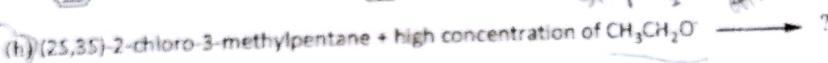
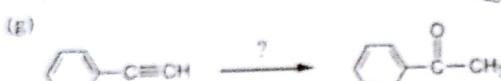
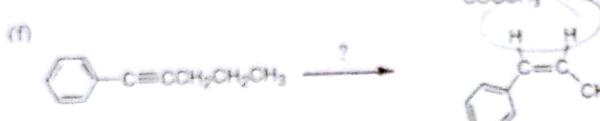
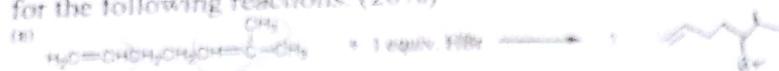
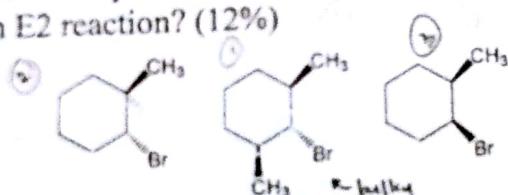


1. Predict the major product, if any, or provide appropriate starting materials, or reagent(s) for the following reactions. (20%)



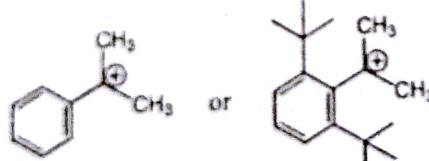
2. Rank the following compounds from most reactive to least reactive in an E2 reaction and give a brief explanation. What would be the major product, if any, for each compound after an E2 reaction? (12%)



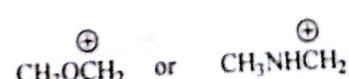
$3 > 2 > 1$ E2 \rightarrow nucleophilicity
 bulky \uparrow steric effect \uparrow , more reactive (?)

3. Which carbocation in each of the following pairs is more stable? Why? (8%)

(a)

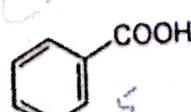
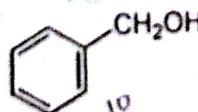
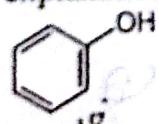


(b)



N more O

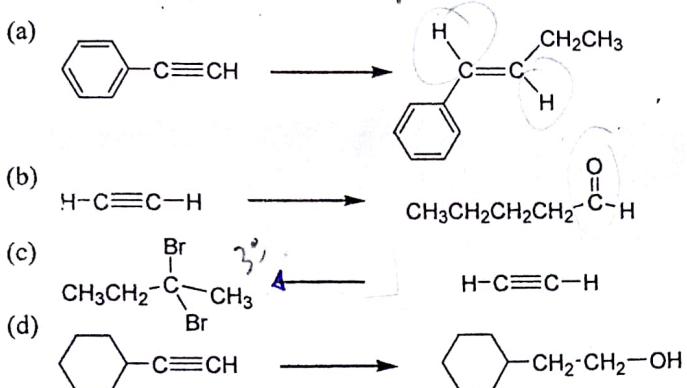
4. Rank the following compounds in an order of decreasing acid strength, and give a brief explanation. (8%)



5. Show how you would synthesize the following compound, starting with the provided starting material. (32%)

3~5步

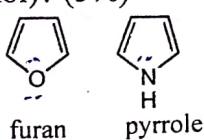
3~5 step, reagent 雖寫, intermediate 寫出



這樣 ans. PPB

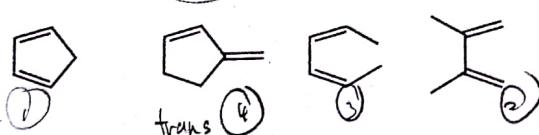
這樣有分

6. Why is the resonance energy of pyrrole (21 kcal/mol) greater than the resonance energy of furan (16 kcal/mol)? (5%)

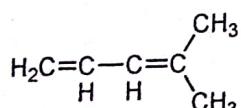


resonance energy
stability ↑ & delocalized energy

7. Rank the following dienes in order of decreasing reactivity in a Diels-Alder Reaction, and give a brief reason for your prediction. (6%)

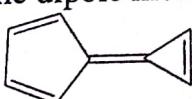


8. Give the possible reaction products for each of the following reactions, and indicate which is the kinetic product, and which is the thermodynamic product. (6%)

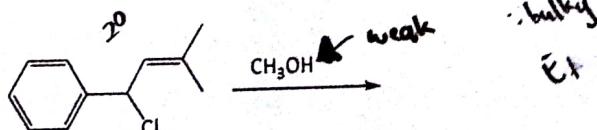


+ 1 equiv. HBr → ?

9. In what direction is the dipole moment in calicene? Explain. (4%)



10. Predict the product for the following reaction and write a mechanism to explain how it is formed. (6%)



11. What is the relative reactivity of the following compounds toward the addition of HBr? Give a brief explanation of your answer. (5%)

