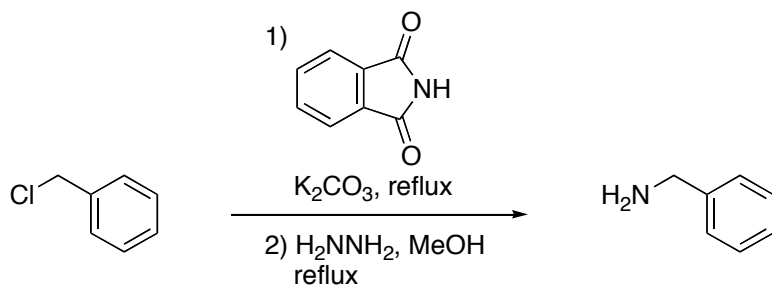


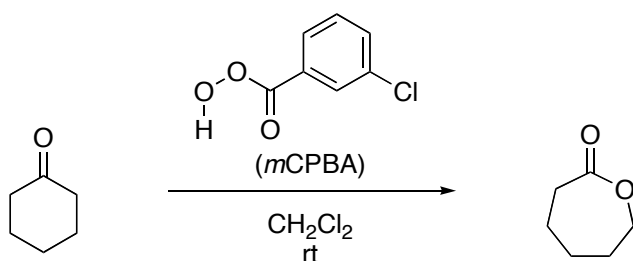
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以下の反応の反応機構を電子の流れがわかるように、別紙に矢印を使って記せ。

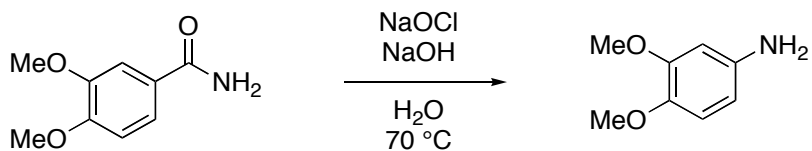
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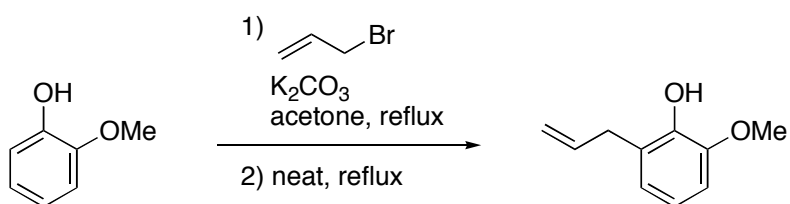
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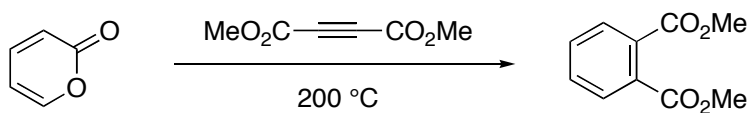
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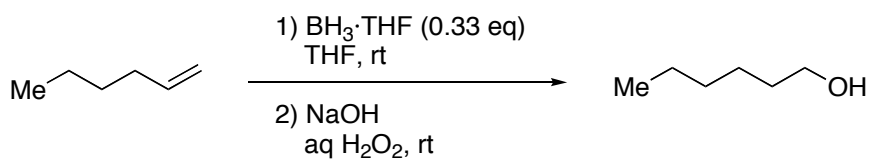
16.



17.



18.



13.

ヒント: Gabriel synthesis. A: pK_a $RCONHCOR = 9.6$, $HCO_3^- = 10.3$. B: Alkylation. C: Addition of H_2NNH_2 to the imide to form a hydrazide. D: Intramolecular addition of the amino group of the hydrazide to the amide carbonyl to release benzylamine.

14.

ヒント: Baeyer-Villiger oxidation. A: Activation of the carbonyl group by protonation. B: Addition of $mCPBA$ to the carbonyl group. C: 1,2-Alkyl shift helped by the oxygen lone-pair with cleavage of the peroxide to form a lactone.

15.

ヒント : Hofmann rearrangement. A: pK_a $RCONH_2 = 17$, $H_2O = 15.7$. B: Chlorination of the amide anion. C: Deprotonation. D: The anion on the nitrogen atom induces migration of the aromatic ring with cleavage of the N-Cl bond to form an isocyanate. E: Addition of hydroxide ion to the isocyanate. F: Decarboxylation.

16.

ヒント : A: Allylation of the phenol. B: [3,3] Sigmatropic rearrangement (Claisen rearrangement). C: Aromatization.

17.

ヒント : A: Diels-Alder reaction. B: Retro Diels-Alder reaction.

18.

ヒント : A: Hydroboration through a four-membered transition state. B: Attack of a hydroperoxide anion to the borane to form an ate complex. C: Migration of an alkyl group. D: Hydrolysis of the borate.