

Unit 4 - Chemical shifts and J-coupling

Course outline

How does an NPTEL online course work?

Week 0 Assignment

Introduction to NMR spectroscopy

Chemical shifts and J-coupling

The concept of chemical shift

Factors that affect chemical shifts

Chemical shift referencing

J coupling

Recap of basics

Quiz : Week 2 Assignment

One-dimensional proton NMR

One dimensional NMR of X-nuclei (¹³C, ¹⁵N, ³¹P and ¹⁹F)

Homonuclear 2D NMR

Heteronuclear 2D NMR

Structure determination of molecules

Advanced topics (Solvent suppression, Drug Discovery, DOSY)

Text Transcripts

Weekly Feedback forms

Video download

Week 2 Assignment

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

Due on 2020-02-12, 23:59 IST.

The value of J-coupling between two atoms does not depend on:

1 point

- The spectrometer frequency
- The type of nuclei involved
- The structure of the molecule
- Number of bonds separating them

No, the answer is incorrect.
Score: 0

Accepted Answers:
The spectrometer frequency

2) In a molecule, a given proton **A** has a J-coupling of 5 Hz with two other protons and 10 Hz coupling with another proton. How many J-multiplet lines will be seen for proton **A** in the ¹H-NMR spectrum?

1 point

- 3
- 4
- 5
- 6

No, the answer is incorrect.
Score: 0

Accepted Answers:
6

3) A peak in a proton NMR spectrum is located at 1.5 ppm from the reference (TMS) on a 400 MHz NMR spectrometer. If the reference is set to 0 ppm, what is the separation of the peak from reference as calculated in Hz scale?

1 point

- 800 Hz
- 600 Hz
- 500 Hz
- 400 Hz

No, the answer is incorrect.
Score: 0

Accepted Answers:
600 Hz

4) The value of J-coupling measured in Hz between two protons changes with

1 point

- The spectrometer frequency
- The linewidth of the peaks
- The structure of the molecule
- The temperature

No, the answer is incorrect.
Score: 0

Accepted Answers:
The structure of the molecule

5) The highly downfield chemical shift of aldehyde proton is directly attributed to:

1 point

- The electronegative effect of the oxygen
- The magnetic anisotropy of the molecule arising from the carbonyl functional group
- The presence of the double bond
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
The magnetic anisotropy of the molecule arising from the carbonyl functional group

6) Among all the following molecules, which molecule will have the most downfield shifted methyl protons?

1 point

- CH₃-CH₂-CH₂-OH
- CH₃-CH₂-OH
- CH₃-OH
- CH₃-CH₂-CH₂-CH₂-OH

No, the answer is incorrect.
Score: 0

Accepted Answers:
CH₃-OH

7) Which of the following compounds will have the strongest methyl signal?

1 point

- (CH₃)₃COH
- (CH₃)₂CHOH
- CH₃CH₂CH₂OH
- CH₃CH₂OH

No, the answer is incorrect.
Score: 0

Accepted Answers:
(CH₃)₃COH

8) In which direction is the RF pulse never applied?

1 point

- x-axis
- y-axis
- x -axis
- z-axis

No, the answer is incorrect.
Score: 0

Accepted Answers:
z-axis

9) Which of the following ¹³C-¹³C coupling is strongest

1 point

- Single bond ¹³C-¹³C J-coupling
- Double bond ¹³C-¹³C J-coupling in aliphatic systems
- Triple bond ¹³C-¹³C J-coupling
- Double bond ¹³C-¹³C J-coupling in the aromatic systems

No, the answer is incorrect.
Score: 0

Accepted Answers:
Triple bond ¹³C-¹³C J-coupling

10) What is the typical chemical shift range of aromatic protons in proteins and peptides?

1 point

- 5 – 3.5 ppm
- 3.5 – 5.5 ppm
- 6.0 – 8.0 ppm
- 8.0 – 10.5 ppm

No, the answer is incorrect.
Score: 0

Accepted Answers:
6.0 – 8.0 ppm