

Video Practice for Topic I.12-13:

Predicting Reaction Spontaneity and Direction of Equilibria
Reaction Coordinate Diagrams and Reaction Rate

Recommended reading for this topic:

Lessons I.12-13 in *Organic Chemistry 1 Primer 2018*,
by Rhett C. Smith, Andrew G. Tennyson and Tania Houjeiry

Additional Videos and how to match videos to your course text book:

ProtonGuru.com

Thermodynamics of Organic Reactions

Which base should one use to push this reaction as far to the products side as possible: NaOH, NaNH₂, NaH or NaF?



Thermodynamics of Organic Reactions



Our choices: NaOH, NaNH₂, NaH or NaF are all ionic, so they will dissociate in solution:



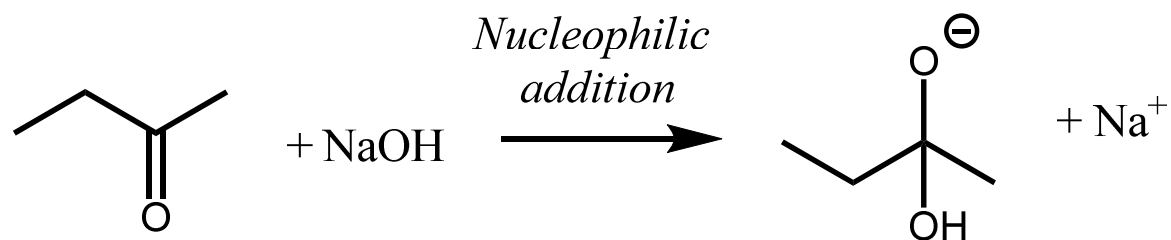
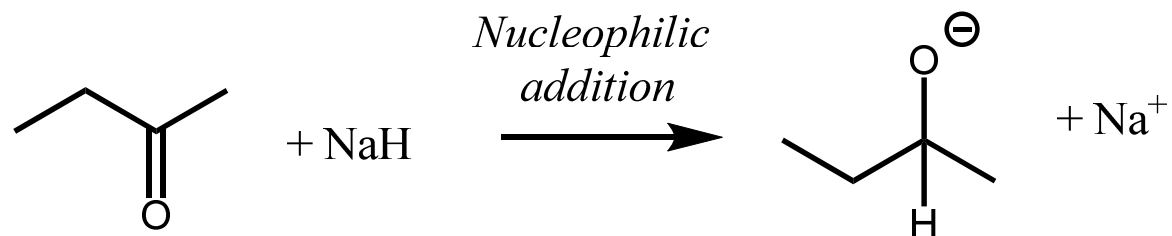
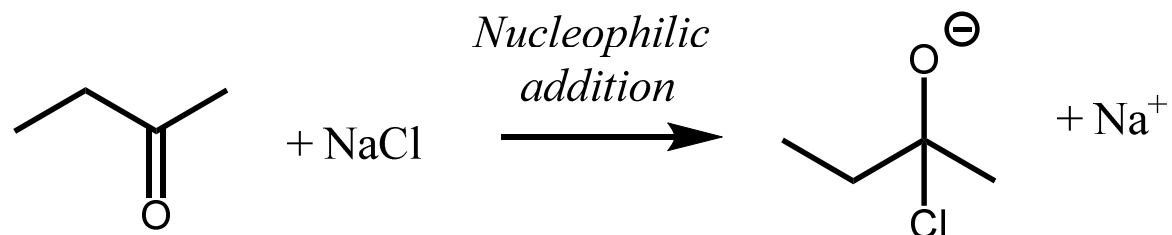
Thermodynamics of Organic Reactions

Which reaction(s) would be expected to be reversible?



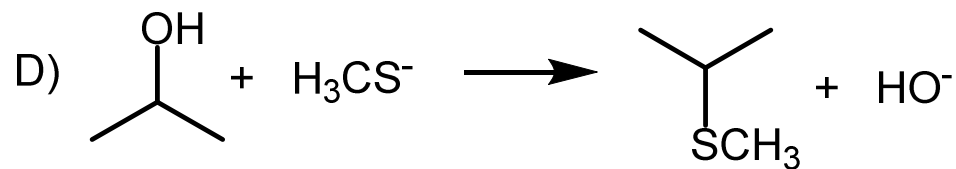
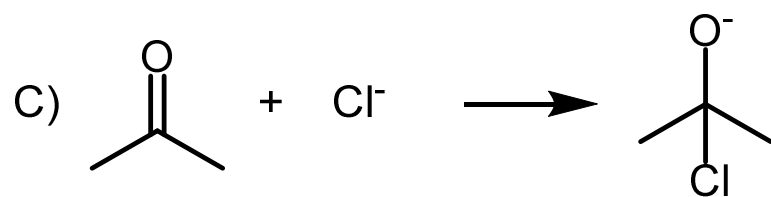
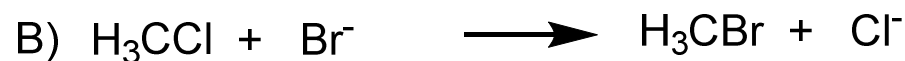
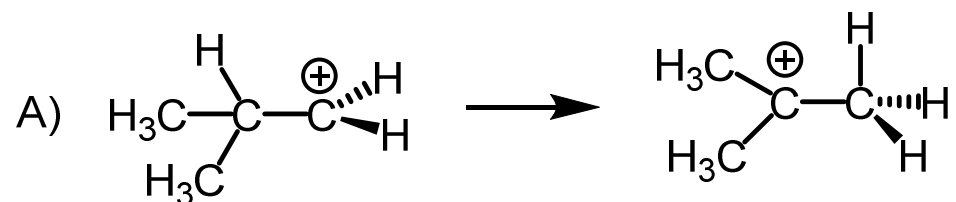
Thermodynamics of Organic Reactions

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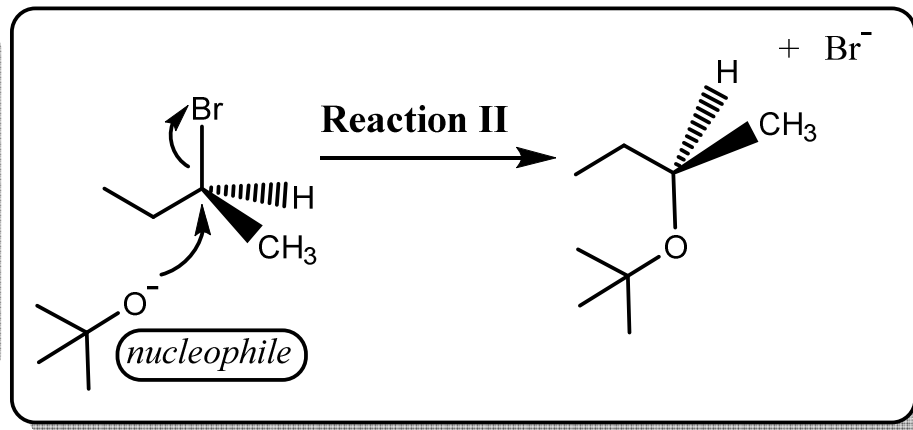
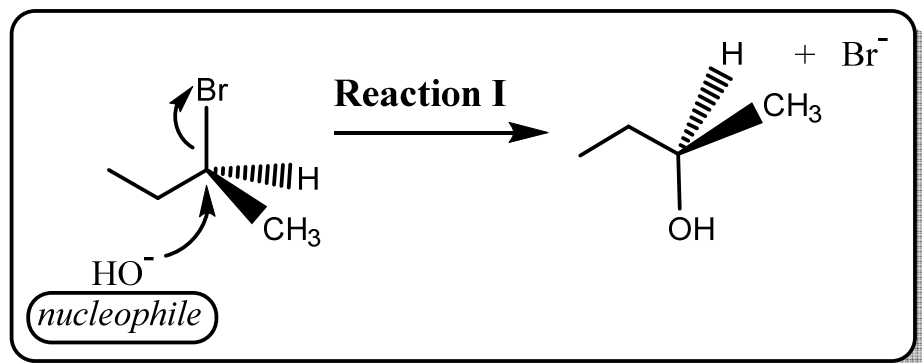
Thermodynamics of Organic Reactions

Which of these reaction(s) will proceed spontaneously from left to right?



Thermodynamics of Organic Reactions

Which reaction proceeds most rapidly and why?



- (A) Reaction I because the smaller nucleophile will experience less repulsion as it approaches the R-Br
- (B) Reaction II because the nucleophile is a stronger base due to more branches on it
- (C) Reaction I because the alkyl bromide is less sterically hindered
- (D) Reaction II because the chiral center formed has more branches and is thus more stable
- (E) They occur at about the same rate

Thermodynamics of Organic Reactions

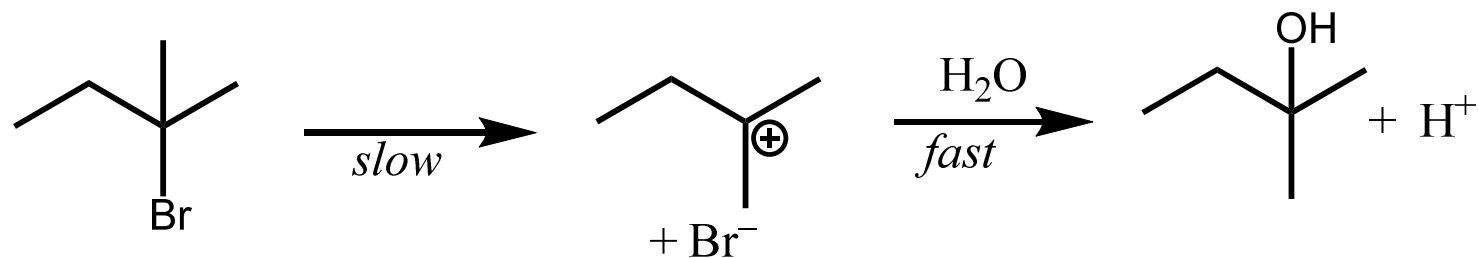
Draw a reaction coordinate diagram that corresponds to a two-step spontaneous (thermodynamically favorable) reaction.



Thermodynamics of Organic Reactions



Draw a reaction coordinate diagram that is consistent with the mechanism shown for this exothermic reaction.



Thermodynamics of Organic Reactions

Which is the strongest base:

