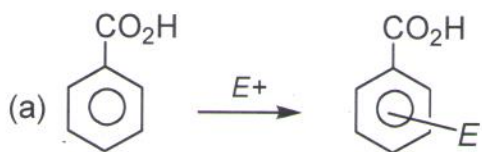
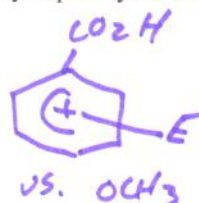


1. What type of substituent (a or b) will enhance electrophilic aromatic substitution? Briefly explain your answer.

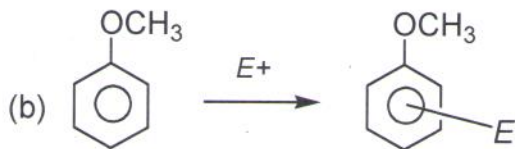
4



faster or slower than benzene?



lower energy

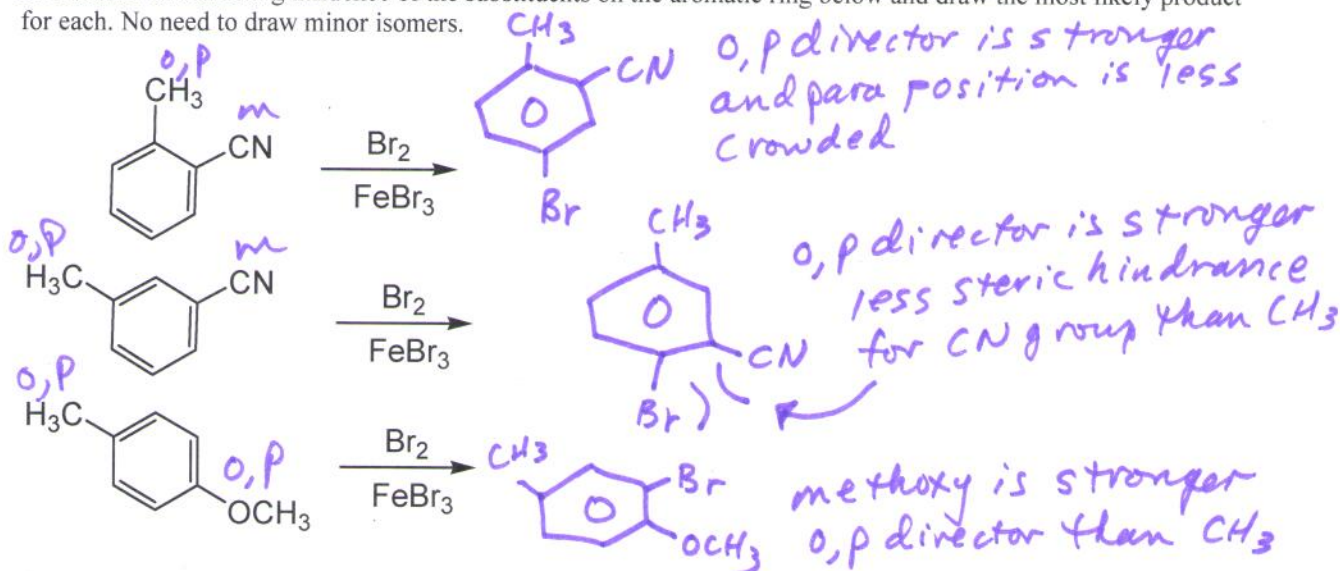


faster or slower than benzene?

Electron donating groups increase reaction rate for electrophilic aromatic substitution since donating groups increase π density in the ring which lowers activation energy of intermediate arenium ion

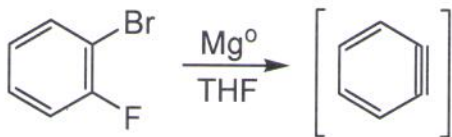
2. Consider the directing influence of the substituents on the aromatic ring below and draw the most likely product for each. No need to draw minor isomers.

9



3. Benzyne can be generated by formation of a Grignard type intermediate from o-bromofluorobenzene:

2



Draw the Diels-Alder cycloadduct formed when benzyne is made in situ in the presence of cyclopentadiene:

