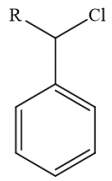
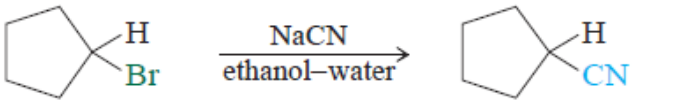
1. Explain the relative rates of the following compounds in the S_N1 reaction based on MO approach.

	R	Relative rate
	CH_3	540
	CH_3CH_2	125
	$(CH_3)_2CH$	27
	$(CH_3)_3C$	1

2. The reaction of cyclopentyl bromide with sodium cyanide to give cyclopentyl cyanide proceeds faster if a small amount of sodium iodide is added to the reaction mixture. Can you suggest a reasonable mechanism to explain the function of sodium iodide?



Cyclopentyl bromide Cyclopentyl cyanide

3. The Relative rates (water = 1) of reaction of nucleophiles with MeBr in EtOH are provided below. Explain the observed trend.

Nucleophiles	Relative rate
PhO^-	2×10^3
EtO^-	6×10^4
PhS^-	5×10^7

4. The relative rates of reactions of different nucleophiles with the following substrate are given in the table. Explain why the rate is practically the same for the first 3 nucleophiles whereas it increases for OH^- and Ph^-.

Nucleophile	**Relative Rate**
AcO^-	1.02
Cl^-	1.05
PhO^-	1
OH^-	20
PhS^-	28