

Jigsaw 5C

1. [From Past Exam] [Week 4 Slides 25-41] Consider the principal values for the following ^{13}C chemical shift anisotropy (CSA) tensors:

- (i) $\delta_{11} = \delta_{22} = \delta_{33} = 20 \text{ ppm}$
- (ii) $\delta_{11} = 20 \text{ ppm}, \delta_{22} = 15 \text{ ppm}, \delta_{33} = 0 \text{ ppm}$

Sketch the powder pattern of the ^{13}C spectra for both static and Magic Angle Spinning (MAS) conditions for each CSA tensor.

2. [Week 4 Slides 43-44] What is the main difference, in terms of molecular dynamics, between a liquid and a solid sample?
3. [From Past Exam] [Hore Section 3.3] The ^{93}Nb spectrum of $[\text{NbOF}_4]^-$ is a quintet. The ^{19}F spectrum has ten equally spaced lines with the same intensity. What is the nuclear spin of ^{93}Nb ?