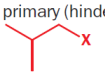
E1 and E2

Summary SN1, SN2, E1, and E2

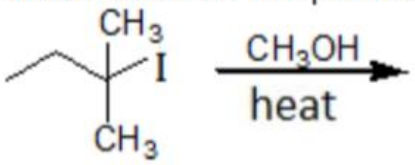
	Poor nucleophile (e.g. H_2O, ROH)[a]	Weakly basic nucleophile (e.g. I^-, RS^-)	Strongly basic, unhindered nucleophile (e.g. RO^-)	Strongly basic, hindered nucleophile (e.g. DBU, DBN, *t*-BuO^-)
methyl 	no reaction	S_N2	S_N2	S_N2
primary (unhindered) 	no reaction	S_N2	S_N2	E2
primary (hindered) 	no reaction	S_N2	E2	E2
secondary 	S_N1, E1 (slow)	S_N2	E2	E2
tertiary 	E1 or S_N1	S_N1, E1	E2	E2

Some points about the table:

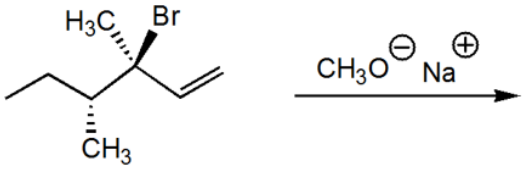
- Methyl halides cannot eliminate as there are no appropriately placed protons
- Increasing branching favours elimination over substitution and strongly basic hindered nucleophiles always eliminate unless there is no option
- Good nucleophiles undergo substitution by S_N2 unless the substrate is tertiary and then the intermediate cation can eliminate by E1 as well as substitute by S_N1
- High temperatures favour elimination by gearing up the importance of entropy in the free energy of reaction ($\Delta G = \Delta H - T\Delta S$). This is a good way of ensuring E1 in ambiguous cases

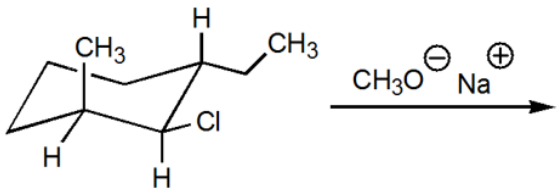
1. E1

What would be the product of the following elimination reaction?



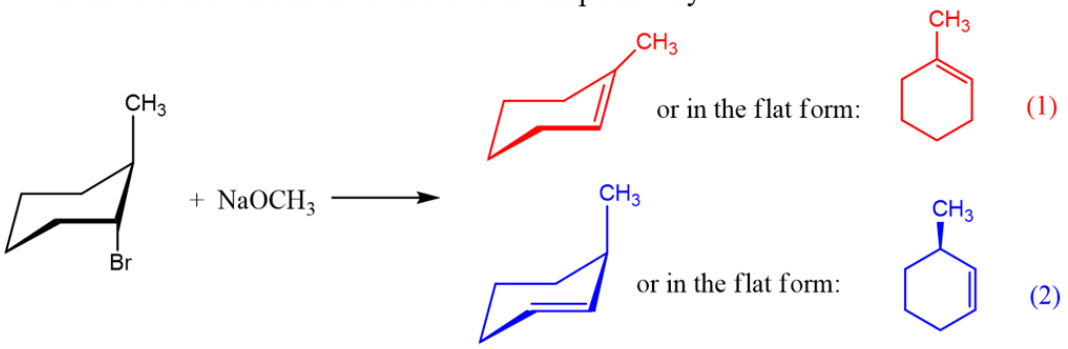
2. E2



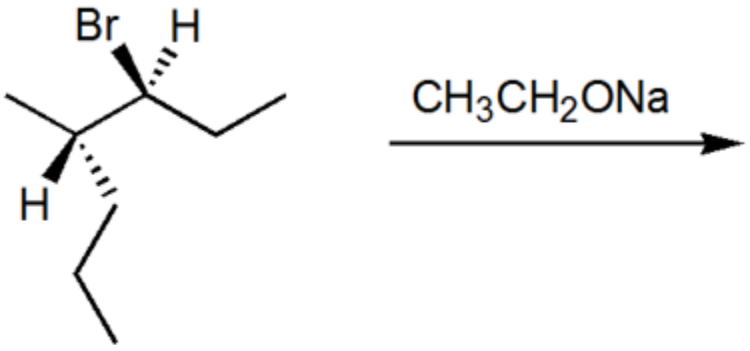


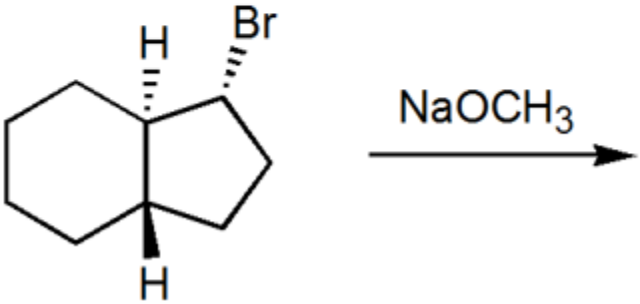
3. E2

According to Zaitsev's Rule, the most stable alkene is the most substituted one. In the reaction shown below, Zaitsev's rule would suggest that product number 1 should form. However only product number 2 is found in the real reaction. Explain why.

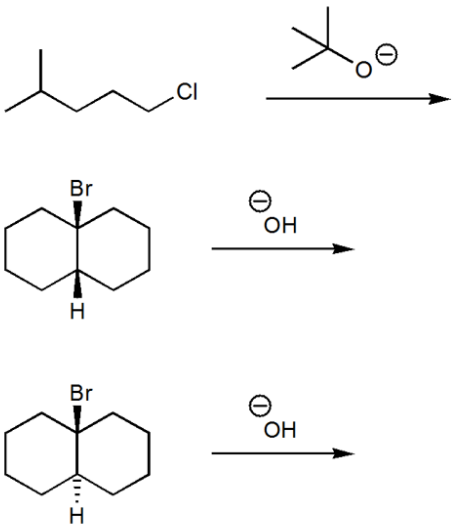


4. E2

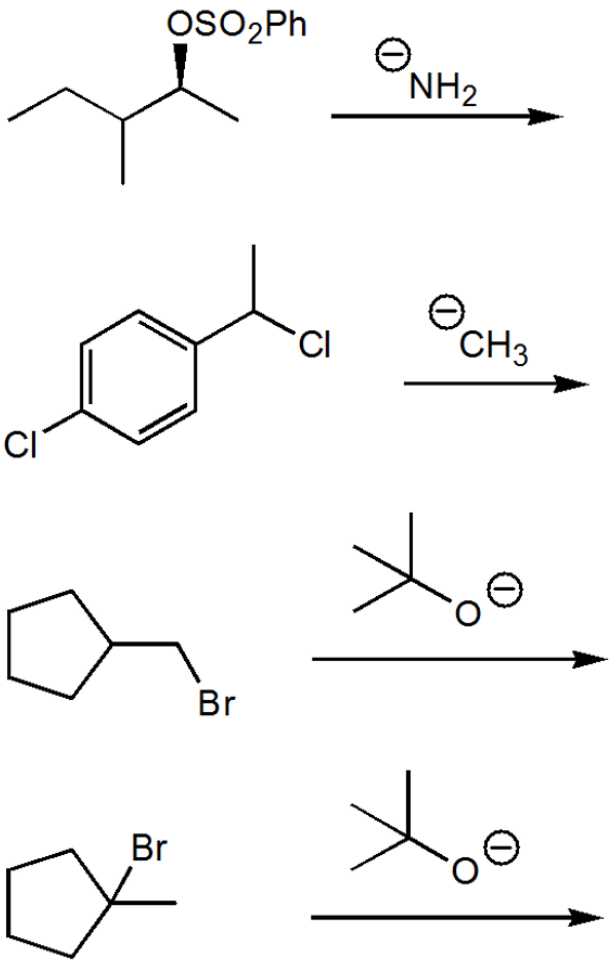




5. E2



6. E2



7. E1
   Write out the complete mechanism for the formation of the following product. Consider the formation of only the elimination product.