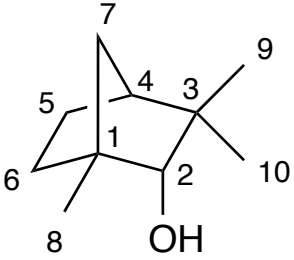


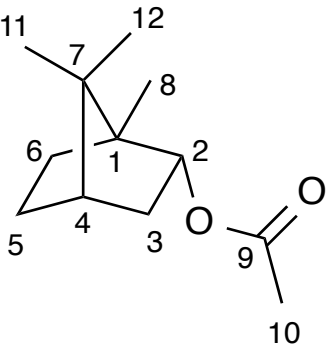
Chem 4010/5326: Organic Spectroscopic Analysis
Fall 2015
Problem Set 6

Answers to assigned problems from Simpson book.

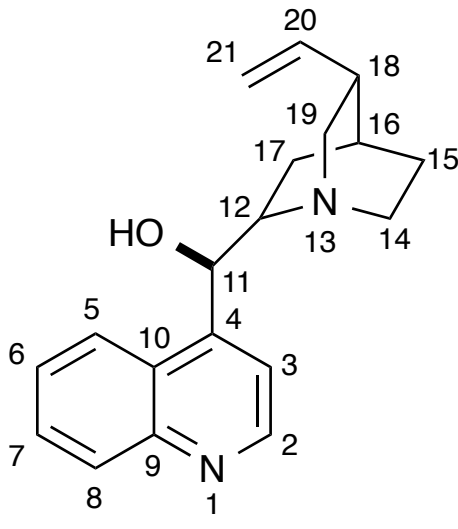
11.3

	¹ H NMR	¹³ C NMR
	C1: --	C1: 49.4
	C2: 3.26	C2: 85.3
	C3: --	C3: 39.3
	C4: 1.69	C4: 48.1
	C5: 1.65/1.41	C5: 26.3
	C6: 1.02/1.60	C6: 25.3
	C7: 1.47 (OH side)/1.12	C7: 41.2
	C8: 1.09	C8: 19.7
	C9: 0.90	C9: 30.9
C10: 0.86	C10: 20.4	

11.4

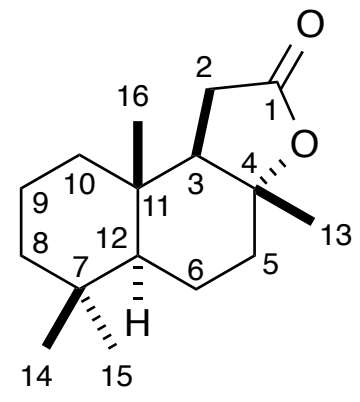
	¹ H NMR	¹³ C NMR
	C1: --	C1: 48.7/47.8 (difficult to tell)
	C2: 4.81	C2: 79.8
	C3: 2.28/0.90	C3: 36.8
	C4: 1.60	C4: 44.9
	C5: 1.88/1.25	C5: 27.0
	C6: 1.68/1.18	C6: 28.0
	C7: --	C7: 48.7/47.8 (difficult to tell)
	C8: 0.75	C8: 13.5
	C9: --	C9: 171.3
	C10: 2.00	C10: 21.2
	C11: 0.81	C11: 19.7
	C12: 0.85	C12: 18.8

12.3

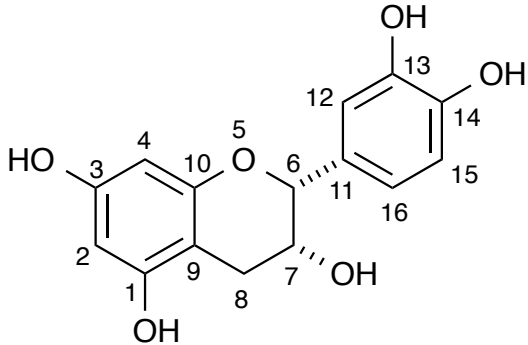
	¹ H NMR	¹³ C NMR
	N1: --	N1: --
	C2: 8.82	C2: 150.4
	C3: 7.58	C3: 118.4
	C4: --	C4: 149.4
	C5: 8.00	C5: 123.2
	C6: 7.4	C6: 126.8
	C7: 7.68	C7: 129.3
	C8: 8.10	C8: 130.5
	C9: --	C9: 148.4
	C10: --	C10: 125.8
	C11: 5.65	C11: 72.1
	C12: 3.15	C12: 60.5
	N13: --	N13: --
	C14: 3.5/2.65	C14: 43.4
	C15: 1.5/1.78 (difficult to tell)	C15: 21.8/27.8 (difficult to tell)
	C16: 1.82	C16: 28.1
	C17: 1.5/1.78 (difficult to tell)	C17: 21.8/27.8 (difficult to tell)
	C18: 2.25	C18: 40.1
	C19: 3.1/2.65	C19: 57.1
	C20: 5.70	C20: 142.0
C21: 5.00–4.85	C21: 114.6	

δ 3.95 (OH)

12.4

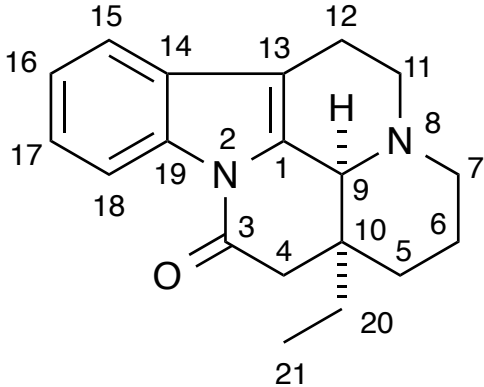
	¹ H NMR	¹³ C NMR
	C1: --	C1: 177.1
	C2: 2.40/2.22	C2: 28.9
	C3: 1.97	C3: 59.3
	C4: --	C4: 86.6
	C5: 2.08/1.69	C5: 38.9
	C6: 1.88/1.36	C6: 20.7
	C7: --	C7: 33.3
	C8: 1.20/1.43	C8: 42.3
	C9: 1.66/1.46	C9: 18.3
	C10: 1.40/1.04	C10: 39.7
	C11: --	C11: 36.2
	C12: 1.06	C12: 56.8
	C13: 1.33	C13: 21.8
	C14: 0.89/0.84 (difficult to distinguish)	C14: 33.4/21.1 (difficult to distinguish)
	C15: 0.89/0.84 (difficult to distinguish)	C15: 33.4/21.1 (difficult to distinguish)
C16: 0.92	C16: 15.3	

12.5

	¹ H NMR	¹³ C NMR
	C1: --	C1: 156.95/156.91/156.5 (can't distinguish)
	C2: 6.02/5.92 (difficult to distinguish)	C2: 95.5/95.0 (difficult to distinguish)
	C3: --	C3: 156.95/156.91/156.5 (can't distinguish)
	C4: 6.02/5.92(difficult to distinguish)	C4: 95.5/95.0 (difficult to distinguish)
	O5: --	O5: --
	C6: 4.88	C6: 78.8
	C7: 4.21	C7: 66.3
	C8: 2.88/2.75	C8: 28.4
	C9: --	C9: 99.2
	C10: --	C10: 156.95/156.91/156.5 (can't distinguish)
	C11: --	C11: 131.6
	C12: 7.05	C12: 114.6
	C13: --	C13: 144.7/144.6 (can't distinguish)
	C14: --	C14: 144.7/144.6 (can't distinguish)
	C15: 6.85	C15: 118.7
	C16: 6.78	C16: 114.8

δ 8.15 (C1-OH), 7.98 (C3-OH), 7.85 (C7 or C8-OH), 7.79 (C7 or C8-OH), 3.62 (C7-OH)

12.6

	¹ H NMR	¹³ C NMR
	C1: --	C1: 132.1
	N2: --	N2: --
	C3: --	C3: 167.6
	C4: 2.64/2.58	C4: 44.4/44.3 (can't distinguish)
	C5: 1.48/1.05	C5: 27.0
	C6: 1.75/1.38	C6: 20.7
	C7: 2.58/2.40	C7: 44.3
	N8: --	N8: --
	C9: 3.98	C9: 57.7
	C10: --	C10: 38.4
	C11: 3.32/3.22	C11: 50.7
	C12: 2.88/2.50	C12: 16.6
	C13: --	C13: 112.6
	C14: --	C14: 130.1
	C15: 7.42	C15: 118.1
	C16: 7.28	C16: 123.8
C17: 7.32	C17: 124.3	
C18: 8.38	C18: 116.2	
C19: --	C19: 134.2	

	C20: 2.02/1.62	C20: 28.4
	C21: 0.92	C21: 7.7