

UNIVERSITY OF SWAZILAND

Final Examination – 2017

TITLE OF PAPER : Advanced Organic Chemistry

COURSE NUMBER : C 403

TIME : Three Hours

INSTRUCTIONS:

Answer any four (4) questions of the six (6) questions and every question holds 25 marks.

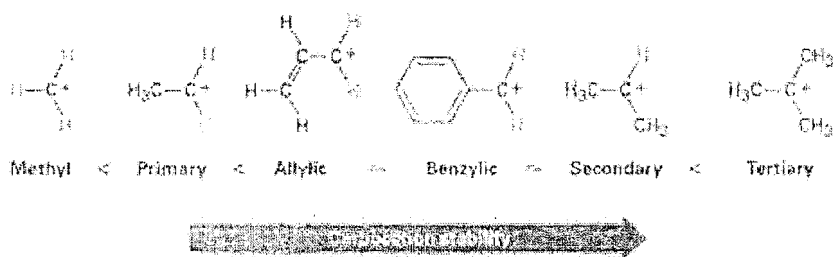
NB: all questions are to be answered in a separate answer sheet.

Question 1

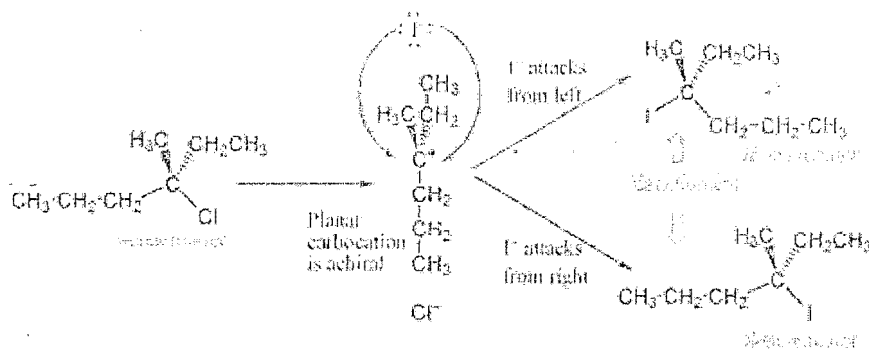
- A) Why does electrophilic substitution of pyridines prefer the β position as compared to the (α , γ) position? Would it also be the same with Nucleophilic Substitution reaction? (6)
- B) Reaction at *Carbon* is usually difficult and slow, requiring forcing conditions. Explain the reason. (7)
- C) Pyridines generally resist oxidation but Pyridines with side chains undergo substitution. How would you explain this condition? (6)
- D) Synthesize quinolines using Skraup Synthesis applying (3+3) strategy and Napieralski Synthesis applying (5+1) strategy. (6)

Question 2

- A) Differentiate between S_N1 and S_N2 nucleophilic substitution reactions. (5)
- B) How do solvents affect S_N1 and S_N2 nucleophilic substitution reactions? (5)
- C) The order below shows a carbocation stability does it favor S_N1 or S_N2 reaction mechanism? Why? (5)

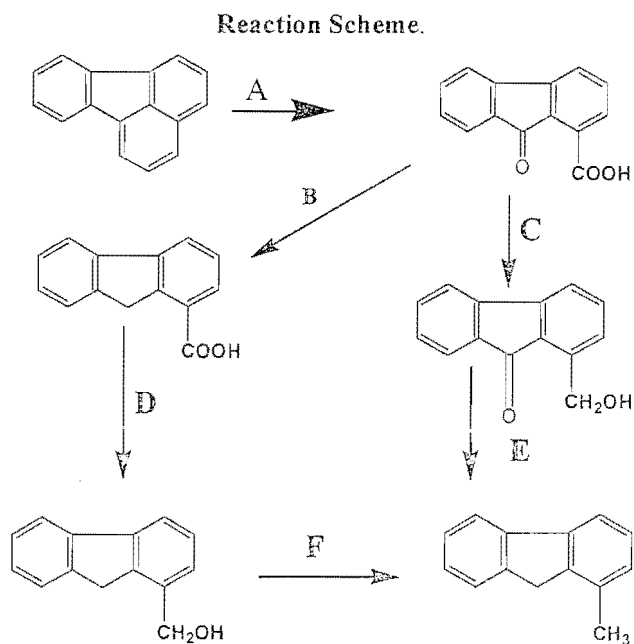


- D) Why are benzylic and allylic carbocation more stable than primary and methyl carbocations? (5)
- E) What is the reaction mechanism of the reaction indicated below? (5)



Question 3

- A) What is the distinguishing feature of aromatic compounds? Explain taking pyridine and pyrrole as examples. (7)
- B) Determine the identity of the following reactants in the oxidation and reduction reaction scheme. (12) Why does reaction take place at the ring specified? (6)

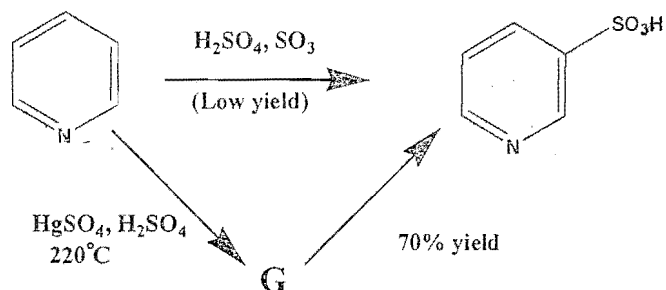


Question 4

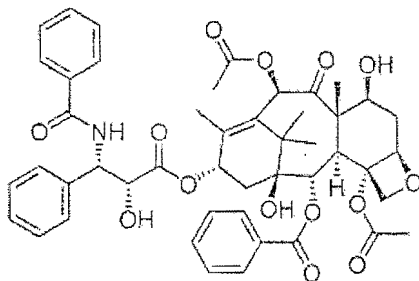
- A) Why are 5- and 6-membered organic ring compounds the easiest to make, are stable and quite common in nature? (5)

B)

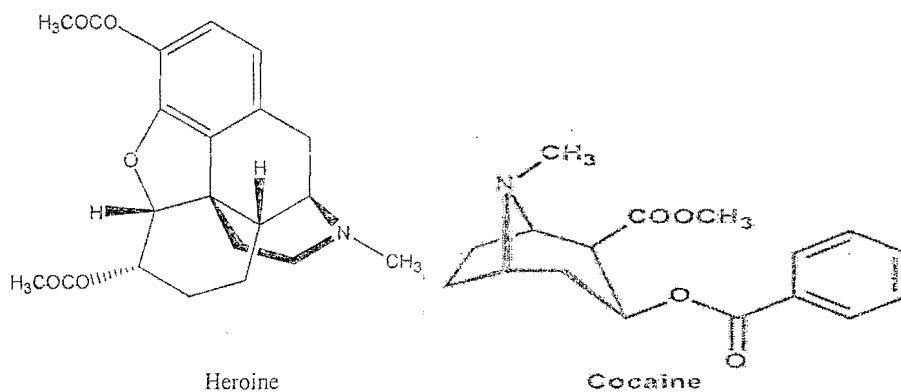
What is the identity of the intermediate G? what type of reaction? Explain. (5)



C) Significant amount of labor, time and financial resources have been channeled to natural products research. Why are natural products important? i.e Use Taxol whose structure is given below as an example. (6)



D) Morphine is the precursor natural product for heroin that is an opioid analgesic drug that directly acts on the nervous system. Compare the bioactivity of the psychoactive chemicals Heroin and Cocaine. How do these two psychoactive chemicals differ in their impact? (9)



Question 5

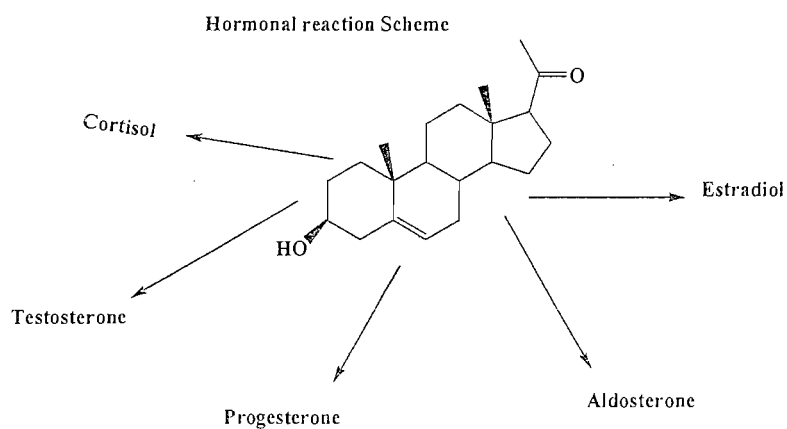
Discuss the different classes of natural products given below. In your discussion give examples of each and show how they are biosynthesized?

- A) Terpenes (5)
- B) Alkaloids (5)
- C) Flavonoids (5)
- D) Proteins and carbohydrates (10)

Question 6

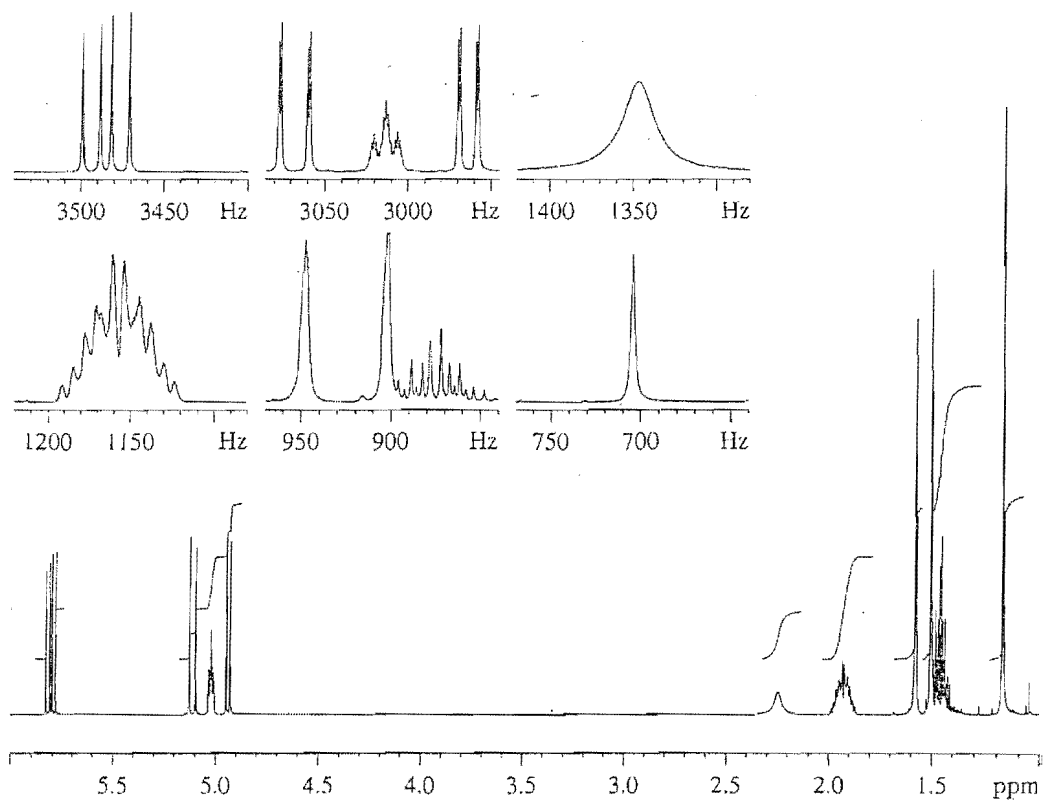
- A) How would you synthesize the following compounds in the laboratory taking pregnenolone as starting material? Write the structures of the products and the reagents utilized in the reaction scheme. (10)

The structure below is pregnenolone.

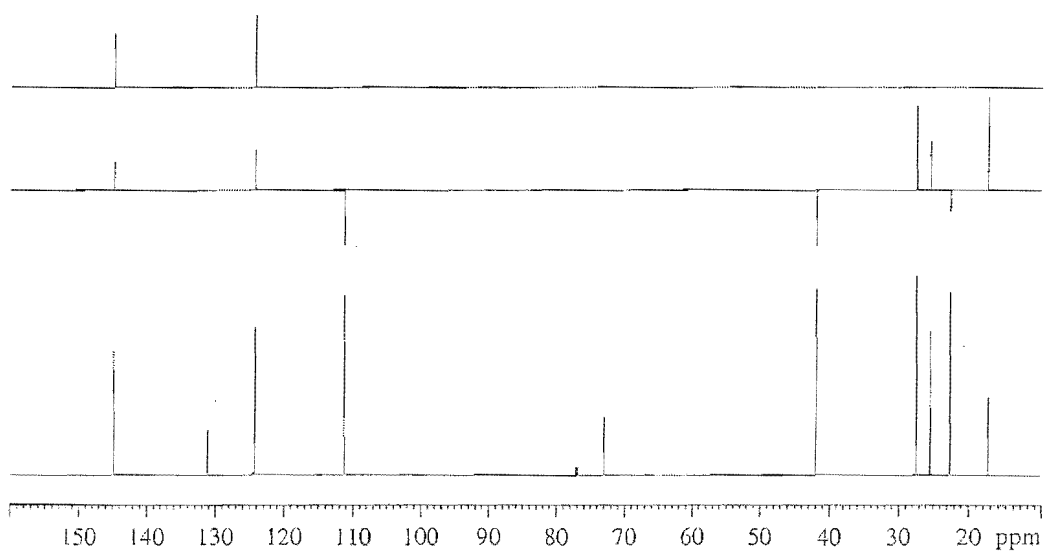


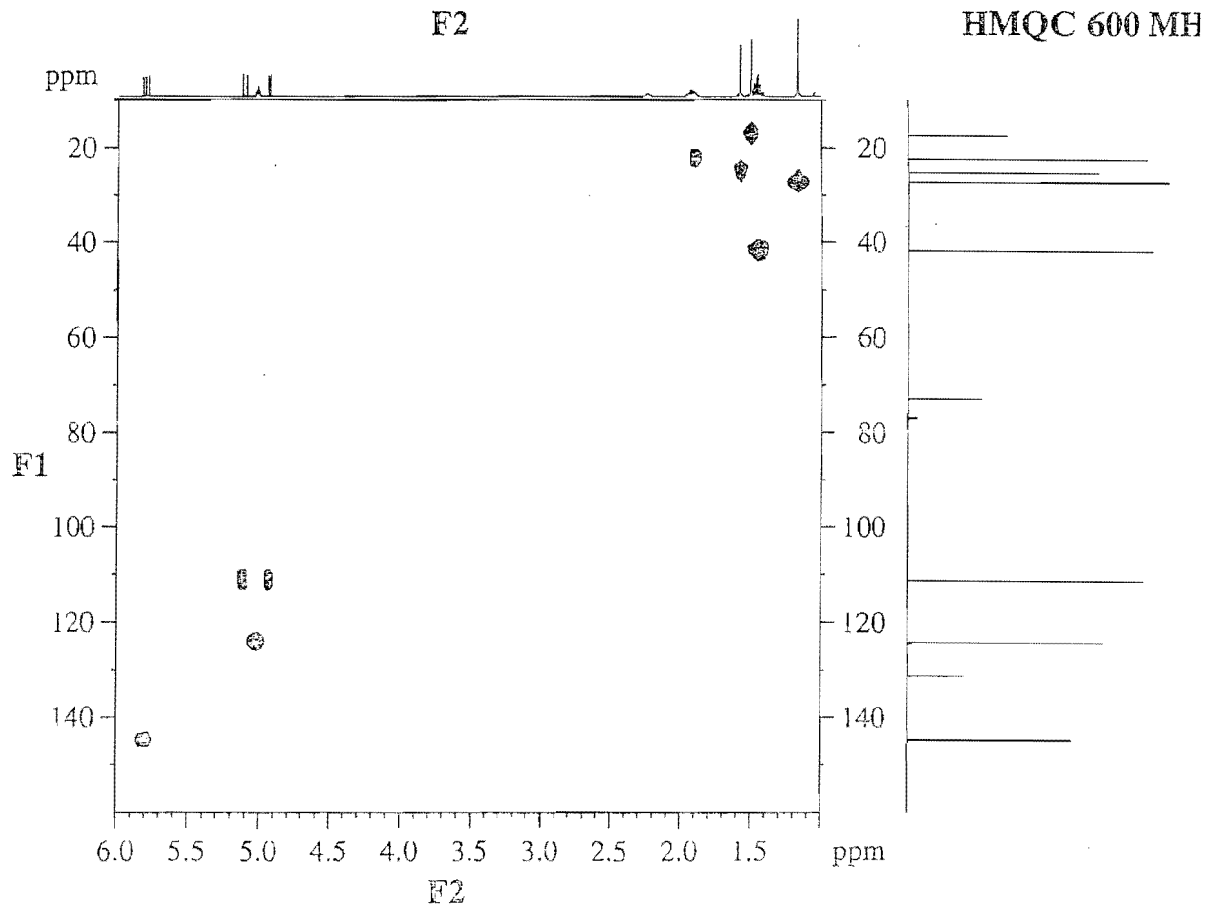
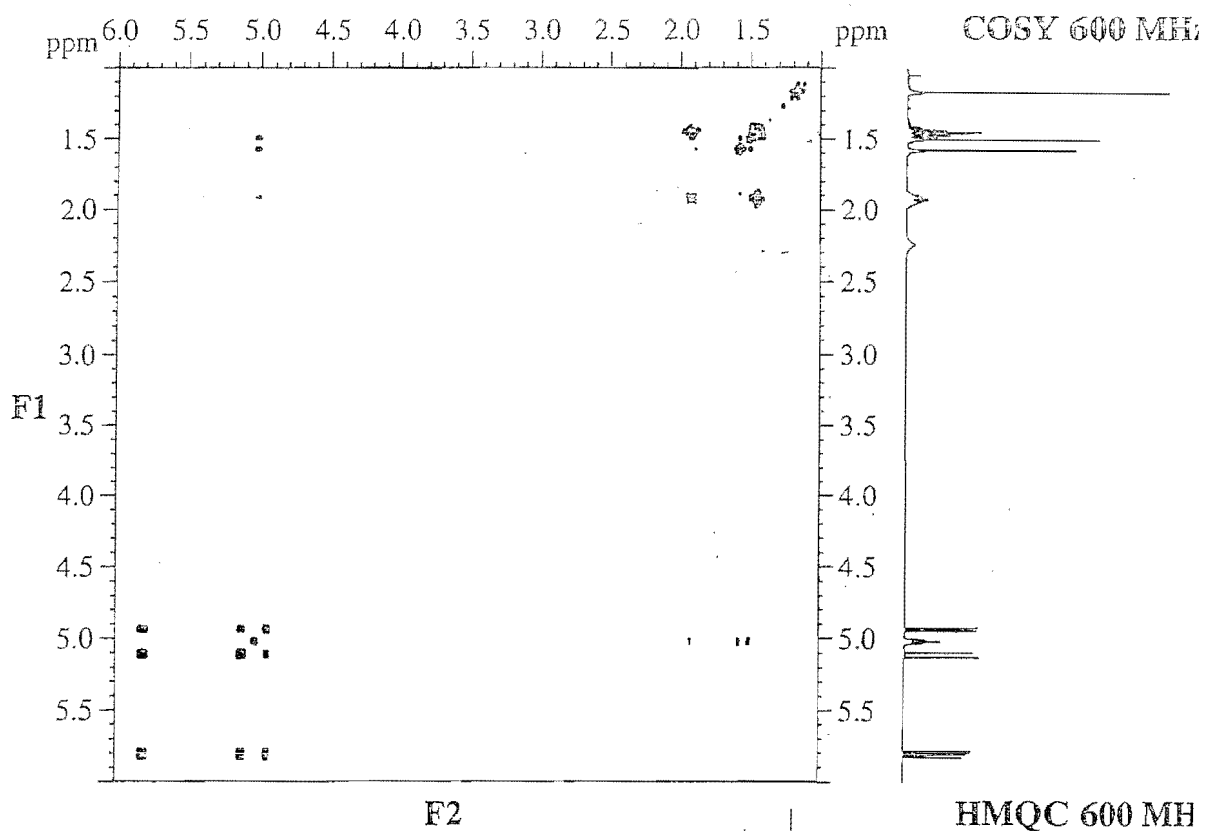
B) Identify compound $C_{10}H_{18}O$ from its 1H , ^{13}C /DEPT, HMQC, HMBC experiments. (15)

1H NMR 600 MHz

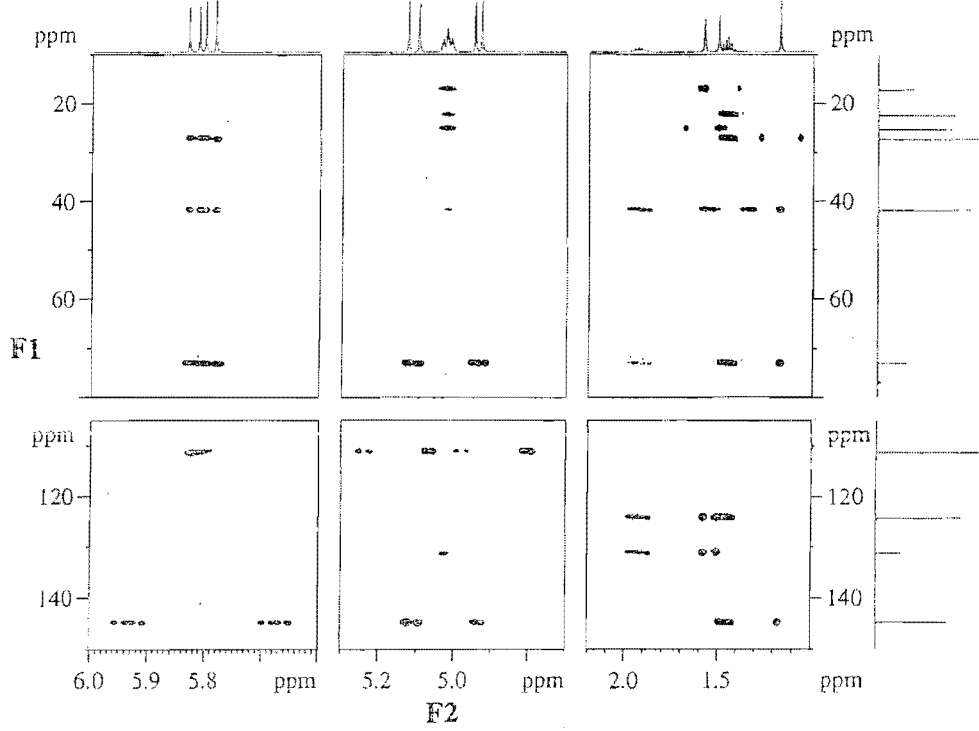
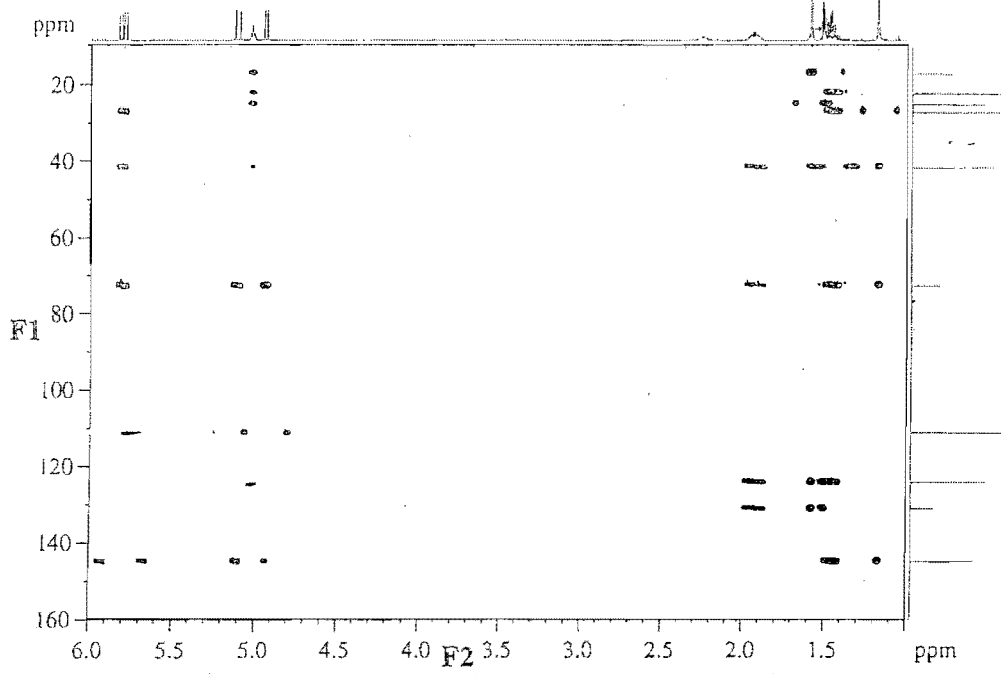


^{13}C /DEPT 150.9 MHz





HMBC 600 MHz



INADEQUATE 150.9 MHz

