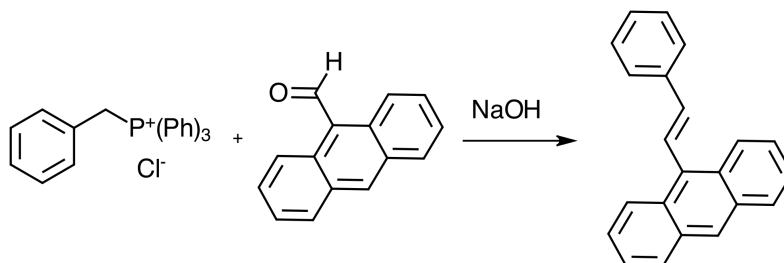


## Wittig Reaction

## Summary:

The Wittig reaction is a classic reaction for converting a carbonyl compound to an olefin through a four-centered intermediate. This reaction traditionally proceeds using a hazardous solvent, such as dichloromethane or dimethyl formamide.



**Reference:** Synthesis of trans-9-(2-phenylethenyl) anthracene (microscale), Macroscale and Microscale Organic Experiments, 6e; Brooks/Cole, 2011; pp. 509-510


Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students (\$)
Benzyltriphenylphosphonium chloride B32807	10 g	<div><div></div><div></div><div></div></div>	\$7.01
9-anthraldehyde 8.2011	5.75 g	<div><div></div><div></div><div></div></div>	\$13.11
Dichloromethane 676853	155mL	<div><div></div><div></div><div></div></div>	\$6.88
Sodium hydroxide, 50% 221465	13 mL	<div><div></div><div></div><div></div></div>	\$1.60
Water n/a	75 mL	<div><div></div><div></div><div></div></div>	n/a
Calcium chloride 793639	50 g	<div><div></div><div></div><div></div></div>	\$21.10
2-propanol 278475	150 mL	<div><div></div><div></div><div></div></div>	\$6.59

Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students (\$)
Benzyltriphenylphosphonium chloride B32807	10 g	<div><div></div><div></div><div></div></div>	\$7.01
4-bromobenzaldehyde B57400	4.75 g	<div><div></div><div></div><div></div></div>	\$8.79
Ethyl acetate 270989	100 mL	<div><div></div><div></div><div></div></div>	\$4.09
Ethanol 459836	100 mL	<div><div></div><div></div><div></div></div>	\$7.75
Heptane 246654	400 mL	<div><div></div><div></div><div>*</div></div>	\$19.80
Potassium phosphate, tribasic P5629	21.3 g	<div><div></div><div></div><div></div></div>	\$1.50
Water n/a	750 mL	<div><div></div><div></div><div></div></div>	n/a

## Comparison: Wittig Reaction

### Comparison of greener and traditional lab:




- Greener method avoids the use of chlorinated solvent – dichloromethane.
- Greener method still requires solvent in the work-up of the product.






	Purchasing costs	Waste (per 100 students)	"Greener" benefits
Greener method	\$48.94	1.4 L liquid waste (0.75L aqueous waste)	
Traditional method	\$56.29	0.5 L liquid waste	

Other greener lab options to explore:

- Greening Wittig Reactions: Solvent-Free Synthesis of Ethyl trans-Cinnamate and trans-3- (9-Anthryl)-2-Propenoic Acid Ethyl Ester, J. Chem. Educ., 2007, 84 (1), p 119
- p-Carboxystyrene. A Wittig procedure in aqueous medium, J. Chem. Educ., 1978, 55 (12), p 813
- Solvent-Free Synthesis and Fluorescence of a Thiol-Reactive Sensor for Undergraduate Organic Laboratories, J. Chem. Educ., 2013, 90 (12), pp 1685–1687

EHS Key:

	Physical hazard
	Toxicity/Health hazard
	PBT

	Very high hazard
	High hazard
	Moderate hazard
	Low hazard
	No data