

SUBJECT - CHEMISTRY
CLASS - B.Sc(Hons) PART-III
PAPER - V

TOPIC - The term spin-spin coupling constant as applied in nmr spectroscopy.

Dr. Hari Mohan Prasad Singh
Department of Chemistry
Dr. L.K.V.D College Talpur Samastipur

Q Explain the term spin-spin coupling constant as applied in nmr spectroscopy.

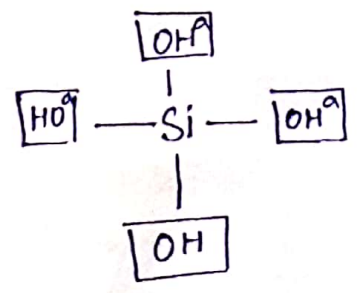
Ans The distance between centres of two adjacent peaks arising due to spin-spin interaction is usually constant called spin-spin coupling constant (J) it is expressed in Hz. The J value ranges from 0-20 Hz. It remains constant whatever be the applied field.

It is used to distinguish between two singlets and one doublet & also a quartet from doublets by recording the spectrum at two different radio-frequencies. If the J value is the same, the signal is a doublet and if it changes, then it is two singlets.

Q How many signals are expected in each of the following compounds in ¹H nmr spectrum?

- (a) Si(OH)₄ (b) ethane (c) acetone (d) cyclo-butane

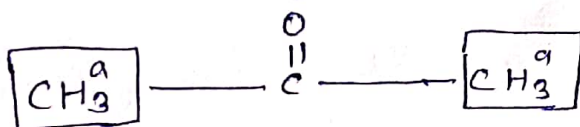
Ans (a) Si(OH)₄ shows only one peak in its ¹H nmr spectrum as four identical OH groups are present in it.



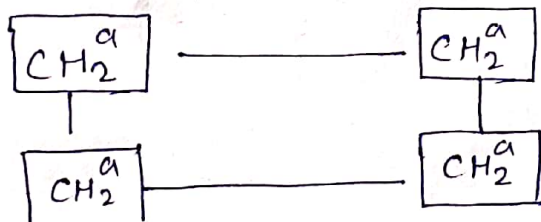
(b) Ethane shows only one peak in its ^1H nmr spectrum as two CH_3 groups are present in the same environment.



(c) Acetone shows only one peak in its ^1H nmr spectrum as two CH_3 groups are present in the same environment.



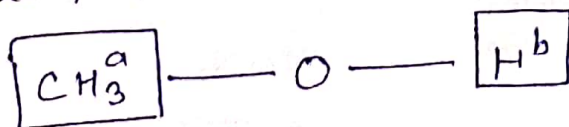
(d) Cyclobutane shows only one peak in its ^1H nmr spectrum in the same environment



(e) $\text{CH}_2 - \text{CH}_2$ shows only one peak in its ^1H nmr spectrum as two CH_2 groups are present in the same environment.



(f) Methyl alcohol shows two peaks in its ^1H nmr spectrum due to two



(g) Tertiary butyl amine shows two peaks in its ^1H nmr spectrum due to two types of protons.

