

Unit 13 - Week 12

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Assignment 12

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2019-10-23, 23:59 IST.

1) Which of the following statements regarding NMR spectroscopy is wrong? 1 point

- NMR signals towards the left of the spectral chart correspond to larger chemical shifts.
- Chemical shifts are larger when the frequencies of the radiation which induces the nuclear transitions are higher
- Chemical shifts are larger when shielding effects are greater
- A hydrogen signal splits into n+1 peaks by spin-spin coupling when the number of equivalent hydrogen atoms on adjacent atom(s) is n, and no other neighboring atoms are involved.

No, the answer is incorrect. Score: 0

Accepted Answers:

Chemical shifts are larger when shielding effects are greater

2) Arrange the compounds according to the increasing value of chemical shift of protons: 1 point

- CH₃F < CH₃Cl < CH₃Br < CH₃I
- CH₃I < CH₃Br < CH₃Cl < CH₃F
- CH₃I < CH₃Cl < CH₃Br < CH₃F
- CH₃F < CH₃Br < CH₃Cl < CH₃I

No, the answer is incorrect. Score: 0

Accepted Answers:

CH₃I < CH₃Br < CH₃Cl < CH₃F

3) How many signals will be obtained for CH₃-CH₂-CH₂-Cl and CH₃-CHCl₂-CH₃, respectively: 1 point

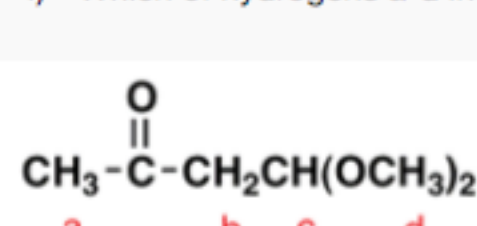
- 3 and 2
- 3 and 3
- 2 and 2
- 2 and 3

No, the answer is incorrect. Score: 0

Accepted Answers:

3 and 2

4) Which of hydrogens a-d in the following molecule gives a triplet signal in a normal ¹H NMR spectrum? 1 point



- Hydrogen a
- Hydrogen b
- Hydrogen c
- Hydrogen d

No, the answer is incorrect. Score: 0

Accepted Answers:

Hydrogen c

5) The ¹H NMR spectrum of CH₃OCHClCH₂Cl will exhibit _____. 1 point

- A three proton doublet. One proton singlet and a two proton doublet
- A three proton singlet. One proton singlet and a two proton doublet
- A three proton singlet. One proton triplet and a two proton doublet
- A three proton triplet. One proton triplet and a two proton triple

No, the answer is incorrect. Score: 0

Accepted Answers:

A three proton singlet. One proton triplet and a two proton doublet

6) How many Hertz does 1 ppm correspond to on a PMR spectrometer operating at a radio frequency of 60 MHz and 100 MHz? 1 point

- 6 Hz, 10 Hz
- 60 Hz, 100 Hz
- 100 Hz, 60 Hz
- 10Hz, 100Hz

No, the answer is incorrect. Score: 0

Accepted Answers:

60 Hz, 100 Hz

7) The separation between the centers of the peaks of doublet (in Hz) is called 1 point

- Coupling constant
- Spin constant
- Spin-spin coupling
- Chemical shift

No, the answer is incorrect. Score: 0

Accepted Answers:

Coupling constant

8) A proton H_b is coupled to four equivalent protons H_a. The multiplicity and the relative intensity of lines in the signal H_b is 1 point

- Doublet, 1 : 4
- Triplet, 1 : 4 : 6
- Quartet, 1 : 4 : 6 : 4
- Quintet, 1 : 4 : 6 : 4 : 1

No, the answer is incorrect. Score: 0

Accepted Answers:

Quintet, 1 : 4 : 6 : 4 : 1

9) Which type of ionic species are allowed to pass through the slit and reach the collecting plate? 1 point

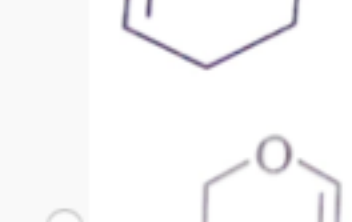
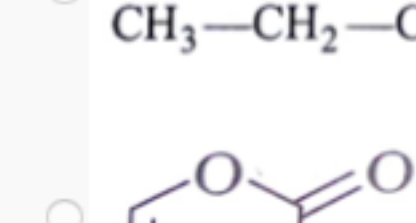
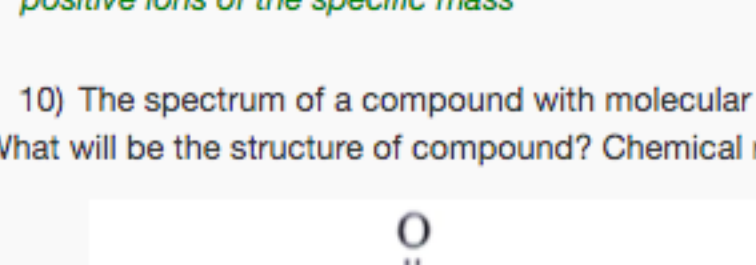
- Negative ions of all masses
- positive ions of the specific mass
- Negative ions of the specific mass
- Positive ions of all masses

No, the answer is incorrect. Score: 0

Accepted Answers:

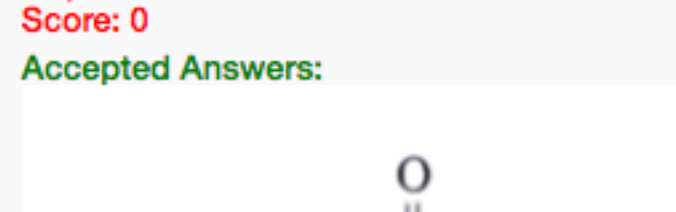
positive ions of the specific mass

10) The spectrum of a compound with molecular formula C₈H₆O₂ is shown below. IR spectrum shows medium intensity band at 3270 and 2180 cm⁻¹. What will be the structure of compound? Chemical reference: 1.3 (²H, t); 2.8 (1H, s), 4.3 (²H, q). 1 point



No, the answer is incorrect. Score: 0

Accepted Answers:



11) The mass spectrum of acetone (CH₃COCH₃) shows major peaks at m/z = 58, 43 and 15. What can be deduced from these data? 1 point

- The parent ion is not observed
- The parent ion is observed, and fragmentation involves cleavage of two C-C bonds
- The parent ion is observed, and fragmentation involves loss of CO.
- The parent ion is observed, and fragmentation involves cleavage of a C-C bond.

No, the answer is incorrect. Score: 0

Accepted Answers:

The parent ion is observed, and fragmentation involves cleavage of a C-C bond.

12) Which of the following corresponds to the molecular ion in a mass spectrum? 1 point

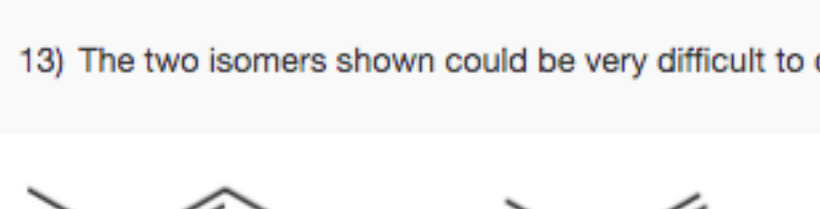
- The most abundant ion
- The ion with the smallest m/z
- The ion formed by removal of an electron from the molecule
- Any ion formed by fragmentation of the molecule

No, the answer is incorrect. Score: 0

Accepted Answers:

The ion formed by removal of an electron from the molecule

13) The two isomers shown could be very difficult to distinguish from each other with typical qualitative testing. 1 point



Which of the following instrumental techniques would be useful in distinguishing them from each other?

- I. mass spectrometry
- II. carbon-13 NMR
- III. proton NMR

- I, II and III
- II and III
- I and II
- I and III

No, the answer is incorrect. Score: 0

Accepted Answers:

I, II and III

14) A substance is analysed by mass spectrometry and IR spectroscopy. The following incomplete data are collected. 1 point

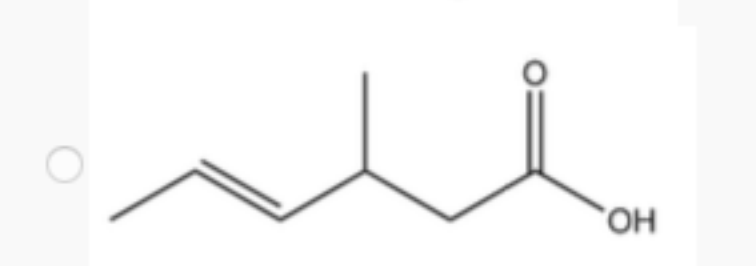
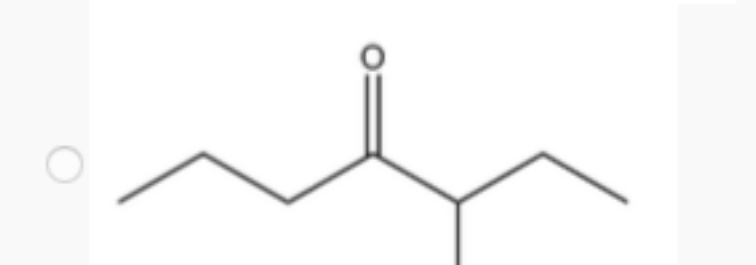
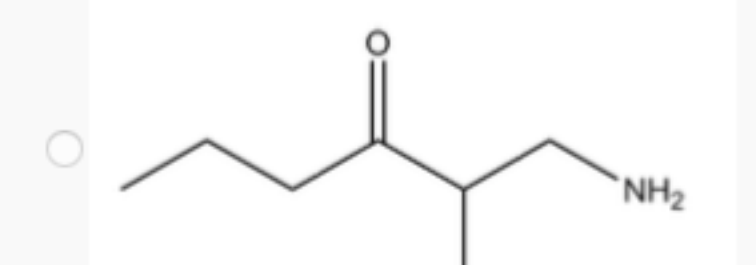
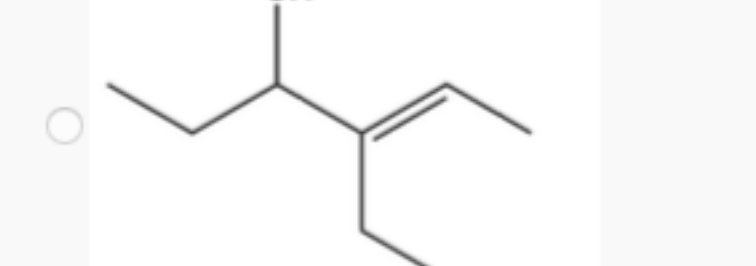
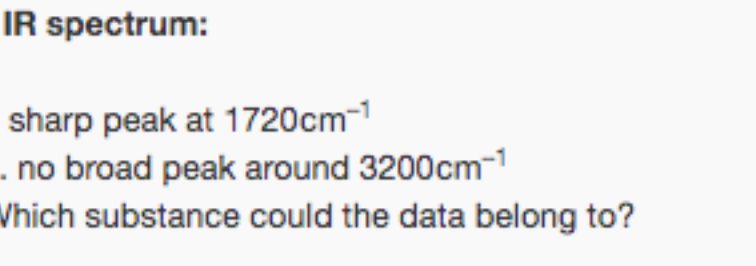
- Mass spectrum:

- I. molecular ion peak at m/z = 128
- II. fragment ion peak at m/z = 15

- IR spectrum:

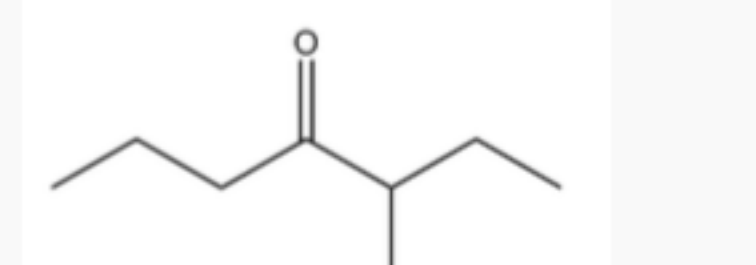
- I. sharp peak at 1720cm⁻¹
- II. no broad peak around 3200cm⁻¹

Which substance could the data belong to?



No, the answer is incorrect. Score: 0

Accepted Answers:



15) In the mass spectrum of CH₂Cl₂, a group of three peaks at m/z = 84, 86 and 88 in an approximate ratio 9: 6: 1 are assigned to the parent ion. The group of peaks has two isotopes. 1 point

- Chlorine has two isotopes.
- Carbon has more than one isotope.
- Chlorine has three isotopes.
- CH₂Cl₂ readily loses two H atoms.

No, the answer is incorrect. Score: 0

Accepted Answers:

Chlorine has two isotopes.