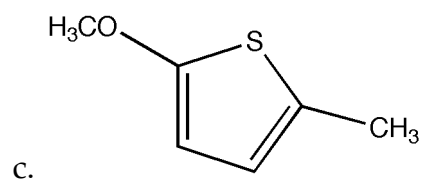
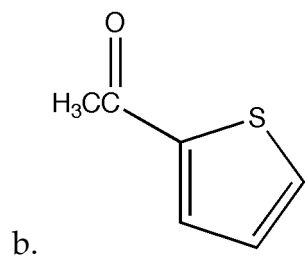
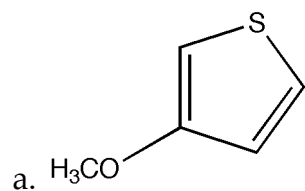


**Exercise 8: Heterocycles**

1. Predict the major mononitration product of the following:



2. The commercial synthesis of furan starts with a diketone reagent, such as 1,4-diphenyl-1,4-butadione, reacting with a strong oxidizer that also happens to have strongly polar bonds, such as  $P_4O_{10}$ .

Draw a **mechanism** for this **acid-catalyzed** reaction. Hint: The purpose of the phosphorous compound is to isolate any water that might be removed from the molecule.

3. But how did we get to 1,4-diphenyl-1,4-butadione? Starting with simpler reactants (they can have a phenyl group already attached), design a synthesis of 1,4-diphenyl-1,4-butadione. Draw the starting reagents, the intermediate products and the final product as a **reaction scheme**; include any relevant reaction conditions (such as heat, cold, etc.).