nucleophile
- Leaving group is substituted by the nucleophile

### $S_N1$

→ Polar, protic, unreactive Lewis Bases

- Leaving group + solvent are KEY
- Carbocation intermediate (2 step mechanism) Rate = k[R-X]
- Racemic product
- Reactivity: 3° > 2° = Benzylic = Allylic > 1° > Methyl Usually weak nucleophiles

Leaving Groups: Prefers stable, weak anion bases

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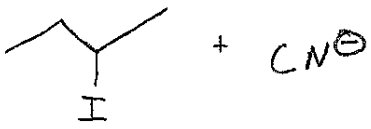
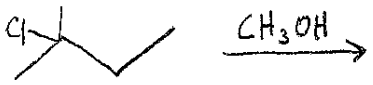
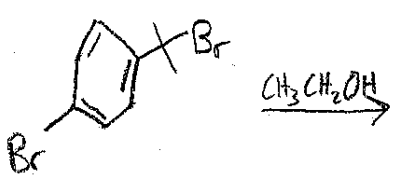
Resonance $TosO^-$ 

Anion size $I^- > Br^- > Cl^-$

1) 

2) 

3) 

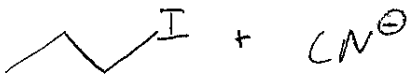
4) 

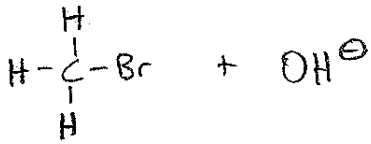
## $S_N2$

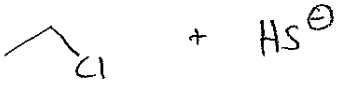
- Rate = k[nucleophile][R-X]
- Inversion of reaction center
- Does NOT like steric hindrance methyl > 1° > 2°
- No carbocation; one step mechanism
- More basic nucleophiles and stronger nucleophiles preferred

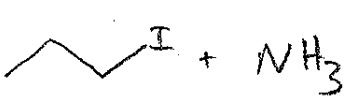
Good leaving groups preferred
- stable, weak base anions

Polar solvents preferred
- avoid solvents w/ H-bonding (aprotic)

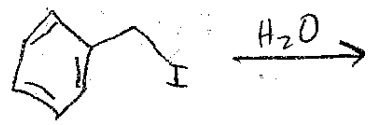
1) 

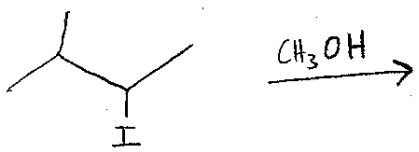
2) 

3) 

4) 

Determine whether each would undergo $S_N1$ or $S_N2$ and then determine the product.

1) 

2) 

3)