

2. Predict the products of the following reactions.

a) Phenol + acetic anhydride

b) Phenol + acetic formic anhydride

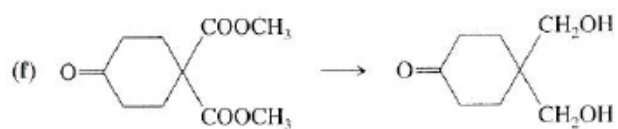
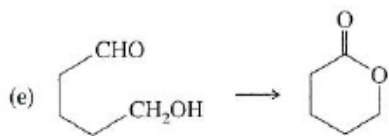
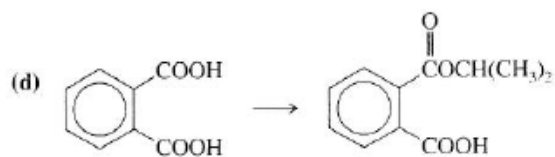
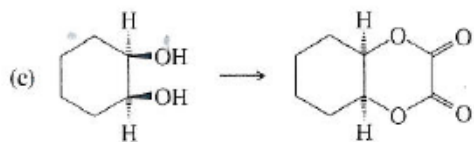
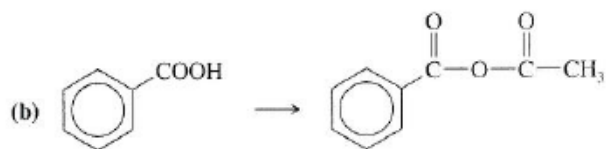
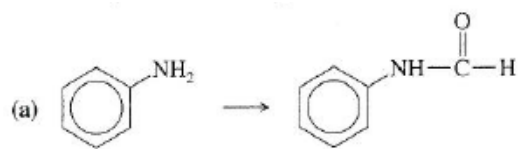
c) Aniline + phthalic anhydride

d) Anisole + succinic anhydride and aluminum chloride

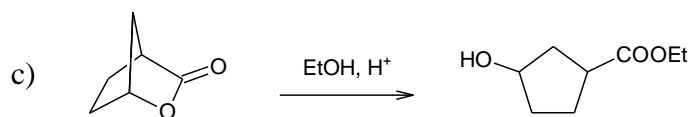
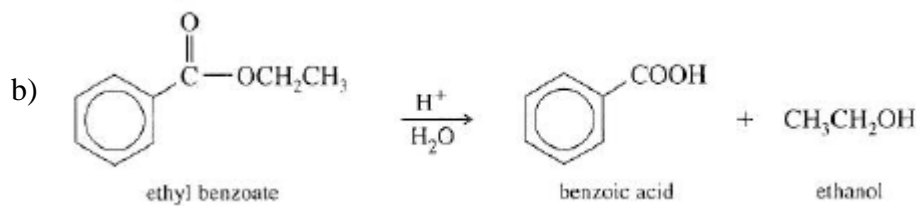
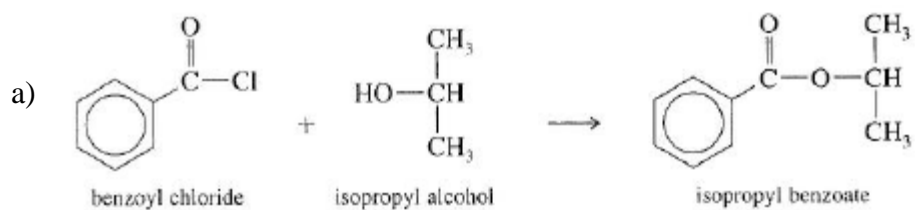
e) $\text{PhCH(OH)CH}_2\text{NH}_2$ + 1 eq. of acetic anhydride

f) $\text{PhCH(OH)CH}_2\text{NH}_2$ + excess acetic anhydride

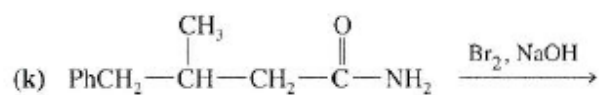
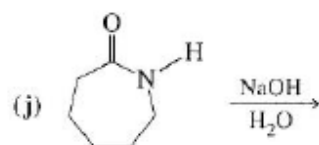
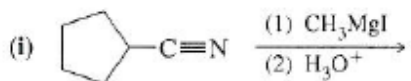
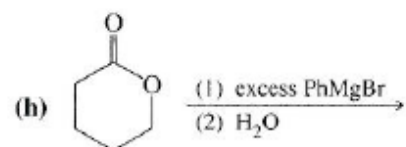
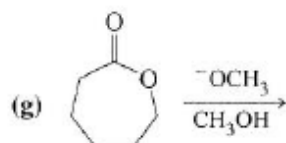
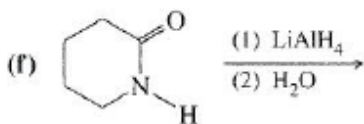
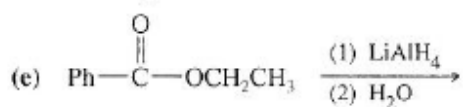
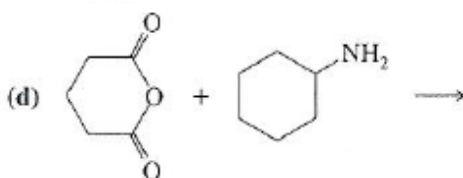
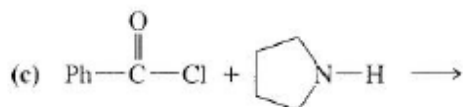
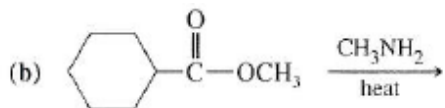
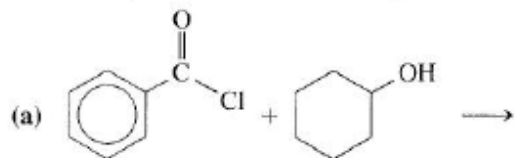
3. Show how you would accomplish the following synthesis in good yields.



4. Propose the mechanism for the following reactions.



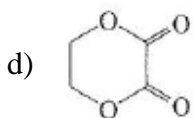
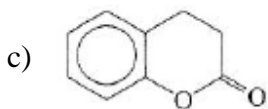
5. Predict the products of the following reactions.



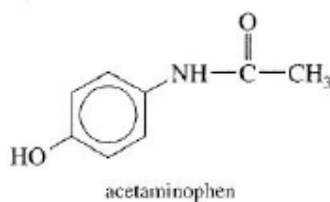
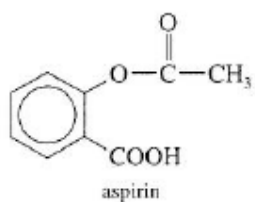
6. Predict the products of saponification of the following esters.

a) HCOOPh

b) $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_3$



7. Show how you would synthesize aspirin and acetaminophen (both pain killers), from phenol.



8. Show how you would carry out the following synthesis. Don't forget, some conversions might require more than one step.

a) Isopentyl alcohol \longrightarrow isopentyl acetate (banana oil)

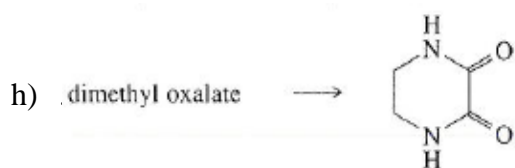
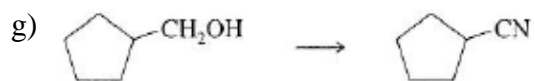
b) 3-ethylpentanoic acid \longrightarrow 3-ethylpentanenitrile

c) Isobutylamine \longrightarrow N-isobutylformamide

d) Ethyl acetate \longrightarrow 3-methyl-3-pentanol

e) Cyclohexylamine \longrightarrow N-cyclohexylacetamide

f) Bromocyclohexane \longrightarrow dicyclohexylmethanol



9. Show how you would accomplish the following multistep synthesis, using the indicated material and any necessary reagents.

