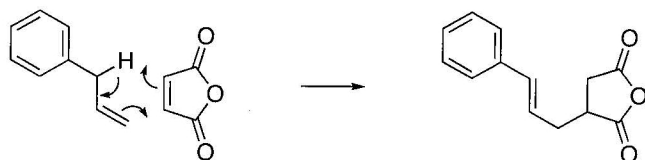


Electrocyclic reaction to form a cyclobutanone. **D:** 4e Electrocyclic reaction to form a cyclobutane. **E:** Elimination of hydrogen chloride to form a ketone.

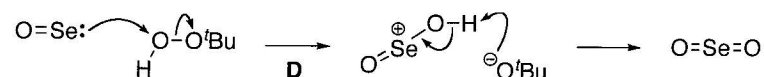
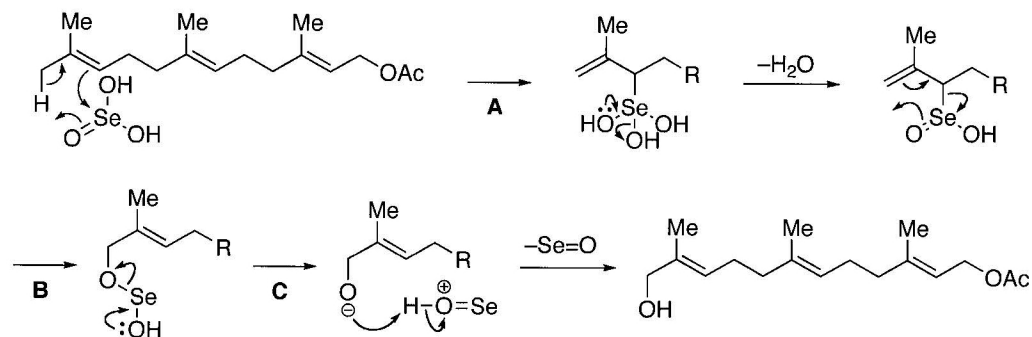
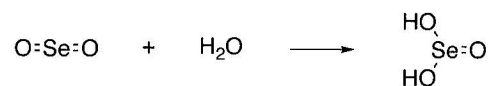
A067



Rondestedt, C. S., Jr. *Org. Synth., Coll. Vol. IV* **1963**, 766.

Ene reaction.

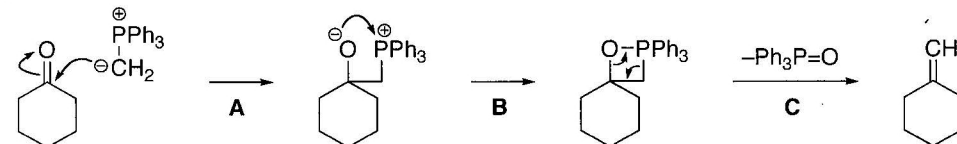
A068



Umbreit, M. A.; Sharpless, K. B. *J. Am. Chem. Soc.* **1977**, 99, 5526.

A: Ene reaction occurs on the least hindered olefin. **B:** [2,3] Sigmatropic rearrangement. **C:** Elimination of the alcohol. **D:** Oxidation of SeO with TBHP to regenerate SeO₂.

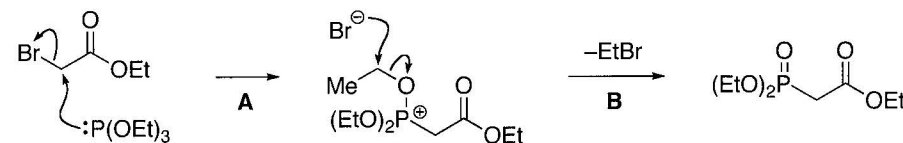
A069



Wittig, G.; Schoellkopf, U. *Org. Synth., Coll. Vol. V* **1973**, 751.

Wittig reaction. **A:** Addition of the ylide to the carbonyl group to form a betaine. **B:** Attack of the alkoxide to the phosphonium cation to form an oxaphosphetane. **C:** Irreversible elimination of Ph₃PO.

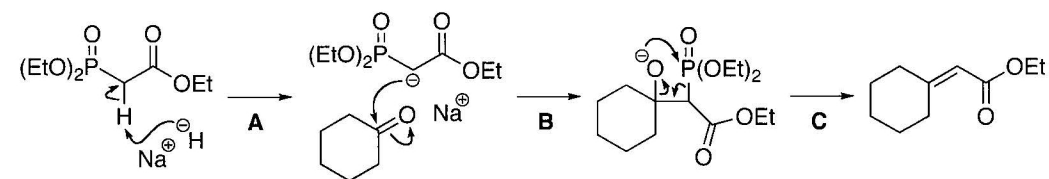
A070



van der Klei, A.; de Jong, R. L. P.; Lugtenburg, J.; Tielens, A. G. M. *Eur. J. Org. Chem.* **2002**, 3015.

Arbuzov reaction. **A:** Attack of P(OEt)₃ to the reactive bromoacetate to release bromide ion (S_N2 reaction). **B:** Attack of the resulting bromide ion to the ethyl group in an S_N2 fashion to form a phosphonate.

A071



Wadsworth, W. S., Jr.; Emmons, W. D. *Org. Synth., Coll. Vol. V* **1973**, 547.

Horner-Wadsworth-Emmons reaction. **A:** Deprotonation of the phosphonate. **B:** Addition of the phosphonate ion to the ketone. **C:** Attack of the alkoxide to the phosphonate followed by elimination of a phosphate ion to form an olefin.

A072

