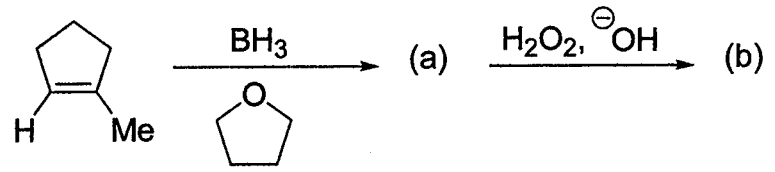
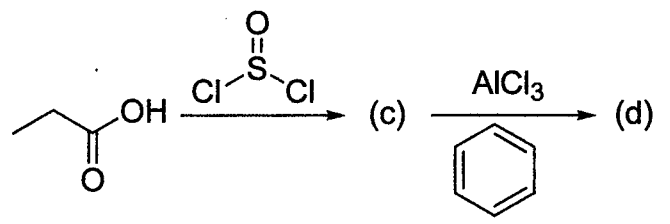
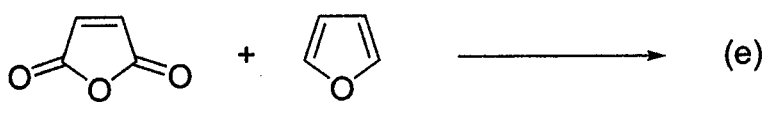
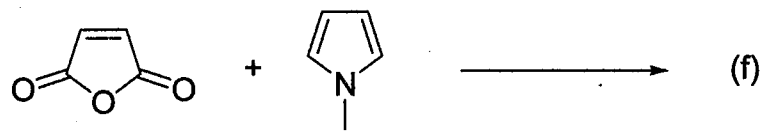
1. The peak with the second highest m/z value of the compound $C_8H_{14}O_2$ is 114. (a) List the compounds that could have been lost on fragmentation of the parent compound to give the peak of 114. (b) How could one determine the actual lost compound by mass spectroscopy. (10%)

2. Give the major product for each reaction listed below. (30%)





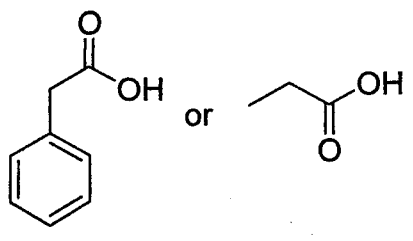




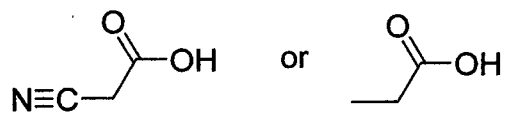
3. In the presence of $AgNO_3$, 7-bromocycloheptatriene completely dissociates in water to give a precipitate of AgBr. Give your reason. (10%)

4. Indicate which compound is more acidic. (10%)

(a)



(b)



5. Draw the hydrogen-bonding in a solution containing CH_3OH and H_2O. Note: Use dashed line to indicate the hydrogen-bonding. (5%)

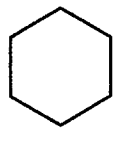
6. Optically active A has the molecular formula C_6H_{12}, which converts to achiral C_6H_{14} after hydrogenation. Give a chemical structure of A. (10%)

7. A reaction has an activation energy ($\Delta H^{\ddagger}$) of 8 kcal mol^{-1} and an enthalpy of formation (ΔH) of 2 kcal mol^{-1}. What is the value of $\Delta H^{\ddagger}$ for the reverse reaction? (5%)

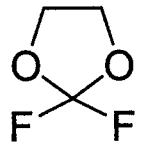
8. (a) Draw the two conformations of 1,3-butadiene. (b) Indicate which one is more stable. (10%)

9. Indicate which one in the following has one peak in its ^1H NMR spectrum and two peaks in its ^{13}C NMR spectrum. (5%)

(a)

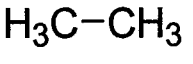


(b)

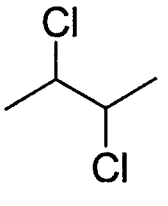


(c)

(d)



(e)



10. Draw the Beckmann rearrangement of cyclohexanone oxime. (5%)

試題隨卷繳回