

- Describe phosphate esters.
- Understand why phosphate esters are important in living cells.

$$\text{CH}_3\text{CH}_2\text{O}-\overset{\overset{\text{O}}{\parallel}}{\text{P}}-\text{OH}$$

Ethyl dihydrogen phosphate

$$\text{CH}_3\text{CH}_2\text{O}-\overset{\overset{\text{O}}{\parallel}}{\text{P}}-\text{OCH}_2\text{CH}_3$$

Diethyl hydrogen phosphate

$$\text{CH}_3\text{CH}_2\text{O}-\overset{\overset{\text{O}}{\parallel}}{\text{P}}(\text{OCH}_2\text{CH}_3)_2$$

Triethyl phosphate

$$\begin{array}{c} \text{O} \\ \parallel \\ \text{HO}-\text{P}-\text{OH} \\ | \\ \text{OH} \end{array}$$

Phosphoric acid

$$\begin{array}{c} \text{O} \quad \text{O} \\ \parallel \quad \parallel \\ \text{HO}-\text{P}-\text{O}-\text{P}-\text{OH} \\ | \quad \quad | \\ \text{OH} \quad \text{OH} \end{array}$$

Pyrophosphoric acid

$$\begin{array}{c} \text{O} \quad \text{O} \quad \text{O} \\ \parallel \quad \parallel \quad \parallel \\ \text{HO}-\text{P}-\text{O}-\text{P}-\text{O}-\text{P}-\text{OH} \\ | \quad \quad | \quad \quad | \\ \text{OH} \quad \text{OH} \quad \text{OH} \end{array}$$

Triphosphoric acid

$$\begin{array}{c}
 \text{CH}_2\text{OH} \\
 | \\
 \text{CHOH} \\
 | \\
 \text{CH}_2\text{OH}
 \end{array}
 + 3 \text{HONO}_2 \longrightarrow
 \begin{array}{c}
 \text{CH}_2\text{ONO}_2 \\
 | \\
 \text{CHONO}_2 \\
 | \\
 \text{CH}_2\text{ONO}_2
 \end{array}
 + 3 \text{H}_2\text{O}$$

Glycerol

Glycerol trinitrate
(nitroglycerin)

phosphoric acids and alcohols

Summary

Inorganic acids such as H_3PO_4 form esters. The esters of phosphoric acid are especially important in biochemistry.

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