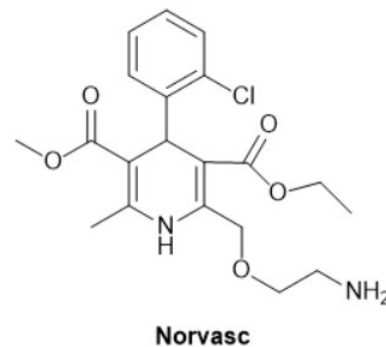
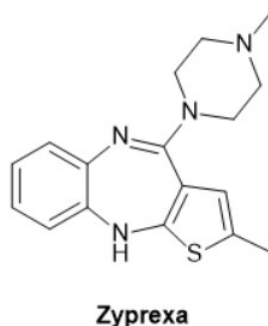
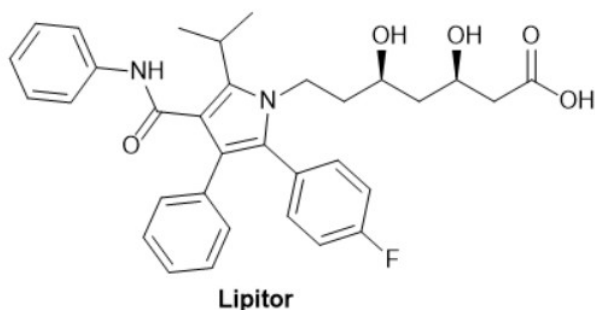




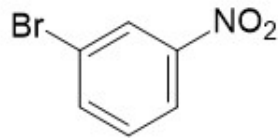
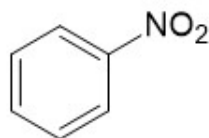
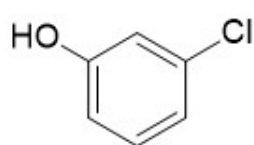
1 How many aromatic rings are in each of the following drugs?

Lipitor treats high cholesterol, Zyprexa is an antipsychotic, and Norvasc treats high blood pressure.



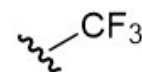
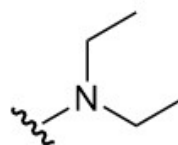
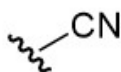
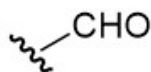
2

Determine whether each compound will readily undergo a *Nucleophilic Aromatic Substitution* (S_NAr) and/or readily reacts (*i.e.*, is "activated") under *Electrophilic Aromatic Substitution* (EAS) conditions.

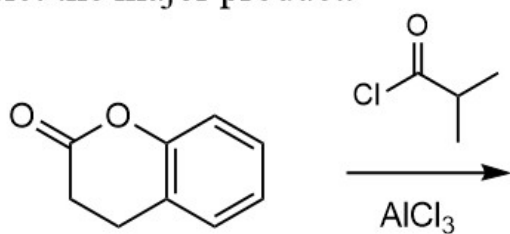


3

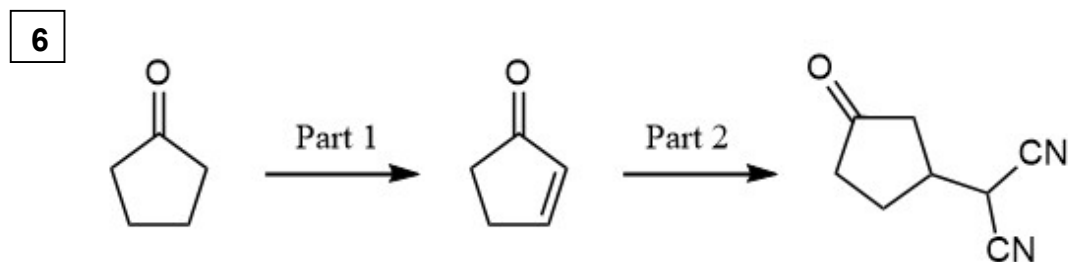
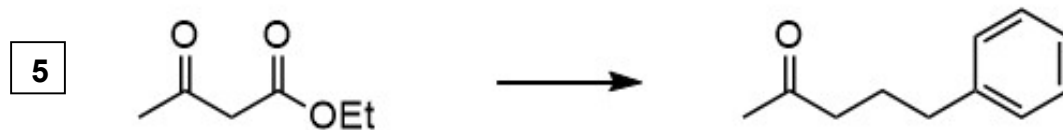
Categorize each of the following groups as an *ortho/para director* or a *meta director*.



4 Predict the major product.

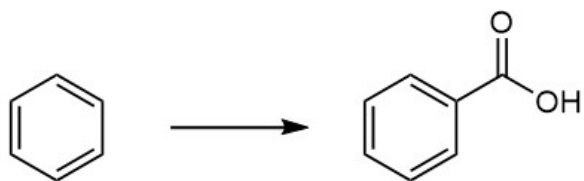


Provide the reagents necessary to transform the given starting material into the desired product.



7 Provide TWO possible synthetic routes:

Possible retrosyntheses: Grignard, oxidation



8 Provide the necessary reagents.

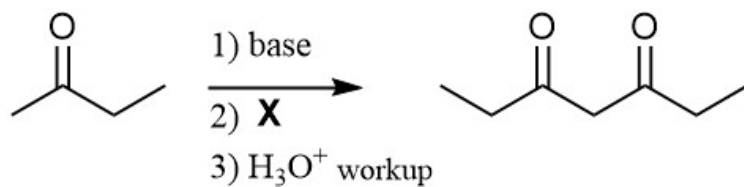


9



10

Provide the necessary reagents (base and compound X).



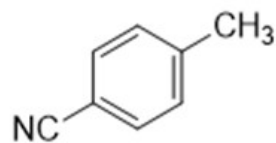
Identify suitable reaction conditions for the "base" above.

A) LDA, -78°C B) NaOH, -78°C C) NaH, 25°C D) NaOH, 25°C

- A) Base should be added slowly to a solution of the ketone.
 B) Ketone should be added slowly to a solution of the base.
 C) The order of addition does not matter (both A and B give the same results)

11–12 Prepare each of the following target molecules from **toluene**.

11



12

meta-nitrobenzoic acid