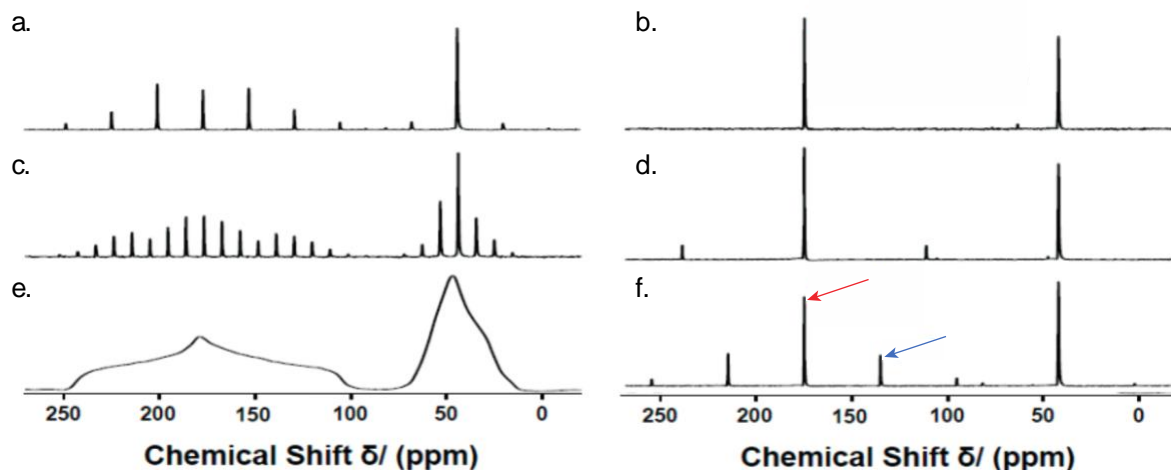
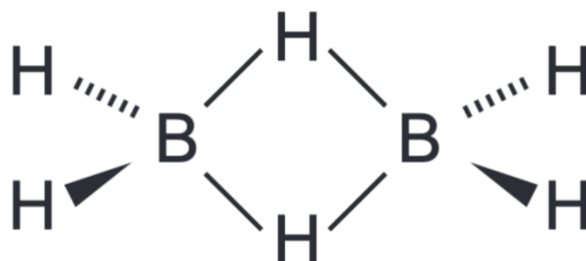


## Jigsaw 5E

1. \* Here are six solid-state NMR spectra of the same sample recorded at different MAS spinning rates: 0kHz (static), 1kHz, 3kHz, 5kHz, 8kHz and 14kHz.



- i. Which spectrum corresponds to each spinning rate?
  - ii. The red arrow indicates the isotropic shift, but what does the second arrow correspond to?
  - iii. What does the spacing between the peaks in part (ii) depend on?
2. [Hore Section 3.3]  $^{11}\text{B}$  has a spin of  $I = 3/2$ . The structure of diborane,  $^{11}\text{B}_2\text{H}_6$ , is shown below.



- a. Are the bridging protons chemically or magnetically equivalent to each other? What about the terminal protons?
- b. Draw the expected  $^1\text{H}$  spectra for the terminal and bridging protons in diborane. What are the expected relative intensities of the peaks?