The Wittig Reaction:
Synthesis of trans-9-(2-Phenylethenyl)anthracene

**Introduction:**
In the Wittig reaction, an aldehyde or ketone is treated with a phosphorous ylide resulting in an alkene. Phosphorus ylides are usually prepared by treatment of a phosphonium salt with a strong base, and phosphonium salts are usually prepared from the phosphine and an alkyl halide.

Phosphonium salts are generally very stable, and can be stored almost indefinitely. Many, such as the one that we will be using in this experiment, are commercially available. The phosphorus ylides are generally not as stable, and are usually prepared in the solution (in situ) or just before use. In this experiment, the ylide is formed in situ by the reaction of the base, sodium hydroxide, with benzyltriphenylphosphonium chloride. The ylide can then react immediately with the 9-anthraldehyde to give the product, trans-9-(2-Phenylethenyl)anthracene, along with triphenylphosphine oxide, a byproduct.

The key step of the mechanism is the formation of the oxaphosphetane, the cyclic intermediate. Wittig reactions give primarily Z alkenes but often some of the E isomer is formed as well. The alkene isomer that is formed depends on the stability of the ylide that is used. Ylides that are stabilized via resonance tend to form E-alkenes, whereas unstabilized ylides tend to form Z-alkenes. The exact mechanism will be covered in detail in the lecture class.
**Procedure:**

To a 50 mL Erlenmeyer flask, add 200 mg of benzyltriphenylphosphonium chloride, 115 mg of 9-anthraldehyde, 0.6 mL of dichloromethane, and a magnetic stirring bar. With rapid stirring, add 10 drops of 50% sodium hydroxide solution from a Pasteur pipette. Be sure to hold the Pasteur pipette vertically in order to add the correct amount. Allow the mixture to stir rapidly for 30 minutes.

After 30 minutes of rapid stirring, add 1.5 mL of dichloromethane and 1.5 mL of water. Stopper the flask, and shake it. Remove the lower organic layer with a pipet, and place it into another 5 mL vial or a centrifuge tube. Add ~1 mL of dichloromethane to the remaining aqueous layer, cap and shake the vial as before. Again, remove the lower organic layer with a pipet, and combine it with the first dichloromethane extract. Dry the combined dichloromethane extracts with sodium sulfate. Place the dried dichloromethane layer into a small beaker or flask, and evaporate the dichloromethane to get the crude product.

Recrystallize the crude product from a minimum amount of 1-propanol (~3-4 mL). After cooling spontaneously to room temperature, cool the flask in ice and collect the product using a Hirsch funnel. The triphenylphosphine oxide byproduct remains in the 1-propanol solution.

Record the melting point, mass, and % yield of the product and submit the product to your instructor.