WITTIG & HORNER-EMMONS REAGENTS

Triphenylphosphonium Salts
Phosphonic Acid Esters
**Wittig Reaction**

![Wittig Reaction Diagram](image)

**Bis-Wittig Reaction**

![Bis-Wittig Reaction Diagram](image)
TRIPHENYLPHOSPHONIUM SALTS

- Methyltriphenylphosphonium Bromide
- Methyltriphenylphosphonium Iodide
- Ethyltriphenylphosphonium Bromide
- Ethyltriphenylphosphonium Iodide
- Propyltriphenylphosphonium Bromide
- 2-Propynyltriphenylphosphonium Bromide
- Isopropyltriphenylphosphonium Iodide
- Butyltriphenylphosphonium Bromide
- Isopentyltriphenylphosphonium Bromide
- Pentyltriphenylphosphonium Bromide
- (Bromomethyl)triphenylphosphonium Bromide
- (2-Bromoethyl)triphenylphosphonium Bromide
- (Triphenylphosphoranylidene)acetonitrile
- (Cyanomethyl)triphenylphosphonium Chloride
- 2-Hydroxyethyltriphenylphosphonium Bromide
- (2-Hydroxyethyl)triphenylphosphonium Chloride
- (4-Carboxybutyl)triphenylphosphonium Bromide
- (5-Carboxypentyl)triphenylphosphonium Bromide
Triphenylphosphonium Salts

- (p-Nitrobenzyl)triphenylphosphonium Bromide
- 4-Methoxybenzyltriphenylphosphonium Chloride
- (4-Butoxybenzyl)triphenylphosphonium Bromide
- (p-Methylbenzyl)triphenylphosphonium Chloride
- (4-Cyanobenzyl)-triphenylphosphonium Chloride
- Cinnamyltriphenylphosphonium Bromide
- (Benzoylmethylene)triphenylphosphorane
- 1-(o-Hydroxyphenyl)-2-(triphenylphosphoranylidene)ethanone
- [2-(1,3-Dioxolan-2-yl)ethyl]triphenylphosphonium Bromide
- 2-(1,3-Dioxan-2-yl)ethyl-triphenylphosphonium Bromide
- 2-(Triphenylphosphoranylidene)-succinic Anhydride
- Ethylenebis(triphenylphosphonium) Dibromide
- Trimethylenebis-(triphenylphosphonium) Dibromide
- Tetramethylenebis-(triphenylphosphonium) Dibromide
- 2-Butylenebis-(triphenylphosphonium) Dibromide
**HORNER-EMMONS REACTION**

\[
\text{PhPOCH}_2R + \text{C}_6\text{H}_{5}C=O \xrightarrow{\text{base}} \text{PhC}=(\text{CF}_3)\text{C}_6\text{H}_4
\]

<table>
<thead>
<tr>
<th>Compound</th>
<th>p-Ordering</th>
<th>E/Z Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-Methylphenyl</td>
<td>trans</td>
<td>trans</td>
</tr>
<tr>
<td>p-Cinnamoyl</td>
<td>trans</td>
<td>trans</td>
</tr>
<tr>
<td>trans</td>
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<tr>
<td>trans</td>
<td>E</td>
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**TBFA** : Tetrabutylammonium Fluoride

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PHOSPHONIC ACID ESTERS

Dimethyl (2-Hydroxyethyl)phosphonate

Dimethyl Allylphosphonate

Dimethyl (2-Oxoheptyl)phosphonate

Benzyl Dimethyl Phosphonoacetate

Dimethyl (3-Phenoxyacetyl)-phosphonate

Tetramethyl Ethylenediphosphonate

Diethyl (Chloromethyl)phosphonate

Diethyl Vinylphosphonate

Diethyl (2-Bromoethyl)phosphonate

Diethyl Propylphosphonate

Diethyl Allylphosphonate

Diethyl (1-Propenyl)phosphonate

Diethyl Butylphosphonate

Diethyl Decylphosphonate

Diethyl (3,3-Diethoxypropyl)-phosphonate

(Diethoxyphosphinoyl)acetic Acid

Etyl Diethylphosphonoacetate

t-Butyl Diethyl Phosphonoacetate

Triethyl 3-Phosphonopropionate

Triethyl 4-Phosphonobutyrate
**Phosphonic Acid Esters**

<table>
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<tr>
<th>Diethyl Benzylphosphonate</th>
<th>Diethyl 4-Chlorobenzylphosphonate</th>
<th>Diethyl (o-Methylbenzyl)phosphonate</th>
<th>Diethyl (p-Methylbenzyl)phosphonate</th>
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<th>Tetraethyl Methylenediphosphonate</th>
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