

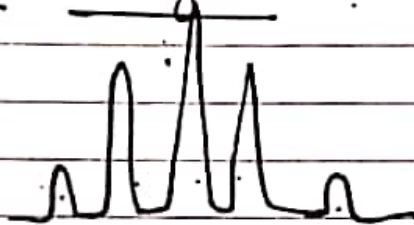
PASCAL'S Triangle

(n+1) rule

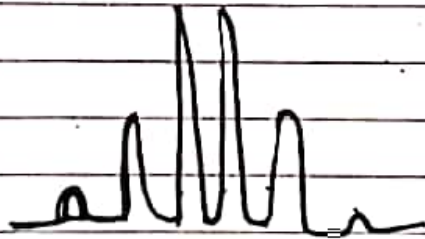
08	Singlet									1											
09	doublet									1										1	
10	Triplet									1		2		1							
11	quartet									1		3		3		1					
11	Quintet									1		4		6		4		1			
12	Sextet									1		5		10		10		5		1	
12	Septet									1		6		15		20		15		6	1

Pascal's triangle

Quintet



Sextet

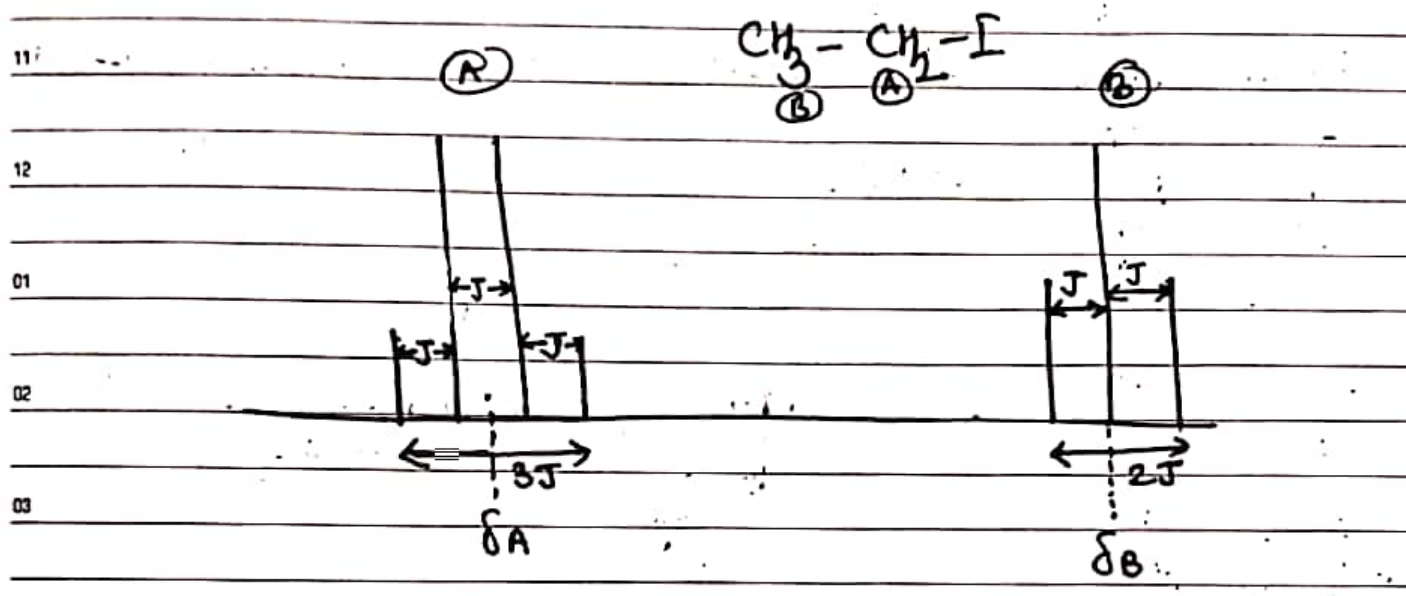


Coupling Constant

* The distance between the peaks in a simple multiplet is called coupling constant 'J'.

* The coupling constant is a measure of how strongly a nucleus is affected by the spin state of its neighbour.

* The space between the multiplet peaks is measured on the same scale as chemical shift and coupling constant is always expressed in Hertz (Hz).



$$1 \text{ ppm} = 12 \text{ division} = 60 \text{ Hz}$$

$$1 \text{ division} = \frac{60}{12} \text{ Hz}$$

$$= 5.0 \text{ Hz}$$

if distance between two peaks = $1.5 \times 5.0 \text{ Hz}$
 Coupling constant = 7.5 Hz

Another units is cps

$$100 \text{ cps} = 20 \text{ division}$$

$$1 \text{ division} = \frac{100}{20} \text{ cps}$$

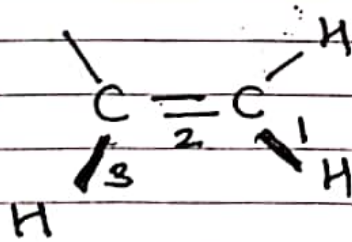
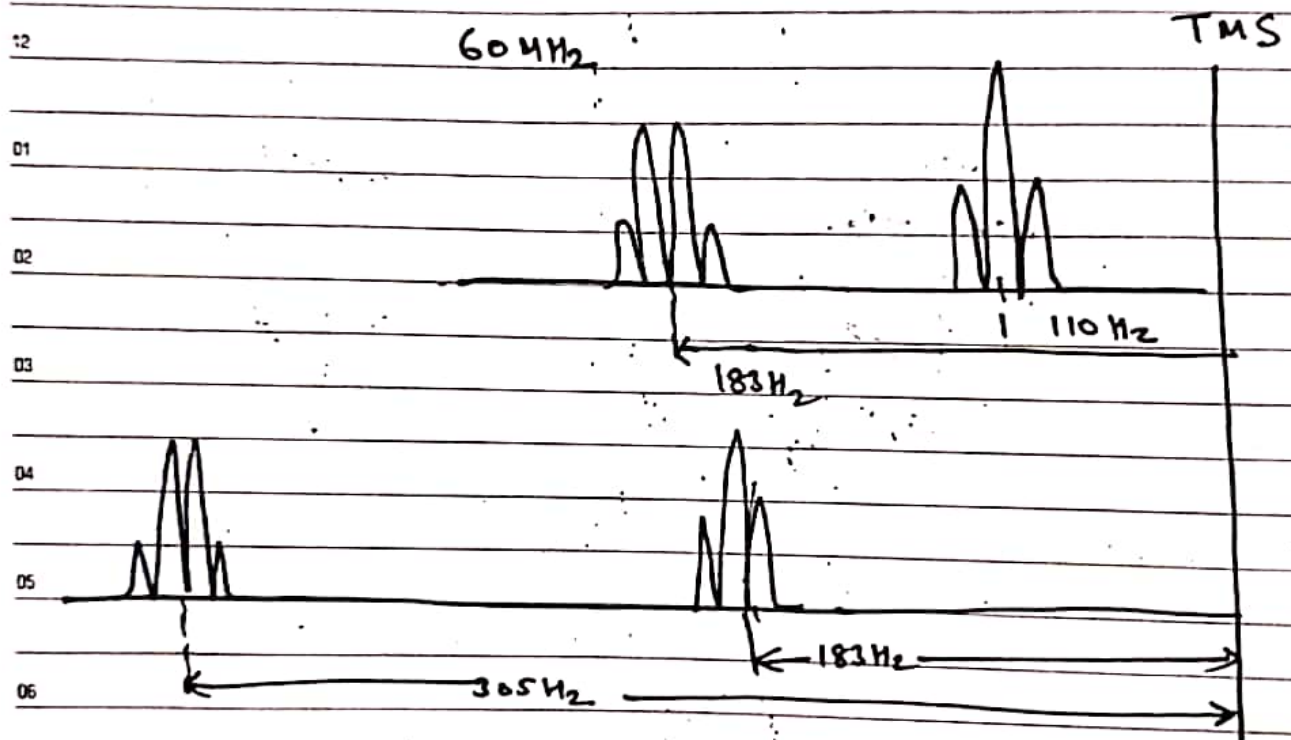
$$= 5.0 \text{ Hz}$$

08 Coupling constant for Methyl & methylene protons

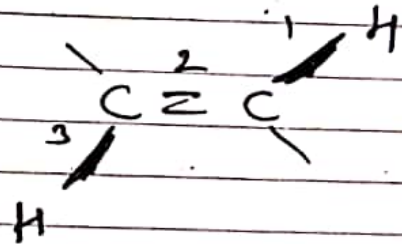
09 is 7.5 Hz

10 * When proton interacts the magnitude is always

11 same value. J is called to be coupling constant.



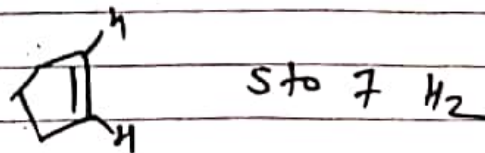
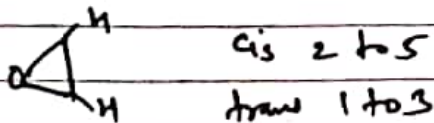
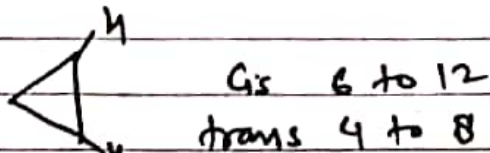
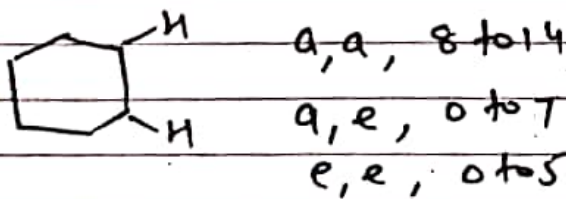
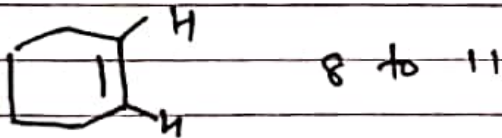
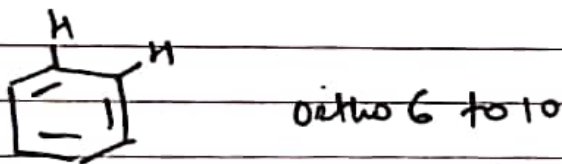
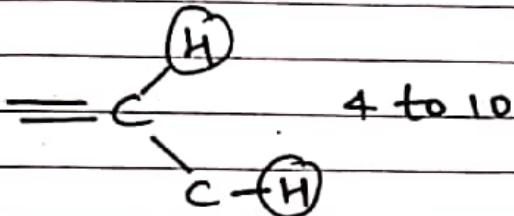
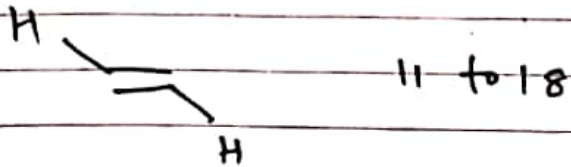
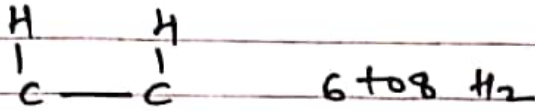
$$^3J_{cis} = 10 \text{ Hz}$$



$$^3J_{trans} = 16 \text{ Hz}$$

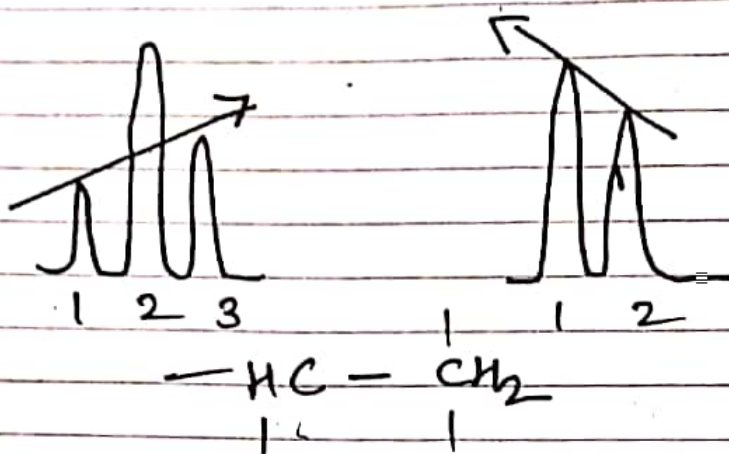
Some representative 3J coupling and their

approximate values (H_2)



10 Sunday

Multiplet skewing (leaning)



Multiplet skewing (leaning) is another effect

that some time be used to link interacting

multiplets. There is tendency of the outermost line of a multiplet to have non-equivalent heights.

* In a triplet line 3 may be slightly taller than line 1 causing the multiplet to lean.

* When this happens, the taller peak is usually in the direction of the proton or group of proton

causing the splitting. The second group of protons

leans toward the first one in the same fashion.