中央大學八十九學年度碩士班研究生入學試題卷

生命科學系　不分組　科目：　有機化學　共 1 頁 第 1 頁

簡答題 (10% for each)

1. Cubane derivatives such as tetranitrocubane (compound A) have potential as explosives. What is the feature of cubane that clearly contributes to the thermal lability of its nitro derivatives?

2. Bromomethane, CH_3Br, is effective in eliminating insect infestations around a number of major crops, including patatoes and tomatoes. (a) What kind of chemical reactivity of bromomethane is responsible for this? (b) Give two special properties owned by this kind of chemical reaction.

3. The color change from Cr(VI) (orange) in the presence of alcohols to Cr(III) (green) is used in a preliminary determination of the ethanol level in the breath of suspected alcohol-intoxicated persons. Give a balanced equation for such a reaction using $K_2Cr_2O_7$ and H_2SO_4 as the reagents.

4. In NMR experiments, deuterated solvents such as $CDCl_3$ are generally used. (a) What is the function of deuterated solvent? In addition, Manoalide (compound B) was isolated from a sponge in 1977. (b) Which carbon in the structure will give the largest chemical shift in a ^{13}C NMR? (draw the structure in your answer sheet first and then mark it)

5. Give an example for (a) the Wittig reaction and (b) the Diels-Alder reaction.

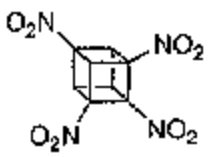
6. The major product of the acid-catalyzed dehydration of α-terpineol (compound C) is α-terpinene (compound D). Propose a reasonable mechanism for the transformation.

7. Sorbic acid (compound E) is the fungicide of choice for wines as well as many foods, but it has no antibacterial capability. Provide an IUPAC name for Sorbic acid.

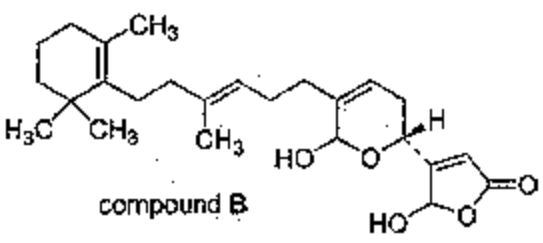
8. 2,4,6-trinitrophenol is also called "Picric acid" because it has a low *pKa* value of 0.38. (a) What is the *pKa* value for phenol? (b) Explain why Picric acid has a low *pKa* value.

9. Cephalosporin C (compound F) is an important antibiotics. Determine the absolute configuration for all its asymmetric carbons. (draw the structure in your answer sheet first and then mark it)

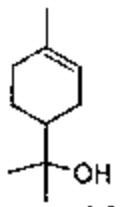
10. N-Bromosuccinimide (NBS) has been an useful reagent in organic reactions. Provide one example using the NBS reagent.



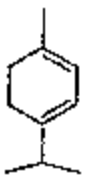
compound A

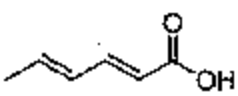


compound B

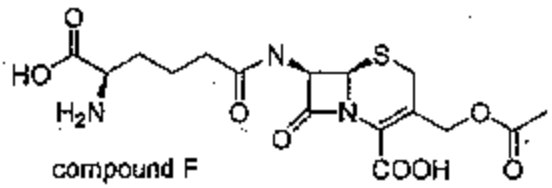


compound C


compound D



compound E



compound F