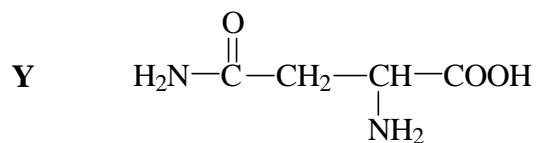


Marks
4

- The amino acid, asparagine, was isolated from asparagus juice in 1806. The uncharged form, **Y**, is given below.



Draw the constitutional formula of the product(s) formed in the reaction of **Y** with the following reagents.

Cold, dilute hydrochloric acid $\text{H}_2\text{N}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\underset{\oplus\text{NH}_3}{\text{CH}}-\text{COOH}$	Cold, dilute sodium hydroxide $\text{H}_2\text{N}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\underset{\text{NH}_2}{\text{CH}}-\text{CO}_2^\ominus$
Hot, 6 M hydrochloric acid $\overset{\ominus}{\text{NH}}_4^+ + \text{HO}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\underset{\oplus\text{NH}_3}{\text{CH}}-\text{COOH}$	Hot, 6 M sodium hydroxide $\text{NH}_3 + \overset{\ominus}{\text{O}}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\underset{\text{NH}_2}{\text{CH}}-\text{CO}_2^\ominus$