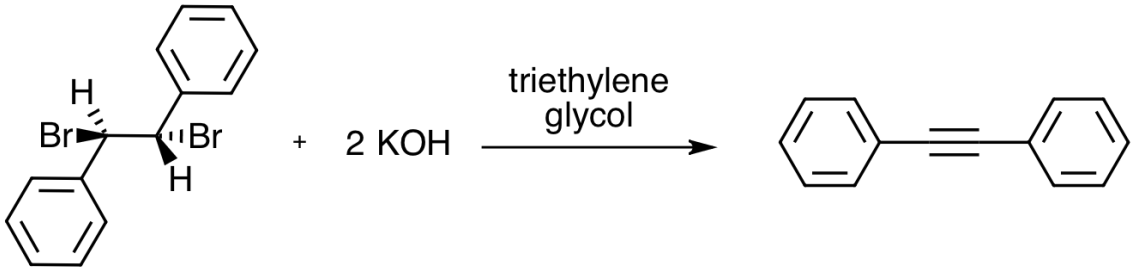
Elimination: Dehydrohalogenation

Summary:

This reaction demonstrates a typical elimination reaction in order to prepare an alkyne by a double displacement reaction. The reagents and raw materials in this experiment are fairly benign. However triethylene glycol is a high-boiling solvent which increases the amount of energy required to perform this reaction.



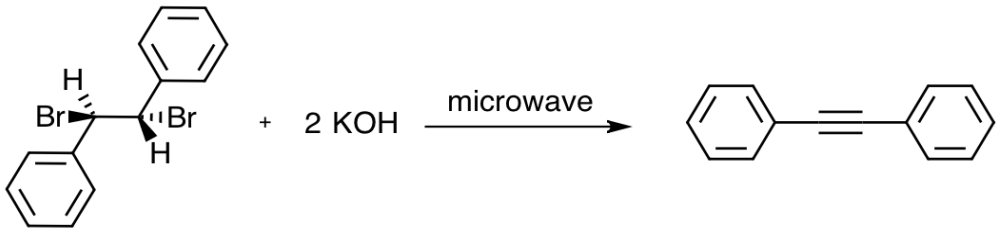
Reference: Dehydrobromination of Meso-Stilbene Dibromide, Experimental Organic Chemistry, Gilbert and Martin, 5th Edition, 2011, pp. 405-409

Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students ($)
Meso-1,2-dibromo-1,2-diphenylethane (stilbene dibromide), 106550	40g		$97.60
Potassium hydroxide 221473	20g	*C	$1.46
Triethylene glycol T59455	200mL		$9.18
Water n/a	650mL		n/a
95% ethanol 459836	500mL		$38.75

Elimination Reaction: Dehydrohalogenation – A Greener Approach

Summary:

The dehydrohalogenation reaction can be performed with essentially the same reagents and raw materials as the traditional reaction. However, through the use of a microwave reactor, triethylene glycol can be eliminated and the reaction time can be drastically reduced, also reducing the energy requirements.



Reference: Pedagogical Comparison of Five Reactions Performed under Microwave Heating in Multi-Mode versus Mono-Mode Ovens: Diels–Alder Cycloaddition, Wittig Salt Formation, E2 Dehydrohalogenation To Form an Alkyne, Williamson Ether Synthesis, and Fischer Esterification, J. Chem. Educ., 2014, 91 (10), pp 1720–1724

Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students ($)
Potassium hydroxide 221473	31g		$2.26
95% ethanol 459836	200mL		$15.50
Meso-1,2-dibromo-1,2-diphenylethane (stilbene dibromide), 106550	50g		$122.00
Water n/a	500mL		n/a

Comparison: Dehydrohalogenation

Comparison of greener and traditional lab:

- Greener method uses an alternative energy source to reduce energy use and reaction time
- Greener method eliminates the use of a high boiling solvent, triethylene glycol

	Purchasing costs	Waste reduction (per 100 students)	"Greener" benefits
Greener method	$139.76	780 mL	
Traditional method	$146.99	1.4 L	

EHS Key: