

Spectroscopy questions-2009

Question 1

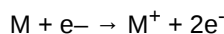
The most appropriate technique to determine levels of the Pb^{2+} ion in blood is

- A. mass spectrometry.
- B. infrared spectroscopy.
- C. atomic absorption spectroscopy.
- D. high-performance liquid chromatography.

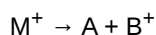
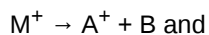
Solution

Question 2

A sample of compound M is analysed in a mass spectrometer where it forms the molecular ion M^+ according to



Some of the molecular ions fragment as follows.



The mass spectrum would show peaks due to the species

- A. M^+ , A, A^+ , B and B^+ only.
- B. M^+ , A^+ and B^+ only.
- C. A^+ and B^+ only.
- D. A and B only.

Solution

Question 3

The UV-visible spectrum of a solution of a certain compound is shown on the right. Consider the following statements about this compound and its UV-visible spectrum.

I The amount of light absorbed by a solution of this compound depends on its concentration.

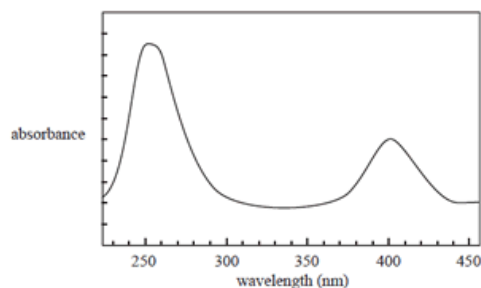
II The amount of light absorbed by a solution of this compound depends on the wavelength of light used.

III The spectrum is a result of electrons falling back from higher to lower electronic energy levels.

IV The concentration of a solution of this compound can only be determined by UV-visible spectroscopy at 250 nm.

Which of the above statements are true?

- A. I and II
- B. II and III
- C. I, II and III
- D. I, II and IV



Solution

[Click to see the spectrum.](#)

Question 4

The structure of an organic molecule, with empirical formula CH_2O , is determined using spectroscopic techniques.

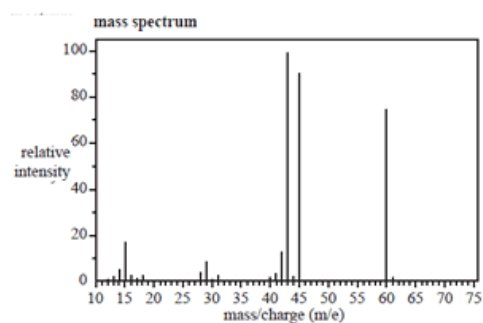
The mass spectrum, ^1H NMR and infrared spectrum for this molecule are given on the right.

Use the information provided by these spectra to answer the following questions.

a. What is the molecular formula of this molecule?

[Solution](#)

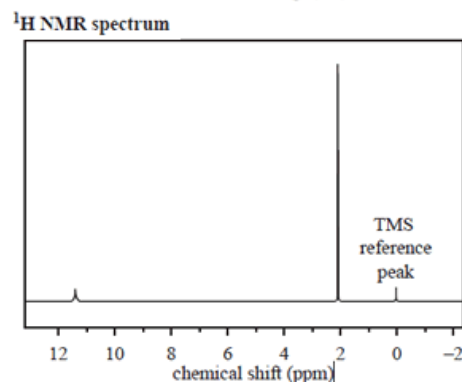
[Click](#) to see the mass spectrum



b. How many different proton environments are there in this molecule?

[Solution](#)

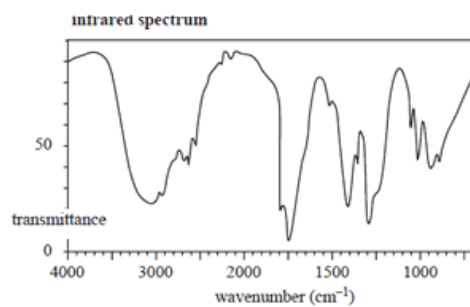
[Click](#) to see the ^1H NMR spectrum.



c. Draw the structure of the unknown molecule, clearly showing all bonds.

[Solution](#)

[Click](#) to see the infrared spectrum



d) Explain how the structure of the compound you have drawn in part c. is consistent with its IR spectrum.

[Solution](#)

[Click](#) to see the infrared spectrum

e. Name the compound you have drawn in part c.

[Solution](#)

[Click](#) to see the infrared spectrum

[Continue](#) with questions from the 2008 exam.
[Continue](#) with general spectroscopy questions