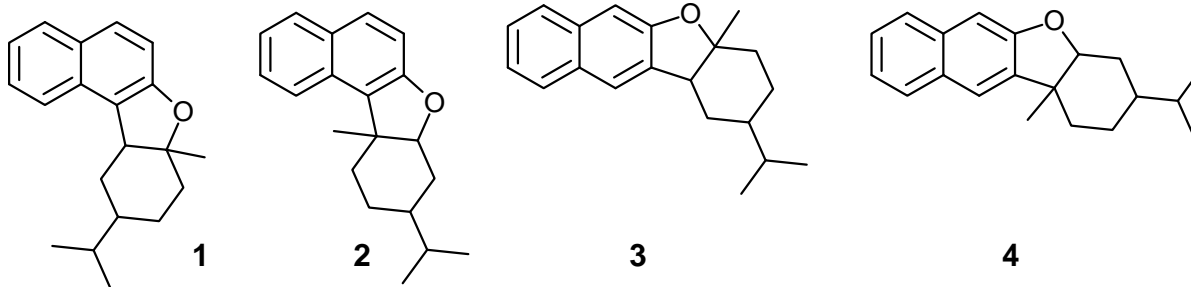


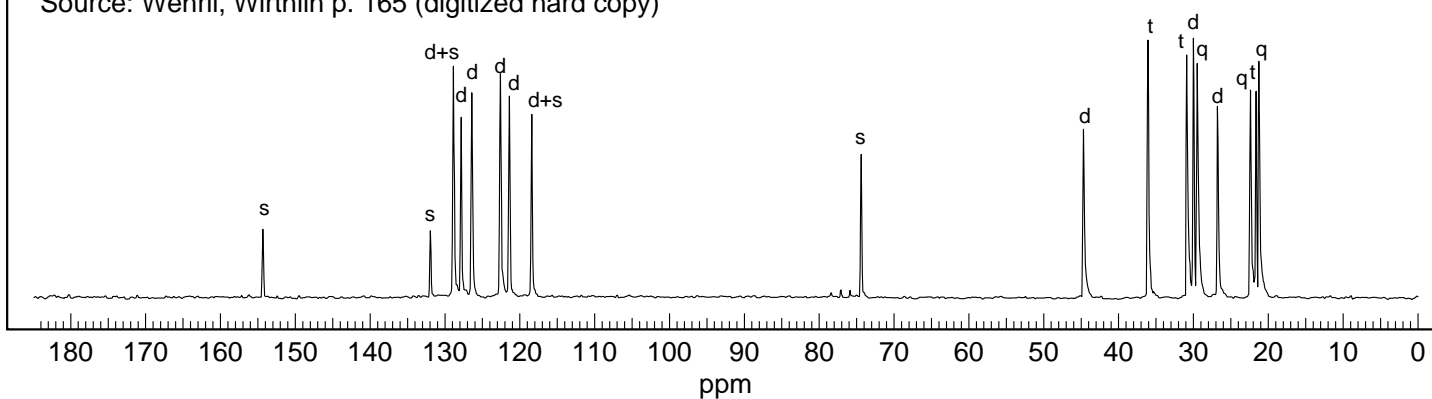
**Problem R-61** ( $C_{20}H_{24}O$ ). An adduct of  $\alpha$ -phellandrene and  $\beta$ -naphthol is expected to possess one of the structures **1** to **4**. Select the proper structure using the 100 MHz proton NMR spectrum and the 25.2 MHz proton noise decoupled  $^{13}C$  NMR spectrum



**Problem R-61** ( $C_{20}H_{24}O$ ).

25.2 MHz  $^{13}C$  NMR spectrum  $CDCl_3$

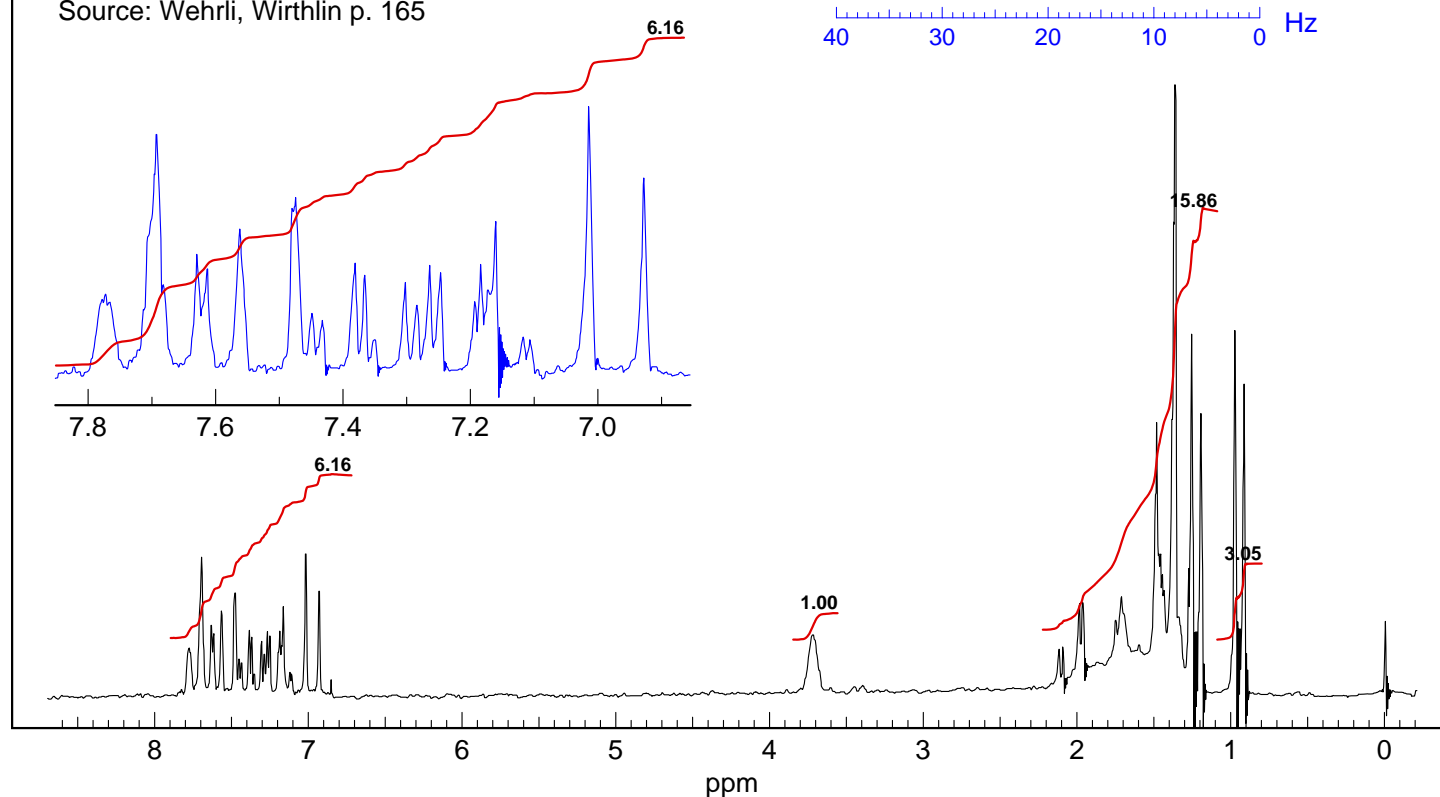
Source: Wehrli, Wirthlin p. 165 (digitized hard copy)



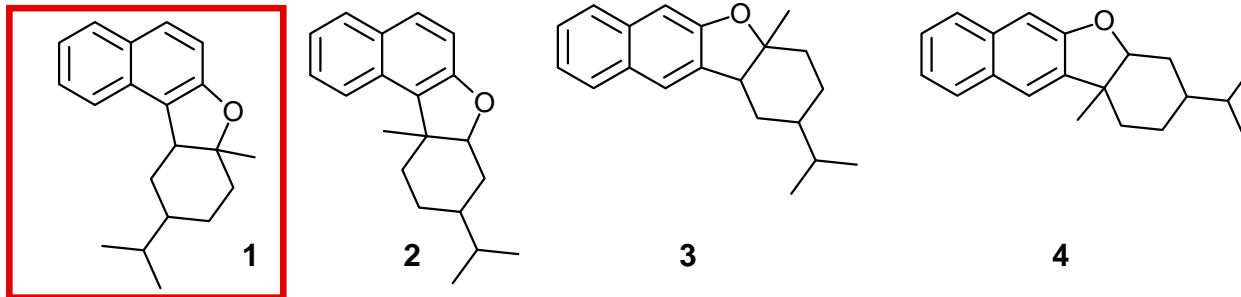
**Problem R-61** ( $C_{20}H_{24}O$ ).

100 MHz  $^1H$  NMR spectrum  $CDCl_3$

Source: Wehrli, Wirthlin p. 165



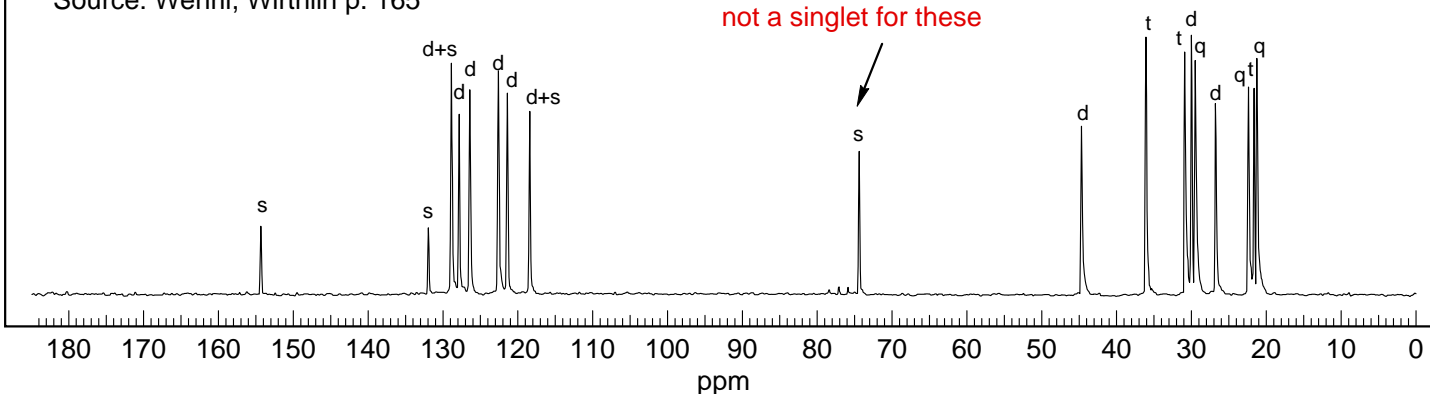
**Problem R-61** ( $C_{20}H_{24}O$ ). An adduct of  $\alpha$ -phellandrene and  $\beta$ -naphthol is expected to possess one of the structures **1** to **4**. Select the proper structure using the 100 MHz proton NMR spectrum and the 25.2 MHz proton noise decoupled  $^{13}C$  NMR spectrum



**Problem R-61** ( $C_{20}H_{24}O$ ).

25.2 MHz  $^{13}C$  NMR spectrum  $CDCl_3$

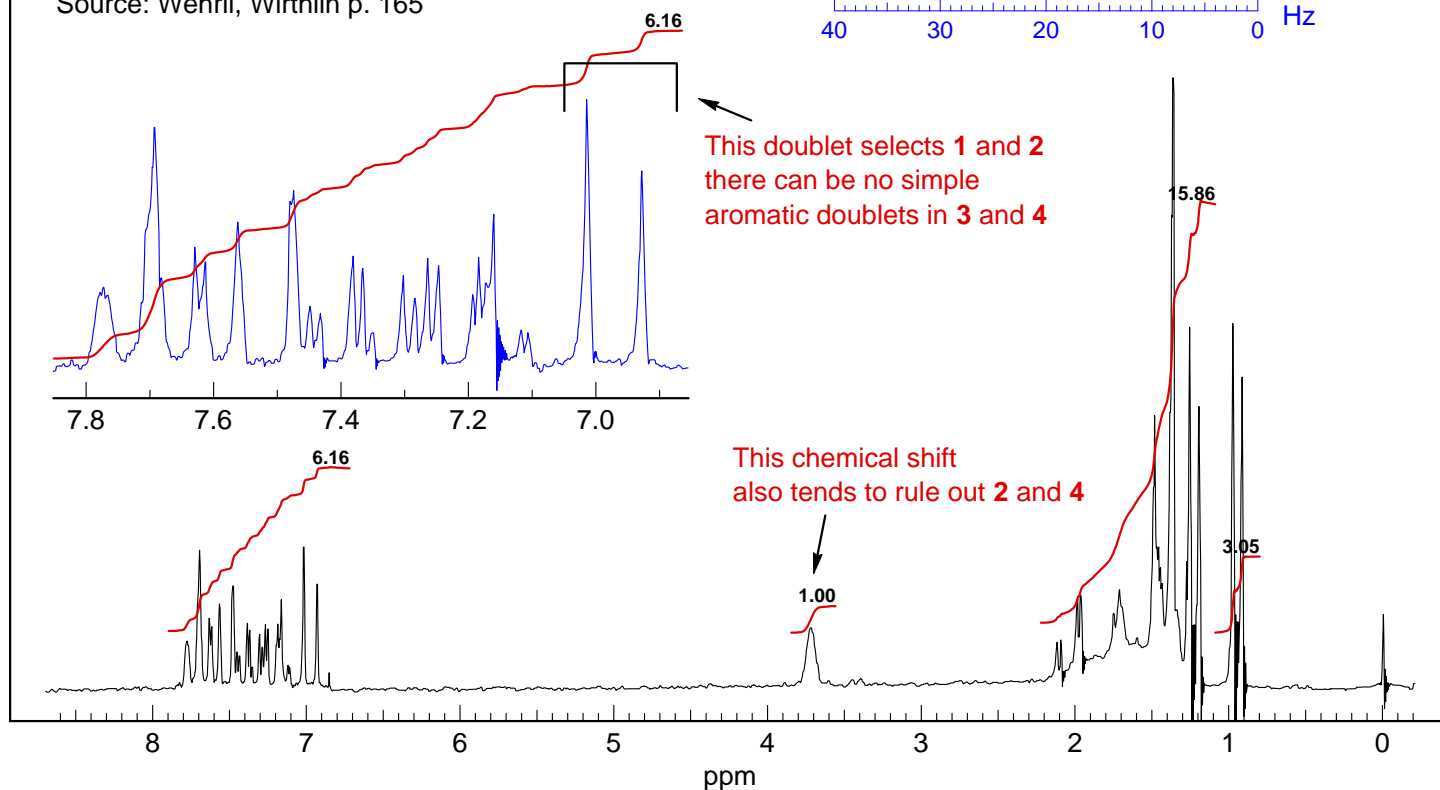
Source: Wehrli, Wirthlin p. 165

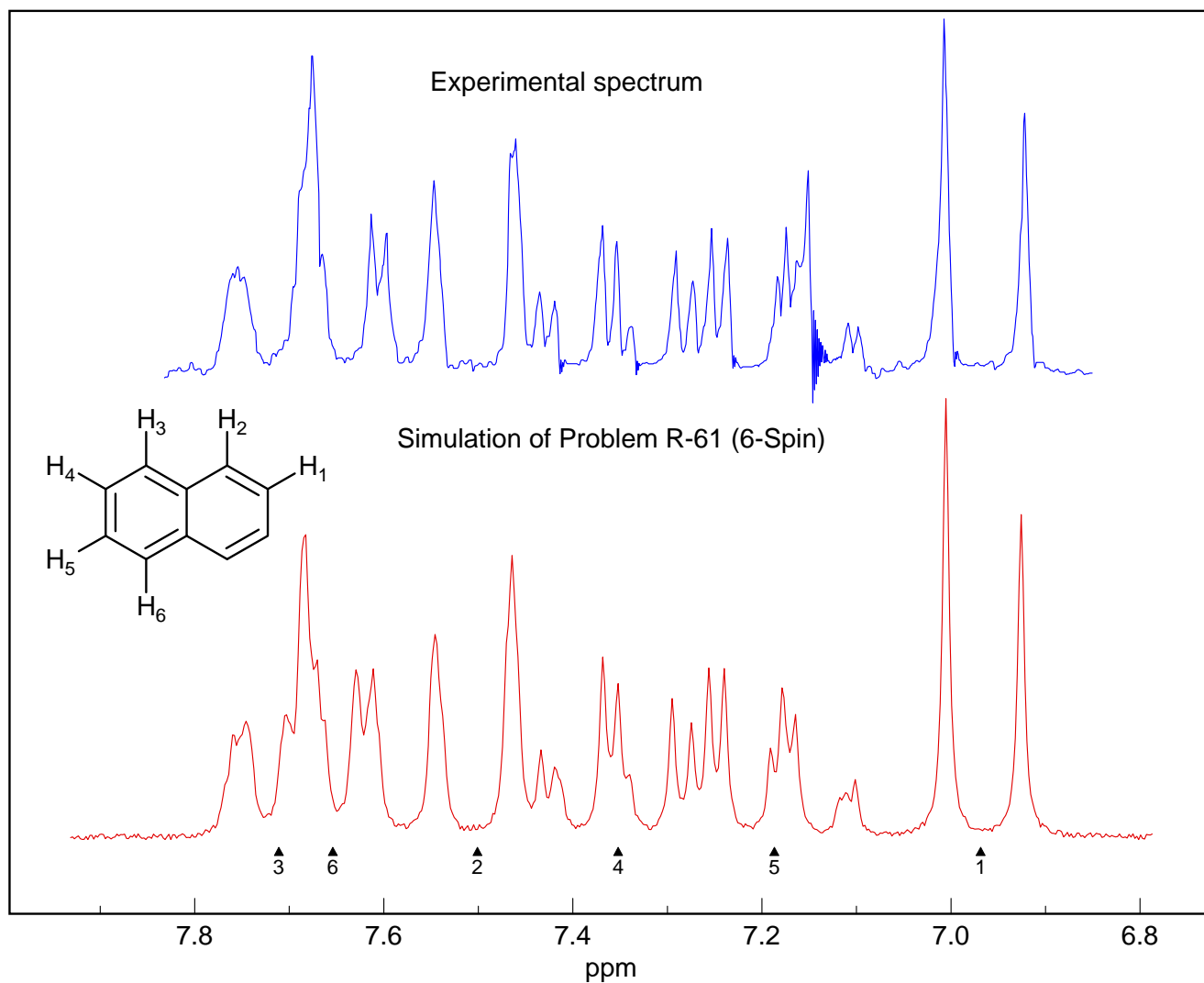


**Problem R-61** ( $C_{20}H_{24}O$ ).

100 MHz  $^1H$  NMR spectrum  $CDCl_3$

Source: Wehrli, Wirthlin p. 165





### Parameters

V1 = 696.87	V2 = 750.07	V3 = 771.00	V4 = 735.20	V5 = 718.68	V6 = 765.37
	J12 = 8.00	J13 = 0.00	J14 = 0.00	J15 = 0.00	J16 = 0.00
		J23 = 0.70	J24 = 0.00	J25 = 0.00	J26 = 0.50
			J34 = 7.80	J35 = 1.30	J36 = 0.60
				J45 = 6.50	J46 = 1.50
					J56 = 7.80