SN1 / SN2 / E1 / E2 Reaction Pathways

Mechanism selection • Substrate, reagent, solvent, temperature, major product and reasoning

Name: _____ Date: _____

Directions: For each case, identify the dominant mechanism (SN1, SN2, E1, E2, or SN1 + E1), write a reasonable major product, and justify your choice using specific reaction conditions. If more than one product is plausible, name the important competitors. No exact yields are required.

1. Iodomethane (CH_3I) + Sodium cyanide ($NaCN$); solvent: DMSO; conditions: Room temperature.
Mechanism: _____ Product(s): _____
Reasoning:

2. 1-Bromobutane + Sodium azide (NaN_3); solvent: DMF; conditions: Room temperature.
Mechanism: _____ Product(s): _____
Reasoning:

3. (R)-2-Bromobutane + Sodium hydrosulfide ($NaSH$); solvent: DMSO; conditions: Room temperature.
Mechanism: _____ Product(s): _____
Reasoning:

4. 1-Chlorobutane + Sodium iodide (NaI); solvent: Acetone; conditions: Room temperature.
Mechanism: _____ Product(s): _____
Reasoning:

5. 2-Bromobutane + Sodium ethoxide ($NaOEt$); solvent: Ethanol; conditions: Heated.
Mechanism: _____ Product(s): _____
Reasoning:

6. 2-Bromo-2-methylpropane (tert-butyl bromide) + Sodium ethoxide (NaOEt); solvent: Ethanol; conditions: Heated.
Mechanism: _____ Product(s): _____
Reasoning:

7. 1-Bromo-2-methylpropane (isobutyl bromide) + Potassium tert-butoxide (KOtBu); solvent: tert-Butanol; conditions: Heated.
Mechanism: _____ Product(s): _____
Reasoning:

8. Bromocyclohexane + Potassium tert-butoxide (KOtBu); solvent: tert-Butanol; conditions: Heated.
Mechanism: _____ Product(s): _____
Reasoning:

9. 2-Methyl-2-butanol + Sulfuric acid (H2SO4), acid catalysis; solvent: Acidic reaction medium; conditions: Heated dehydration.
Mechanism: _____ Product(s): _____
Reasoning:

10. 1-Methylcyclohexanol + Phosphoric acid (H3PO4), acid catalysis; solvent: Acidic reaction medium; conditions: Heated dehydration.
Mechanism: _____ Product(s): _____
Reasoning:

11. 2-Methyl-2-propanol (tert-butanol) + Sulfuric acid (H_2SO_4), acid catalysis; solvent: Acidic reaction medium; conditions: Heated dehydration.
Mechanism: _____ Product(s): _____
Reasoning:

12. 2-Chloro-2-methylpropane (tert-butyl chloride) + Water; solvent: Water; conditions: Room temperature, no strong added base.
Mechanism: _____ Product(s): _____
Reasoning:

13. 2-Bromo-2-methylbutane + Ethanol (solvolysis); solvent: Ethanol; conditions: Heated, no strong added base.
Mechanism: _____ Product(s): _____
Reasoning:

14. 1-Bromo-1-phenylethane (secondary benzylic bromide) + Methanol (solvolysis); solvent: Methanol; conditions: Cool to room temperature; no strong added base.
Mechanism: _____ Product(s): _____
Reasoning:

15. 1-Bromopropane + Sodium methoxide ($NaOCH_3$); solvent: Methanol; conditions: Room temperature.
Mechanism: _____ Product(s): _____
Reasoning: