Analytical Chemistry: NMR Spectroscopy - Multiplet Patterns

Given: The splitting pattern that needs to be identified.

Introduction

NMR (Nuclear Magnetic Resonance) spectroscopy is a technique used to determine the structure of organic compounds. The splitting pattern in an NMR spectrum reveals the number of neighboring hydrogen atoms (protons) through the coupling effect. The nomenclature for the splitting patterns includes singlet, doublet, triplet, quartet, quintet, sextet, among others.

Step-by-Step Solution

1. **Identify and Count the Peaks:**

   The given NMR spectrum pattern shows four distinct peaks.

   Explanation: The number of peaks corresponds to the splitting pattern. In NMR terminology:

   - A singlet has 1 peak.
   - A doublet has 2 peaks.
   - A triplet has 3 peaks.
   - A quartet has 4 peaks.

2. **Determine the Pattern Name:**

   Since the pattern has four peaks, the correct name for this splitting pattern is "quartet".

   Explanation: The quartet pattern arises due to the coupling of a hydrogen atom with three neighboring hydrogen atoms. According to the (n+1) rule, where n is the number of adjacent protons, (3+1) results in 4 peaks, hence a quartet.

Supporting Statement

Verification with the options provided:

- A) Singlet – Incorrect (1 peak)
- B) Doublet – Incorrect (2 peaks)
- C) Triplet – Incorrect (3 peaks)
- D) Quartet – Correct (4 peaks)

Conclusion

The correct name for the given splitting pattern is "quartet".

Final Solution: D) Quartet

All steps are explained with accurate calculations, adhering to the guidelines for clarity and correctness in the solution.