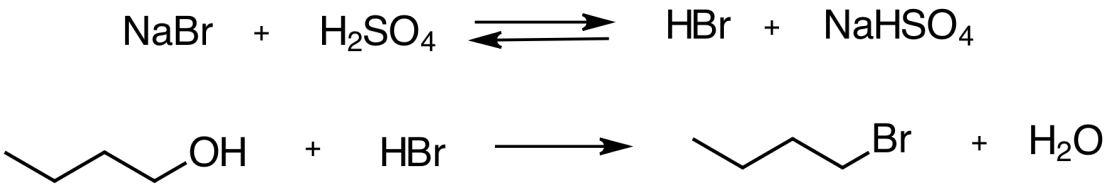
SN2 Reaction

Summary:

A commonly performed reaction for converting a primary alcohol to an alkyl halide involves the treating of an alcohol with a hydrogen halide. In this reaction, hydrobromic acid is generated *in situ* from sodium bromide and concentrated sulfuric acid.



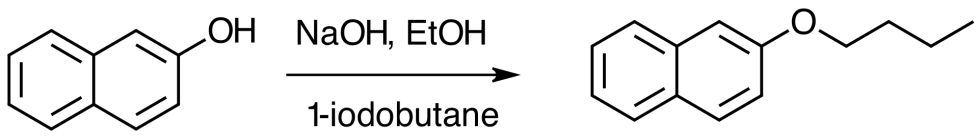
Reference: Preparation of 1-bromobutane: An SN2 Reaction, Experimental Organic Chemistry, Gilbert and Martin, 5th Edition, 2011, p. 465-466 (Miniscale Procedure)

Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students ($)
Sodium bromide 793574	555 g		$81.59
Water n/a	1500 mL		n/a
1-Butanol B7906	500 mL		$49.40
Sulfuric acid, conc. 258105	500 mL		$15.70
Sodium hydroxide, 2M 221465	500 mL		$4.61
Sodium chloride, sat. sol'n 746398	500 mL		$11.43
Sodium sulfate 239313	250 g		$17.50

SN2 Reaction – A Greener Approach

Summary:

In this greener approach, 1-iodobutane and 2-naphthol are utilized in this SN2 reaction to produce 2-butoxynaphthalene. Ethanol is used as the solvent, minimizing the use of hazardous solvents.



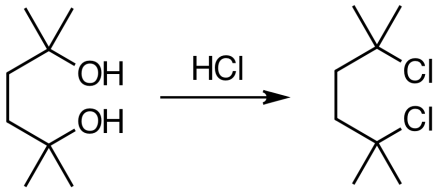
Reference: A Simple SN2 Reaction for the Undergraduate Organic Laboratory, J. Chem. Educ. 2009, 86, 850

Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students ($)
Sodium hydroxide 221465	28 g	*C	$3.23
2-Naphthol 185507	50 mL	*	$16.85
Ethanol 459836	1000 mL		$77.50
1-Iodobutane 167304	50 mL		$16.45
Water n/a	3750 mL		n/a

SN1 Reaction

Summary:

This simple SN1 reaction is useful for instructing students on synthetic mechanisms. This procedure produces a solid product, 2-5-dichloro-2,5-dimethylhexane, which can be used in further experiments to test solubility, melting point, and purity via TLC.



Reference: Synthesis of 2,5-Dichloro-2,5-dimethylhexane by an SN1 Reaction, Wagner, C.E., Marshall, P.A., J. Chem. Ed., 87(1), 2010, 81-83

Chemical Name Aldrich Catalog #	Amount per 100 students (g or mL)	EH&S	Purchasing cost per 100 students ($)
2,5-dimethyl-2,5-hexanediol 143618	12.5 mL		$1.79
Hydrochloric acid, conc. 320331	100 mL	*C *	$3.90
Water n/a	250 mL		n/a

Comparison: SN2 Reaction

Comparison of greener and traditional lab:

- Greener method avoids the use of concentrated sulfuric acid
- Greener method utilizes a safer solvent, ethanol

	Purchasing costs	Waste reduction (per 100 students)	"Greener" benefits
Greener method	$114.03	4.9L liquid waste (3.75L aqueous waste)	
Traditional method	$180.23	4L liquid waste 250 g solid waste	

Please note that there is not a "greener" approach for the SN1 reaction provided in this evaluation. To date, we have not found a greener version that avoids the use of concentrated hydrochloric acid, as described in the procedure here within and in many other standard procedures.