Supporting Information
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Supporting Information

One-Pot Three-Component Synthesis of Pyrrolidin-2-ones via a Sequential Wittig/Nucleophilic Addition/Cyclization Reaction

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1. Preparation and spectral data of 1c

To a solution of dibutyl maleate (2.30 ml, 10.0 mmol) in dry acetonitrile (50 mL) was added triphenylphosphine hydrobromide (3.43 g, 10.0 mmol) tardily at room temperature. The reaction mixture was heated to 80 °C for 12 h and the progress of reaction was monitored by TLC. After completion of the reaction, the solvent was removed under reduced pressure, and then distilled water (100 mL) and few phenolphthalein was added. Sodium hydroxide aqueous solution (10%) was added to the mixture dropwise until it was turned from colorless to red. The purified product was obtained through extraction with dichloromethane, drying with anhydrous sodium sulfate and removing of the solvent.

Dibutyl 2-(triphenylphosphoranylidene)succinate (1c)
White solid (4.655 g, 95%). Mp: 83-84 °C.

$^1$H NMR (CDCl$_3$, 600 MHz) δ (ppm) 7.72-7.46 (m, 15H, Ar-H), 3.98-3.69 (m, 4H, 2CH$_2$), 3.00-2.87 (m, 2H, CH$_2$), 1.48-0.51 (m, 14H, 4CH$_2$ and 2CH$_3$);

$^{13}$C NMR (CDCl$_3$, 150 MHz) δ (ppm) 175.4, 170.5, 133.8, 133.7, 131.6, 128.5, 128.4, 128.3, 127.9, 127.3, 126.8, 63.9, 62.0, 61.6, 30.7, 30.6, 19.0, 18.9, 13.7, 13.5;

MS (EI, 70 eV) m/z (%) 490 (M$^+$, 32), 388 (32), 331 (31), 182 (100), 91 (40).
2. Copies of $^1$H and $^{13}$C NMR spectrum of 1c, 4a-s, 3t and 3u, 4v-4w, and 5

![NMR Spectra of 1c, 4a-s, 3t and 3u, 4v-4w, and 5](image)

ppm (δ)

1c

O

PPh$_3$O

O

PPh$_3$O

O
\begin{align*}
\text{ppm (1H)}
\end{align*}
3. Copies of $^{19}\text{F}$ NMR spectrum of 4a, 4e, 4q and 3u