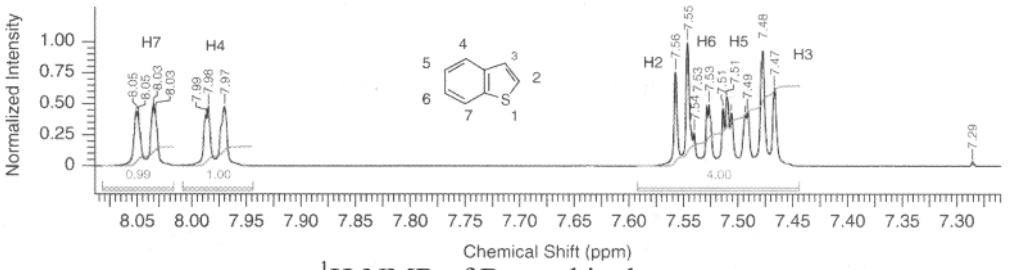
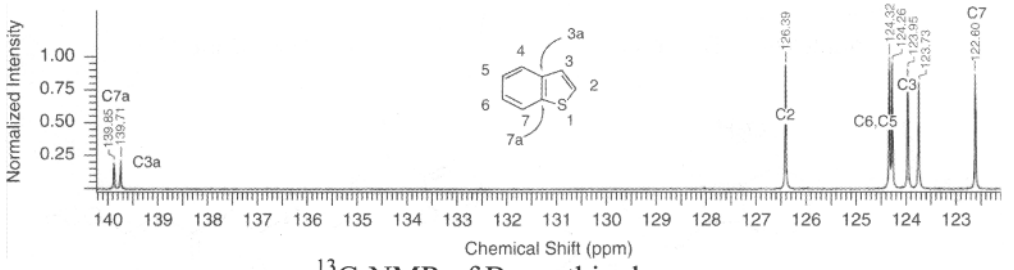
The ^{1}H-NMR spectra of benzothiophene is much more complex than thiophene due to the fused aromatic ring and six nonequivalent protons. Protons *H7* and *H4* are located farthest downfield at 8.04 ppm and 7.98 ppm because they are deshielded by the adjacent thiophene moiety. As expected *H2* is deshielded and is detected further downfield of *H3* due to its proximity to the sulfur. Although the effect is not as pronounced, *H6* (7.53 ppm) is also slightly downfield of *H5* (7.50 ppm) for the same reason.



^{1}H-NMR of Benzothiophene

The ^{13}C-NMR spectrum of benzothiophene presents eight distinct signals. The quaternary carbons *C7a* and *C3a* are found downfield at 139.8 ppm and 139.7 ppm, respectively. Of the remaining carbon signals, *C2* (126.3 ppm) is downfield due to the proximity of the sulfur atom followed by *C6*, *C5*, *C3*, *C4*, and *C7*.



^{13}C-NMR of Benzothiophene

Furan and benzofuran ring systems are found in a variety of natural products and pharmaceutical compounds. One of the most successful furan-based pharmaceutical compounds is ranitidine (Zantac), an important H_2-histamine receptor antagonist for the treatment of acid reflux disease. In 1986, just three years after receiving FDA approval, sales of Zantac reached a record $1 billion, making it the largest selling prescription drug in the world at the time. In addition, sales from furan-based antimicrobials such as nitrofurazone (Furin), furazolidone (Furoxone), nitrofurantion (Niftran), cefuroxine (Ceftin), and their generic derivatives, generate over $50 million in revenue per annum in the United States combined. More recently, Lapatinib (Tyverb) has become an increasingly important therapeutic for the treatment of breast cancer and other solid tumors, earning nearly $1 billion