



Nuevas Aplicaciones de la L-Serina Hidroximetiltransferasa y la Benzaldehído Liasa en Síntesis Orgánica

Karel Hernández Sánchez



Aquesta tesi doctoral està subjecta a la llicència [Reconeixement- CompartIgual 3.0. Espanya de Creative Commons](#).

Esta tesis doctoral está sujeta a la licencia [Reconocimiento - CompartirIgual 3.0. España de Creative Commons](#).

This doctoral thesis is licensed under the [Creative Commons Attribution-ShareAlike 3.0. Spain License](#).

Nuevas Aplicaciones de la L-Serina Hidroximetiltransferasa y la Benzaldehído Liasa en Síntesis Orgánica.

Instituto de Química Avanzada de Cataluña (IQAC).

Consejo Superior de Investigaciones Científicas (CSIC).

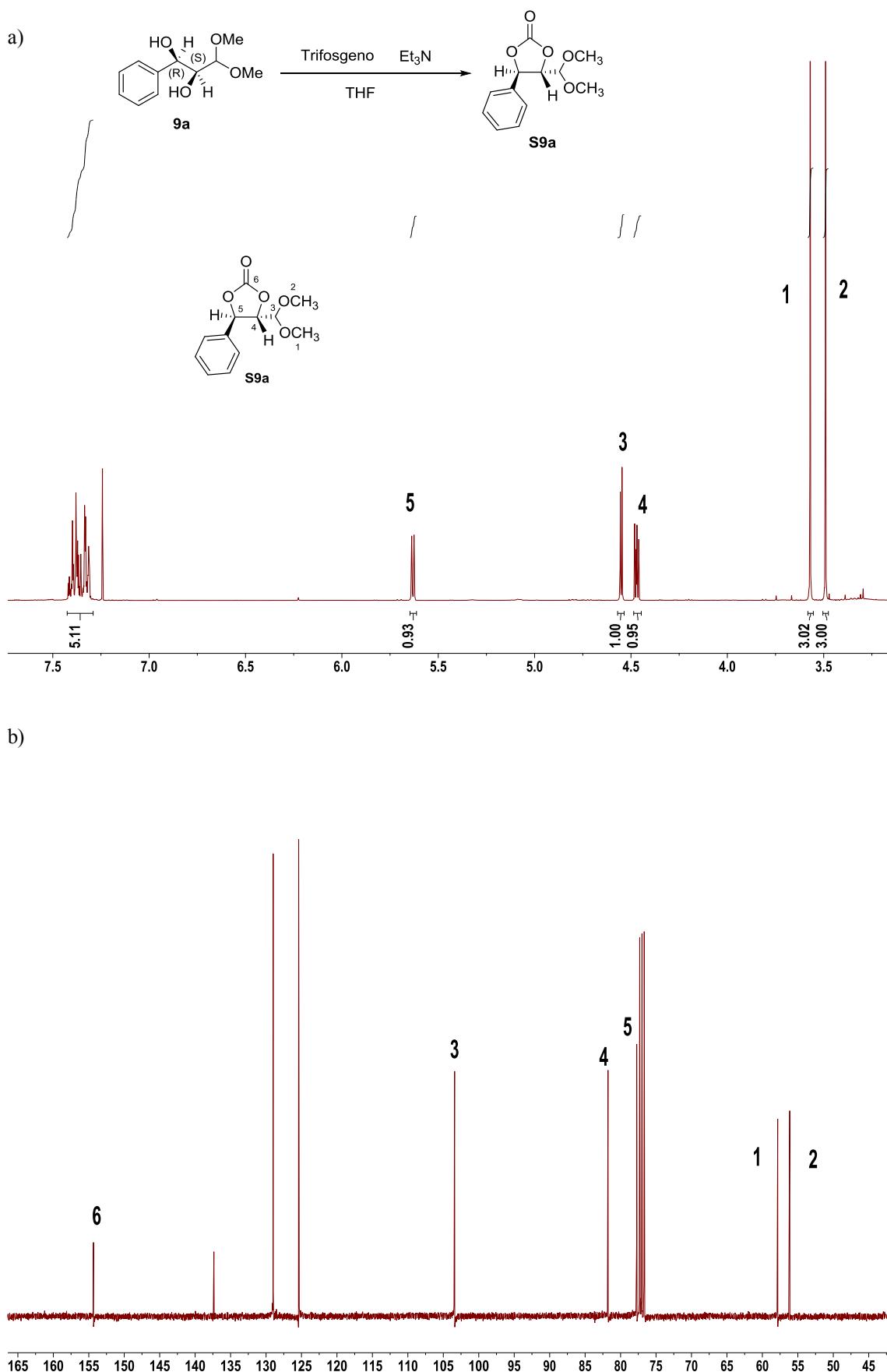
Facultad de Farmacia, Universidad de Barcelona. Departamento de
Bioquímica y Biología Molecular. Programa de Biotecnología.

**Karel Hernández Sánchez
2014**

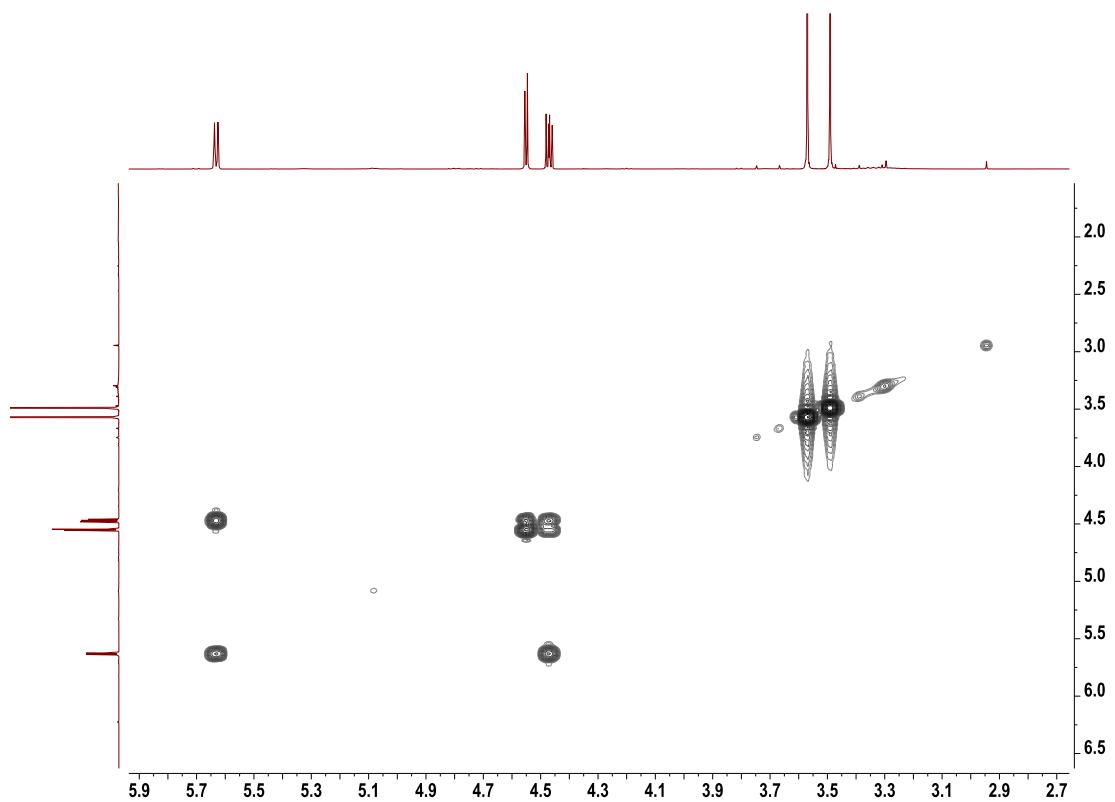
Contenido

Figura1S(3.2). Espectros de RMN (CDCl_3) de S9a : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY y d) HSQC.....	3
Figura2S(3.2). Espectros de RMN(CDCl_3) de S10a : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY y d) HSQC.....	5
Figura3S(3.2). Espectros de RMN (D_2O) de 12a : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	7
Figura4S(3.2). Espectros de RMN (D_2O) de 12b : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	10
Figura5S(3.2). Espectros de RMN (D_2O) de 12g : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	13
Figura6S(3.2). Espectros de RMN (D_2O) de 12h : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	16
Figura7S(3.2). Espectros de RMN (D_2O) de 12i : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	19
Figura8S(3.2). Espectros de RMN (D_2O) de 12j : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	22
Figura9S(3.2) Espectros de RMN (D_2O) de 12k : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	25
Figura10S(3.2) Espectros de RMN (D_2O) de 12t : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	28
Figura11S(3.2) Espectros de RMN (D_2O) de 12x : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	31
Figura12S(3.2) Espectros de RMN ($\text{DMSO}-d_6$) de 12ad : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOE-1D.	34
Figura13S(3.2) Espectros de RMN (D_2O) de 13a : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	38
Figura14S(3.2) Espectros de RMN (D_2O) de 13h : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	41
Figura15S(3.2) Espectros de RMN (D_2O) de 14a : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	44
Figura16S(3.2) Espectros de RMN (D_2O) de 14b : a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.....	47

Figura17S(3.2) Espectros de RMN (D ₂ O) de 14g : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	51
Figura18S(3.2) Espectros de RMN (D ₂ O) de 14h : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	55
Figura19S(3.2) Espectros de RMN (D ₂ O) de 14i : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	59
Figura20S(3.2) Espectros de RMN (D ₂ O) de 14j : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	63
Figura21S(3.2) Espectros de RMN (D ₂ O) de 14k : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	67
Figura22S(3.2) Espectros de RMN(D ₂ O) de 14t : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	71
Figura23S(3.2) Espectros de RMN (D ₂ O) de 14x : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY.....	75
Figura24S(3.2) Espectros de RMN (DMSO- <i>d</i> ₆) de 14ad : a) ¹ H; b) ¹³ C; c) 2D ¹ H- ¹ H COSY; d) HSQC y e) NOESY	79
Figura25S(3.2) Espectros de RMN (D ₂ O) de 15a y 16a : a) ¹ H; b) ¹³ C; c) COSY; d) HSQC y e) 1D NOESY selectivo.	83
Figura26S(3.2) Espectros de RMN (D ₂ O) de 15k y 16k : a) ¹ H; b) ¹³ C; c) COSY; d) HSQC.	87

Figura 1S(3.2). Espectros de RMN (CDCl_3) de **S9a**: a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY y d) HSQC.

c)



d)

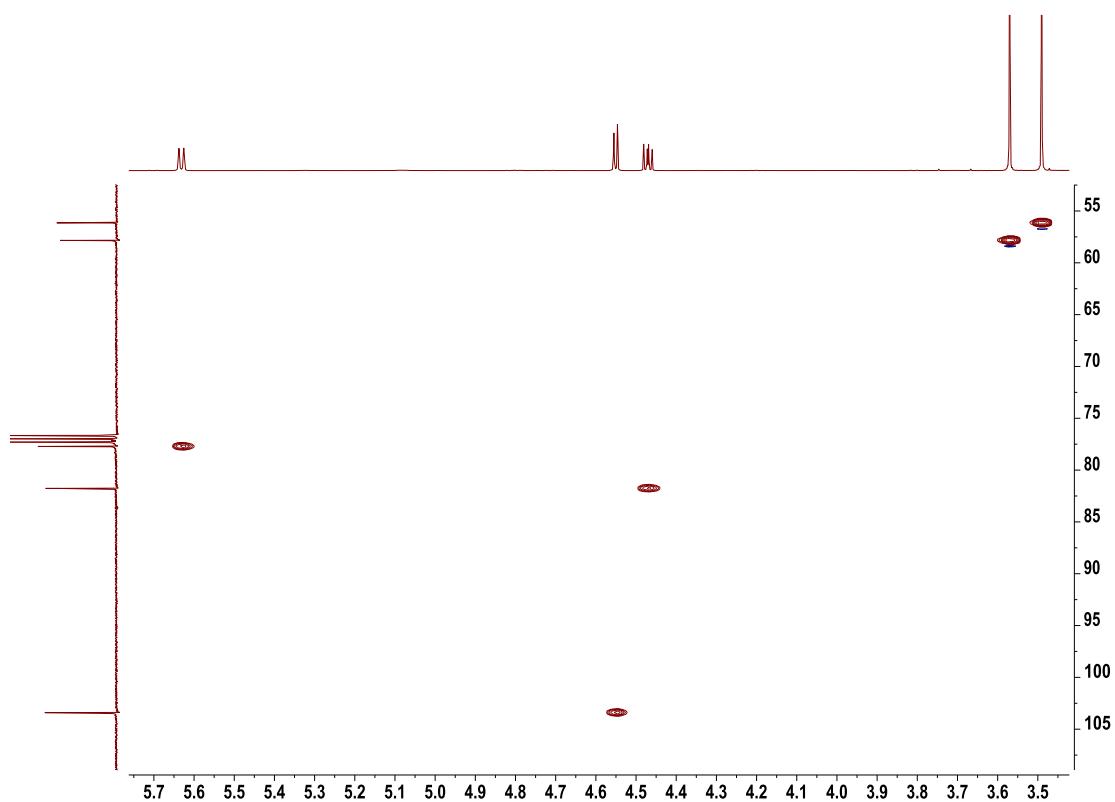
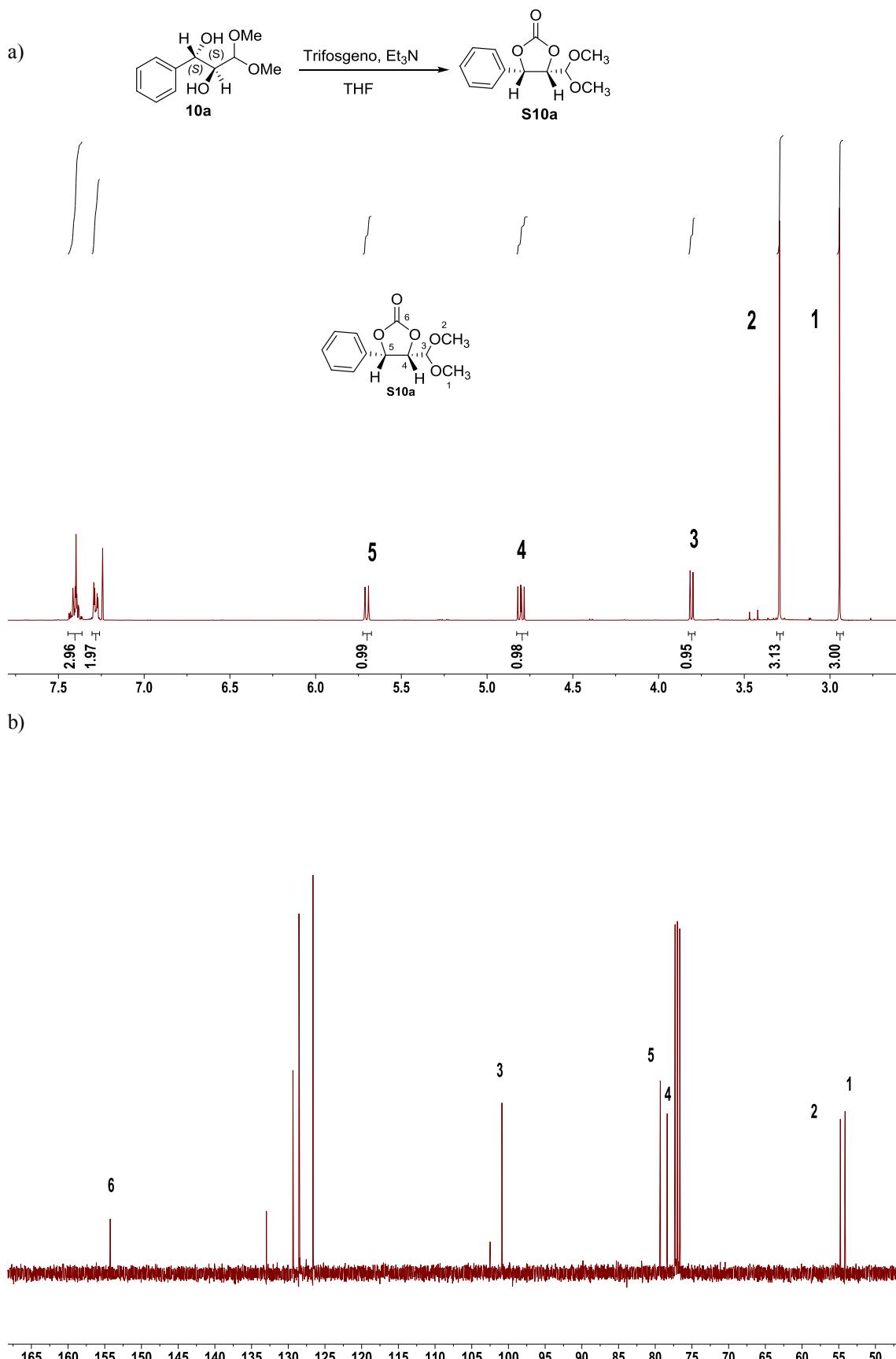
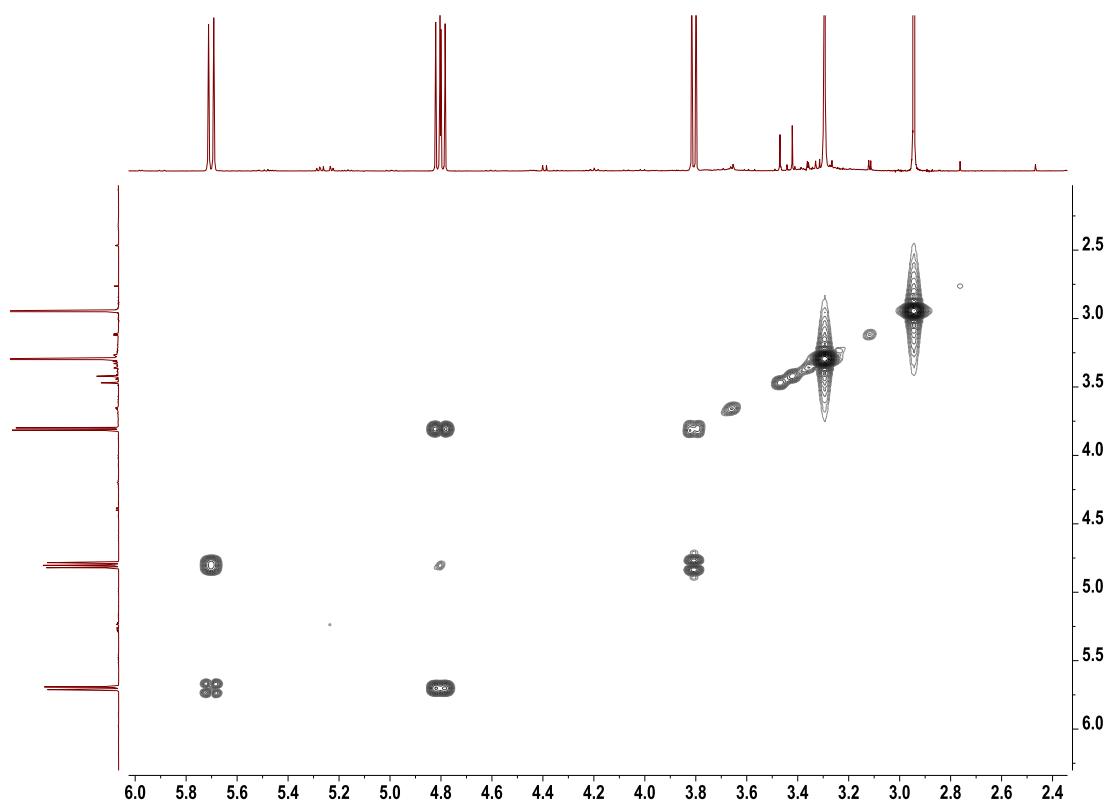


Figura2S(3.2). Espectros de RMN(CDCl_3) de **S10a**: a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY y d) HSQC.

c)



d)

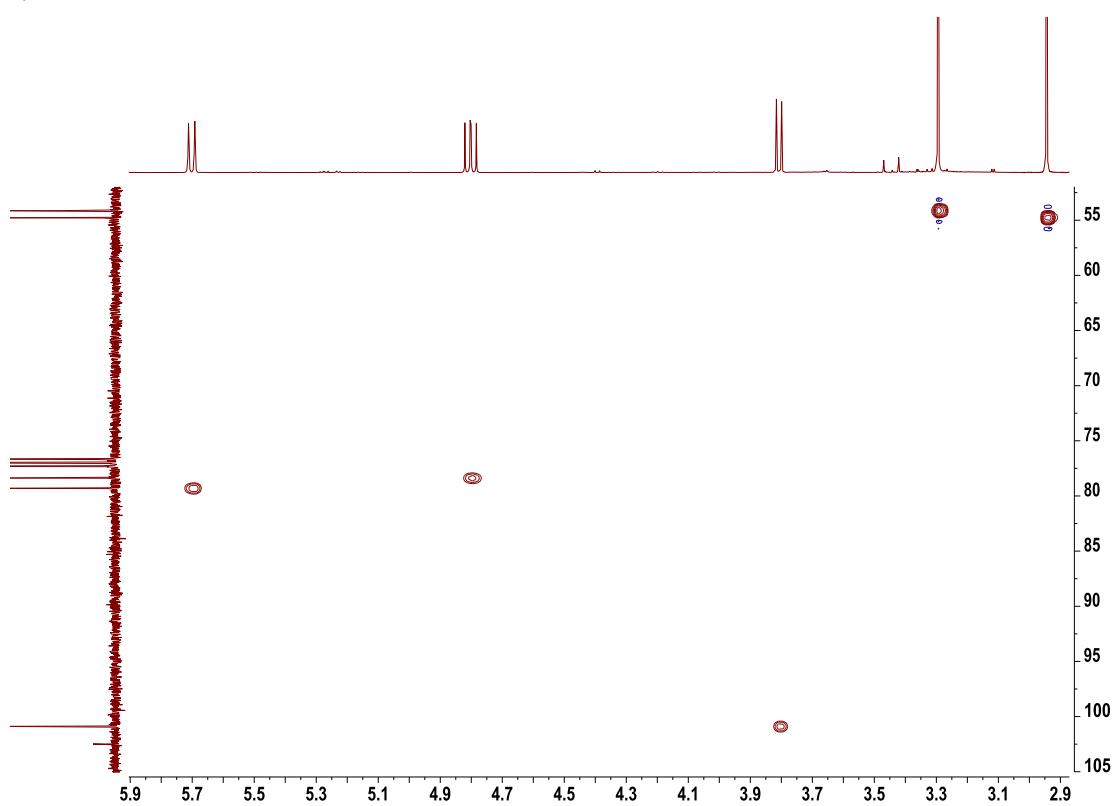
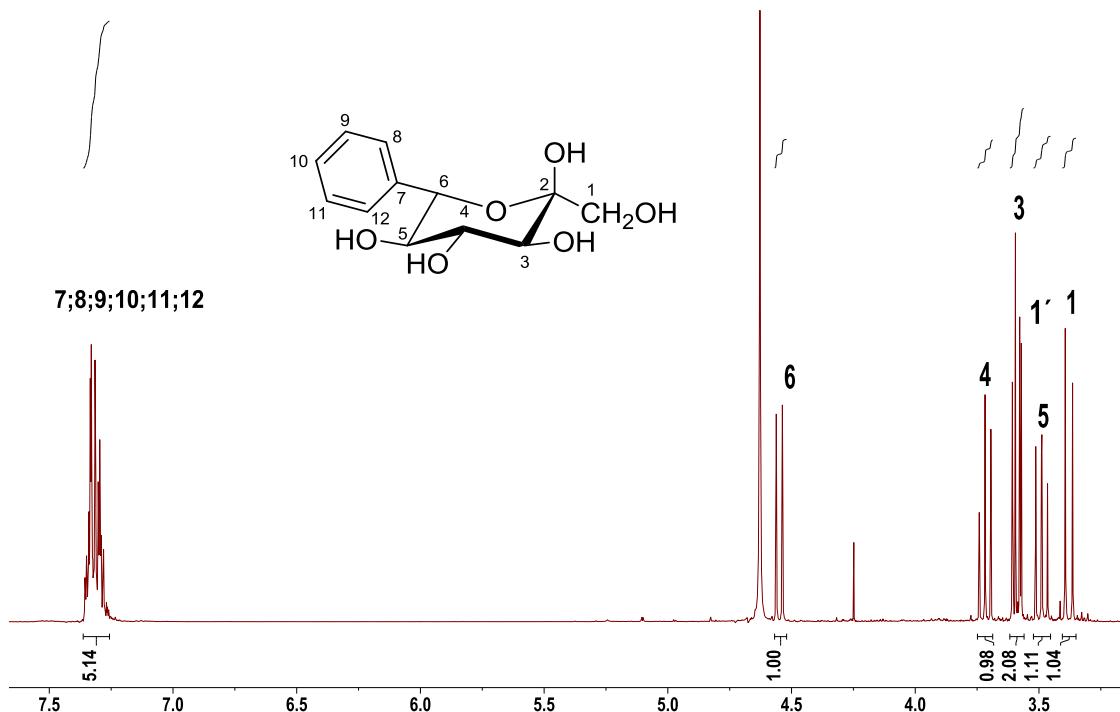
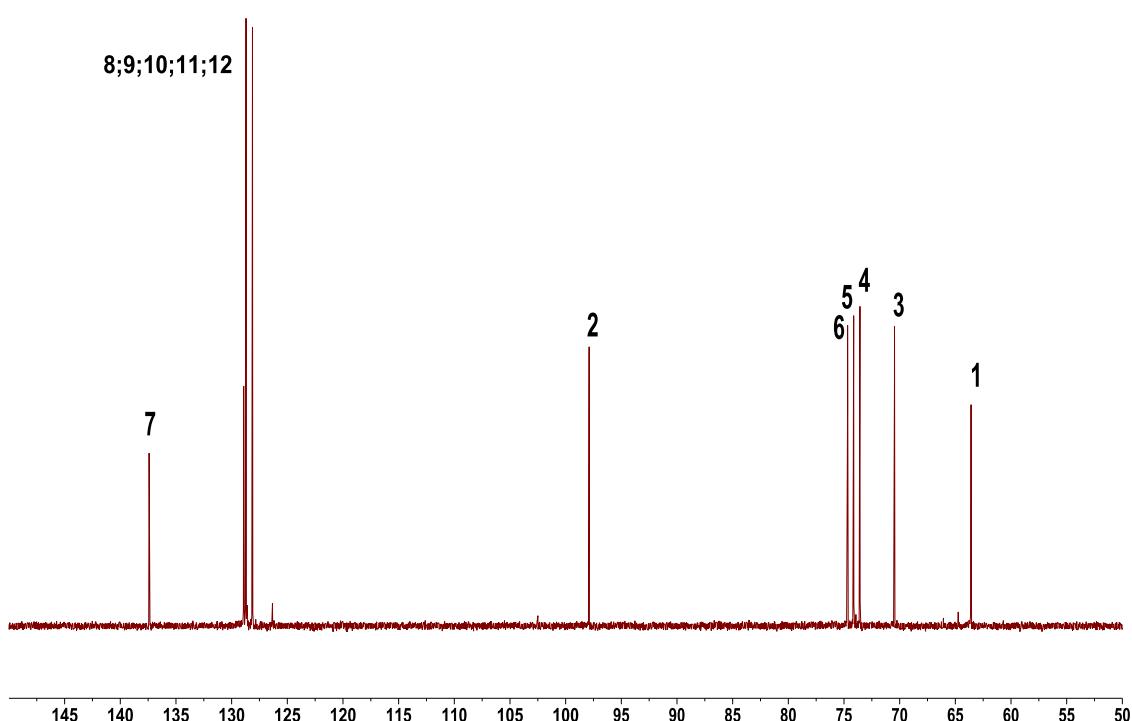


Figura3S(3.2). Espectros de RMN (D_2O) de **12a**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

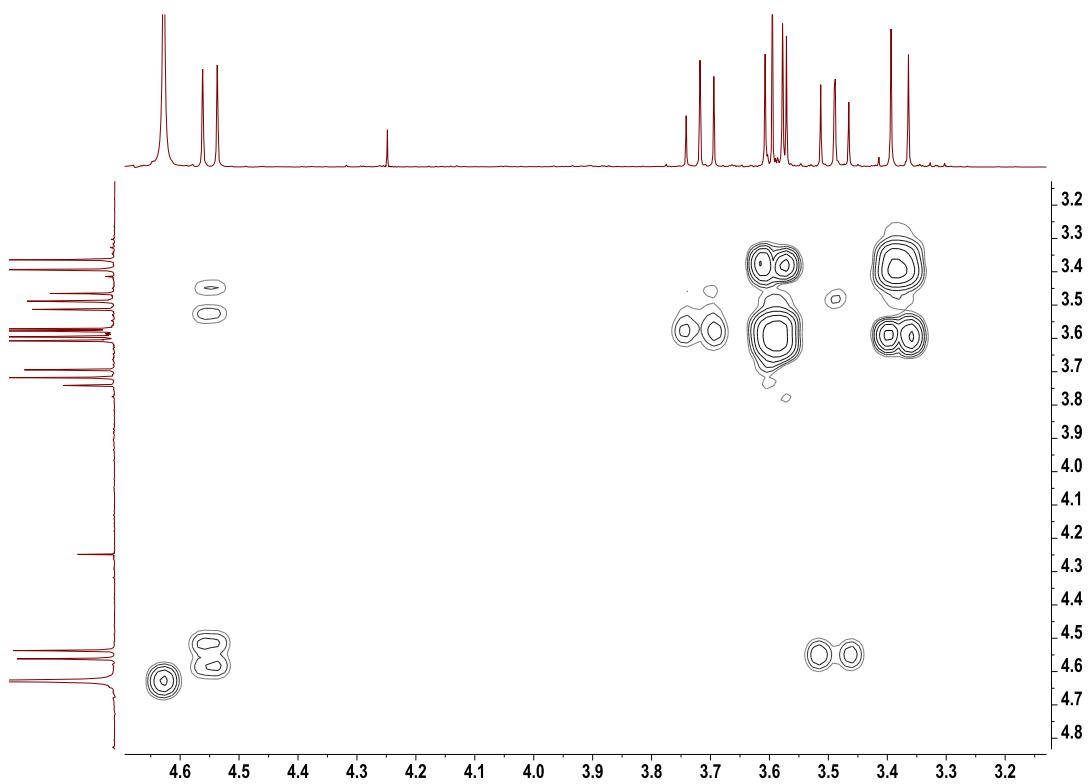
a)



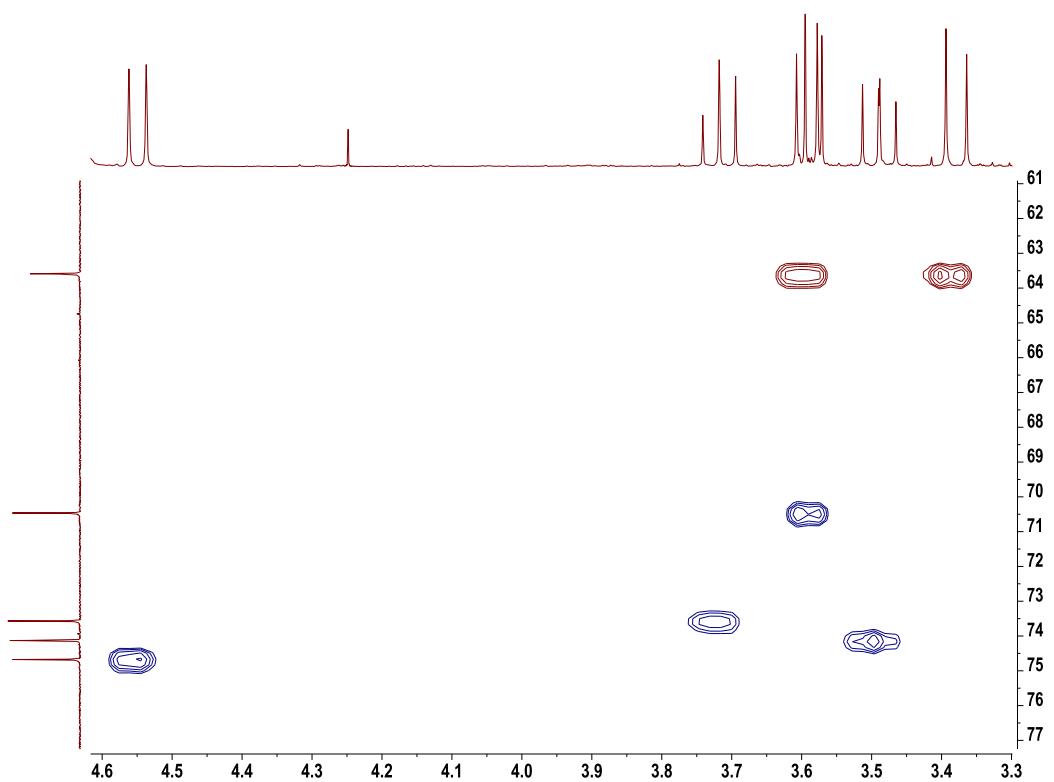
b)



c)



d)



e)

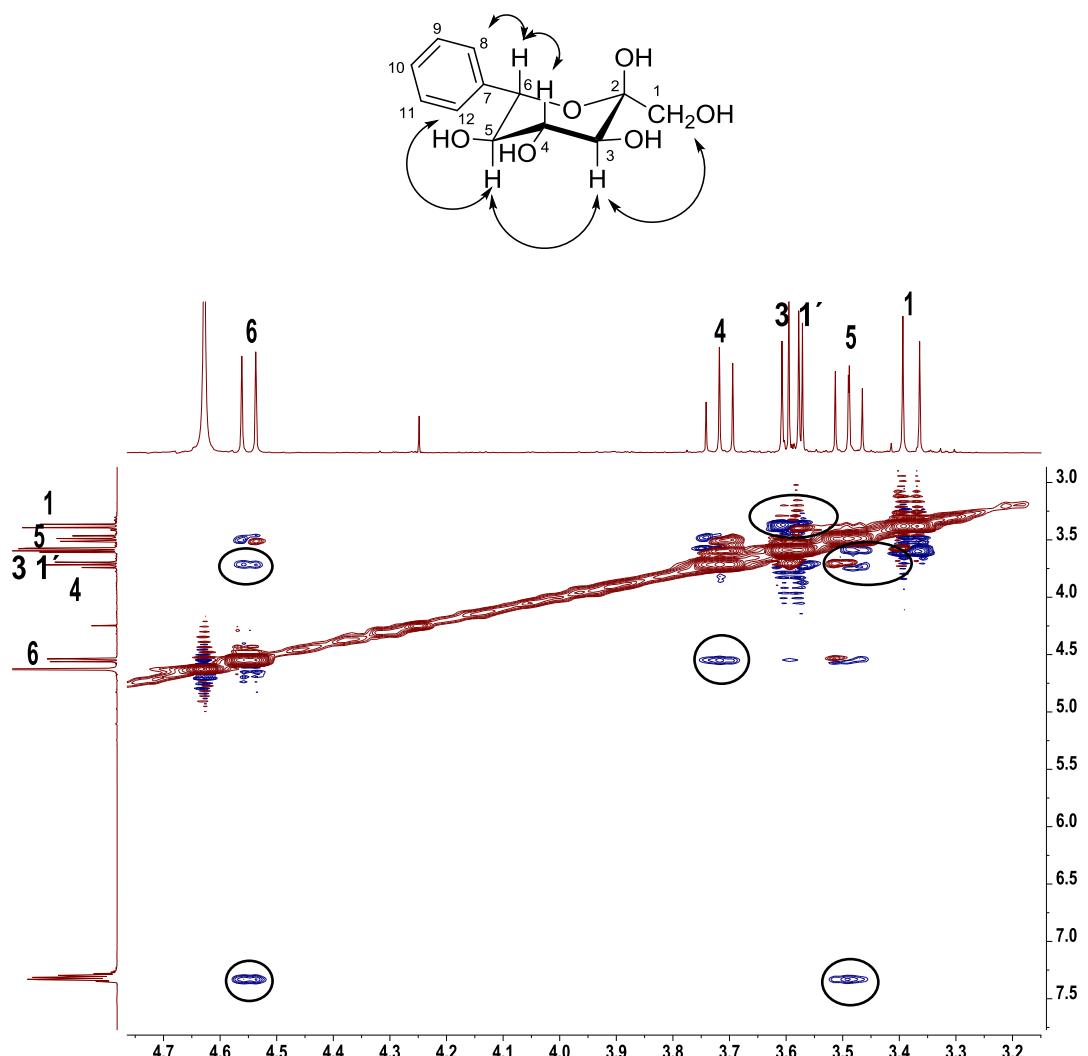
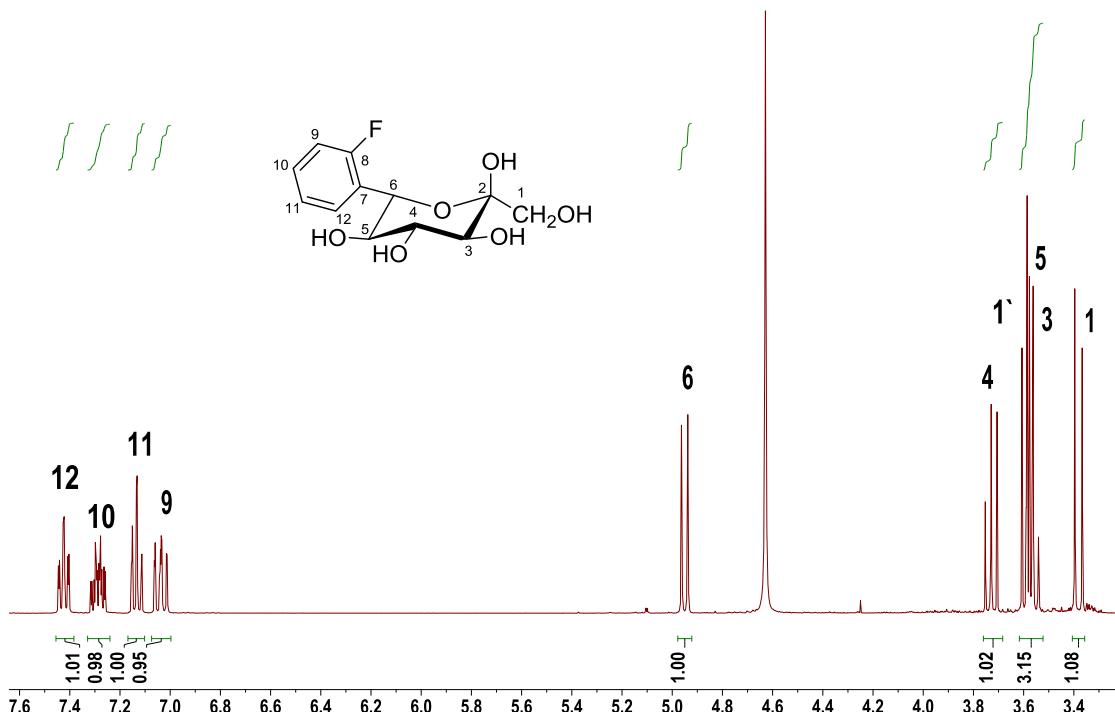
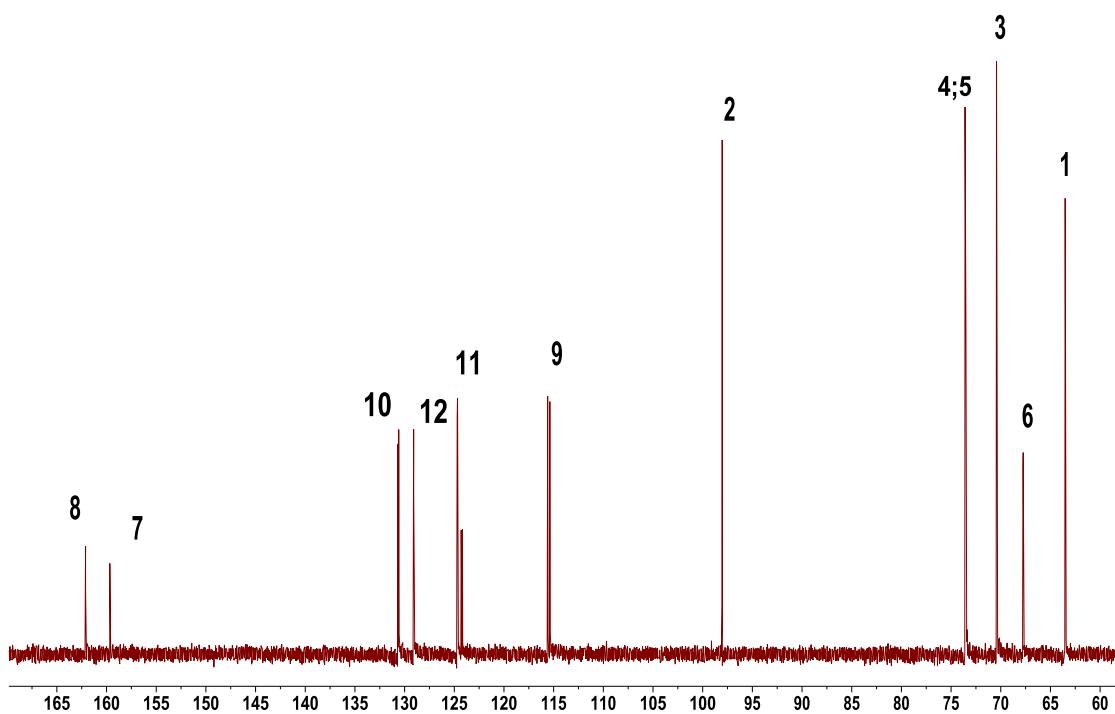


Figura 4S(3.2). Espectros de RMN (D_2O) de **12b**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

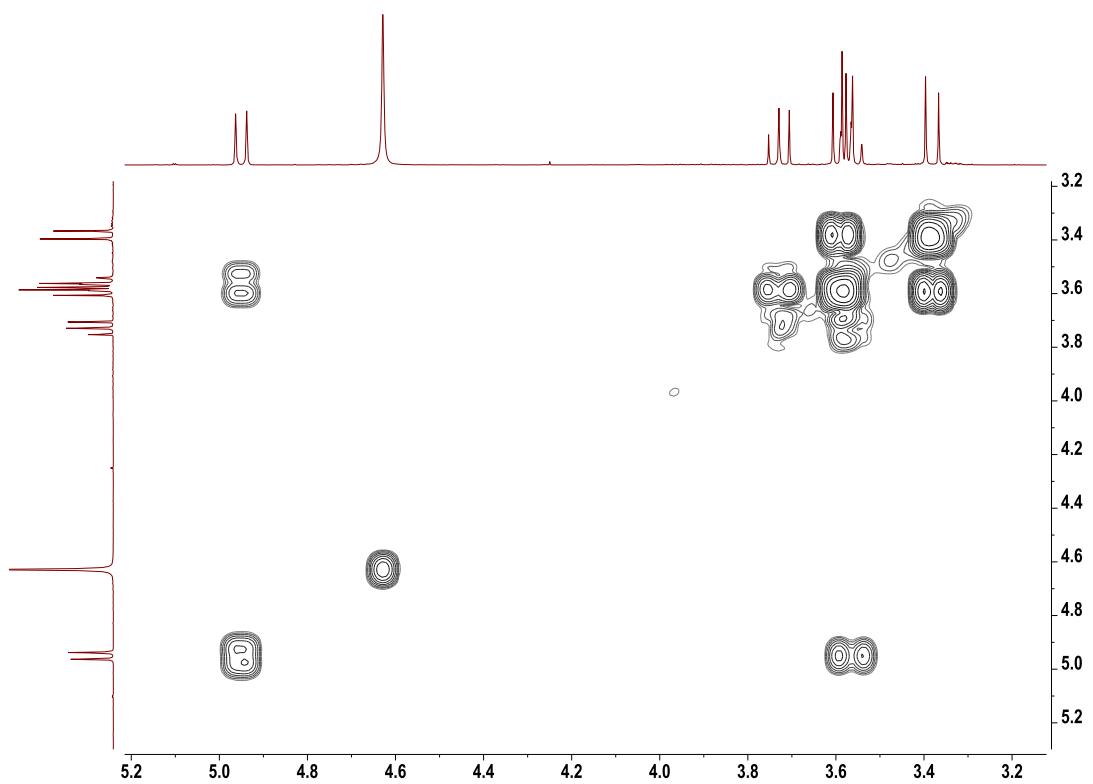
a)



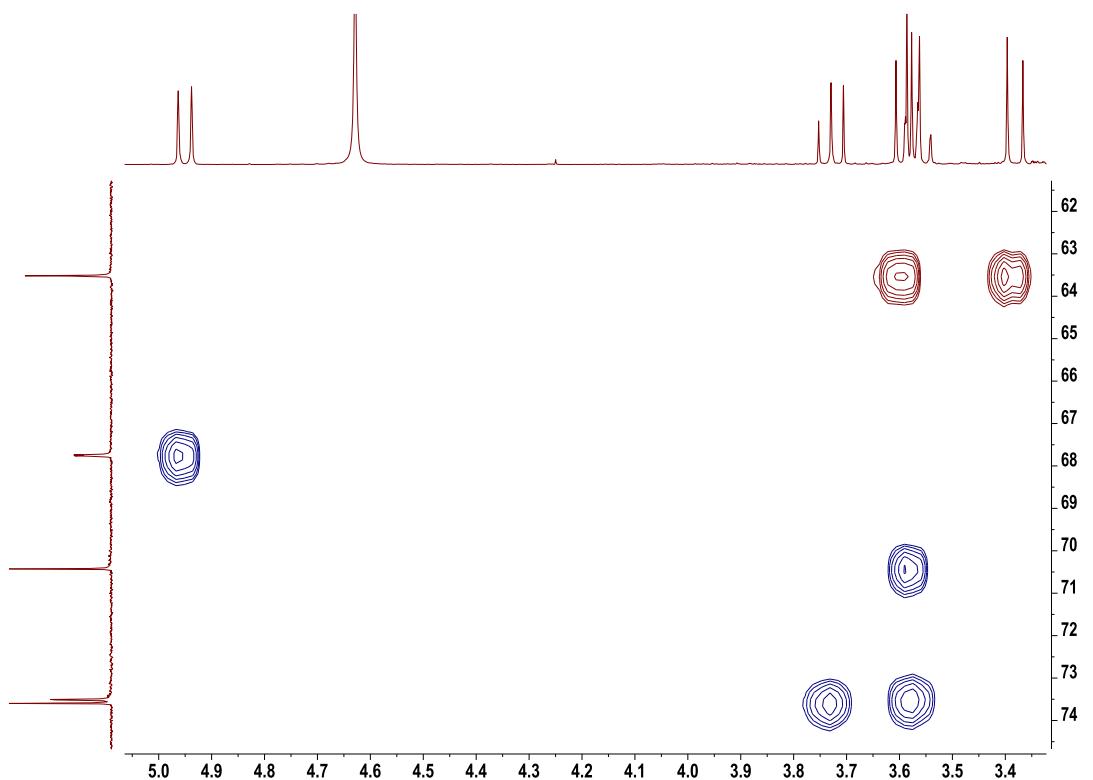
b)



c)



d)



e)

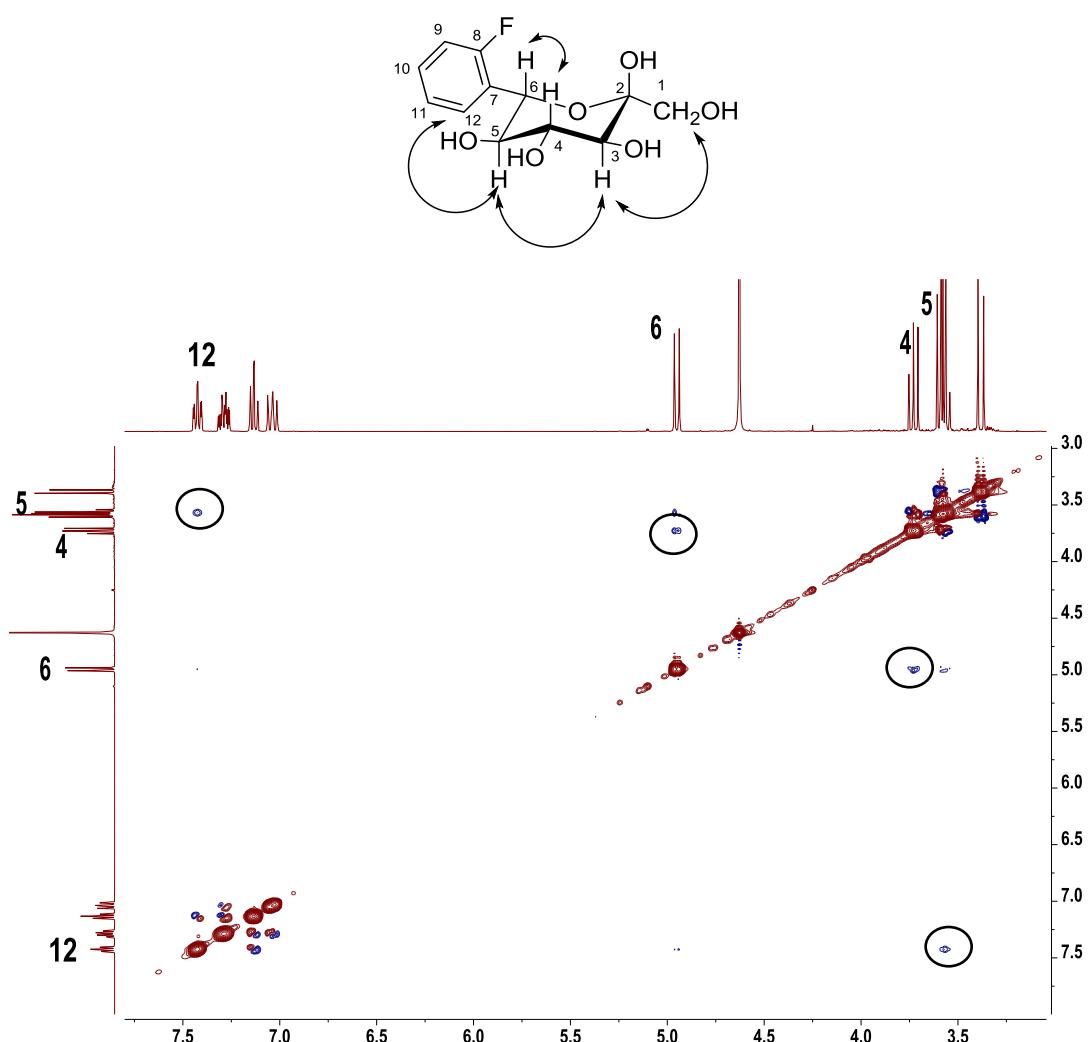
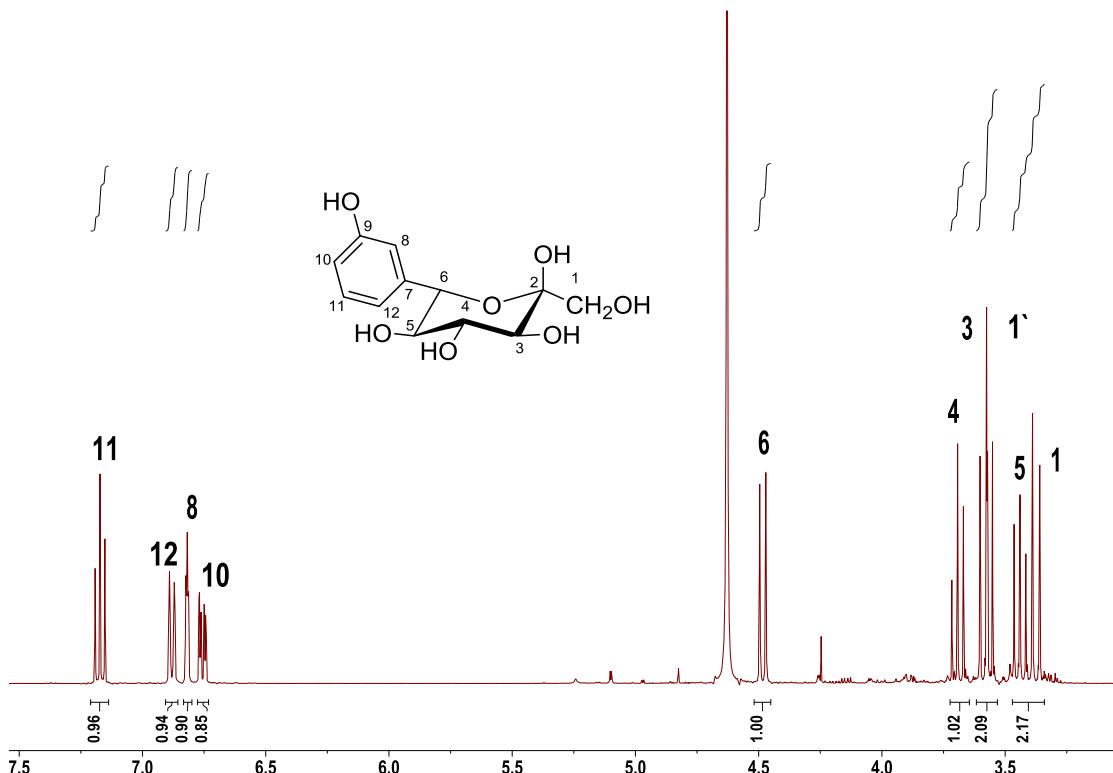
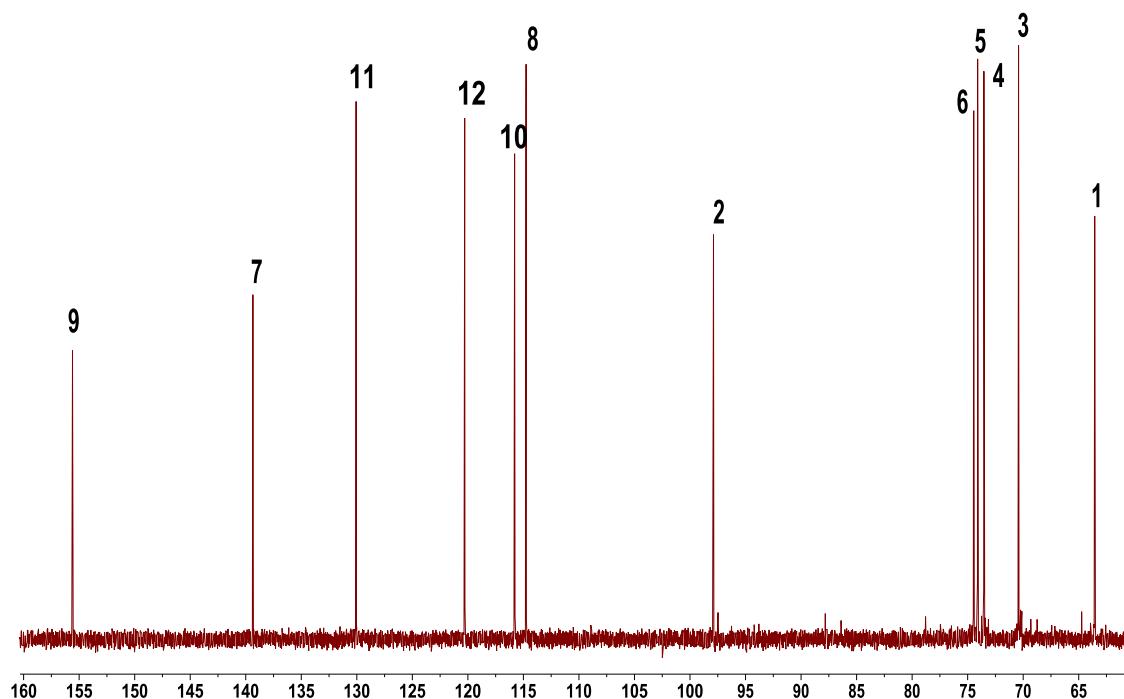


Figura 5S(3.2). Espectros de RMN (D_2O) de **12g**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

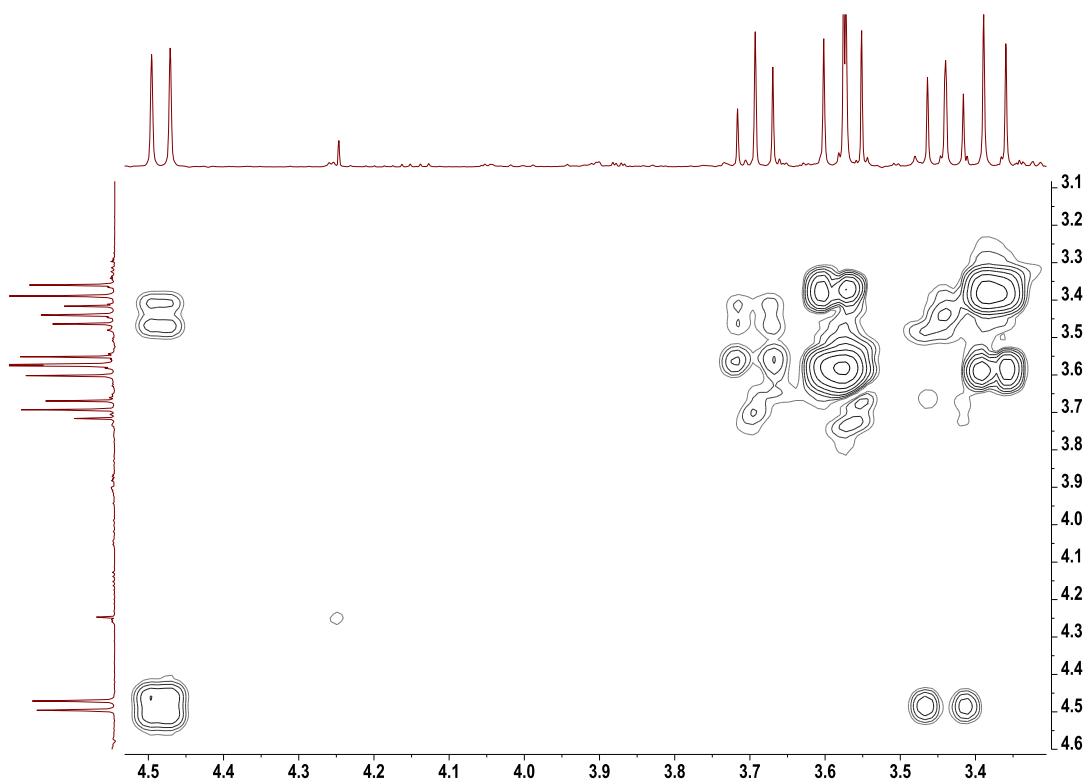
a)



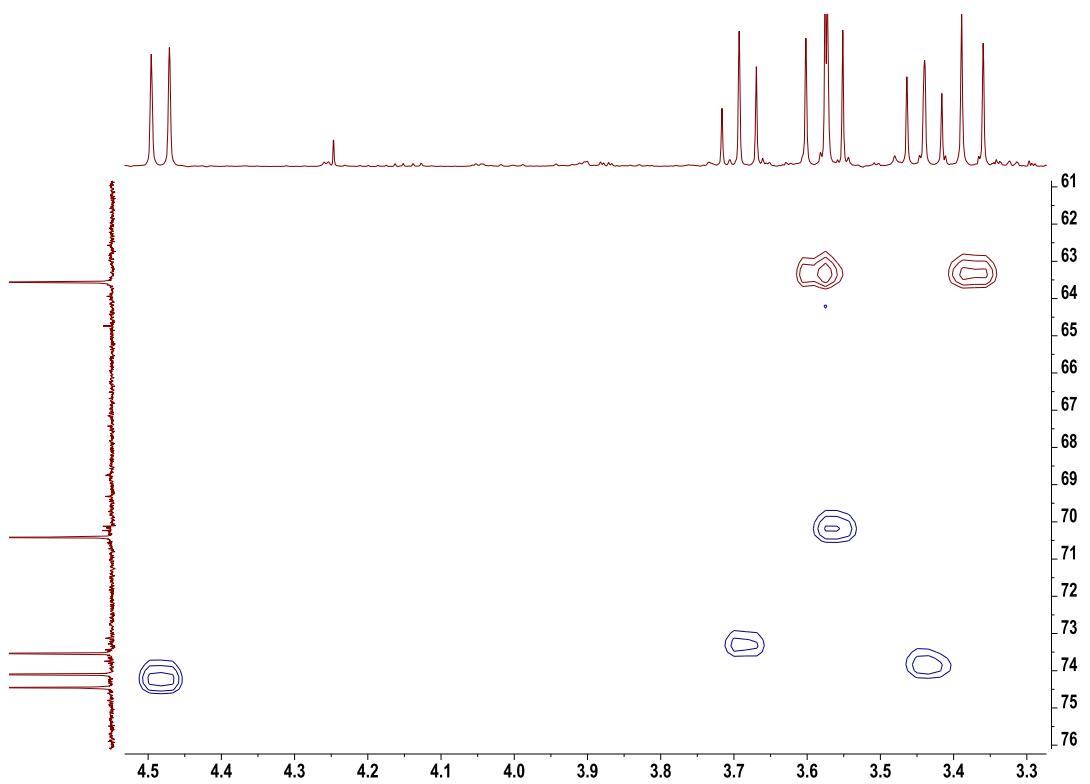
b)



c)



d)



e)

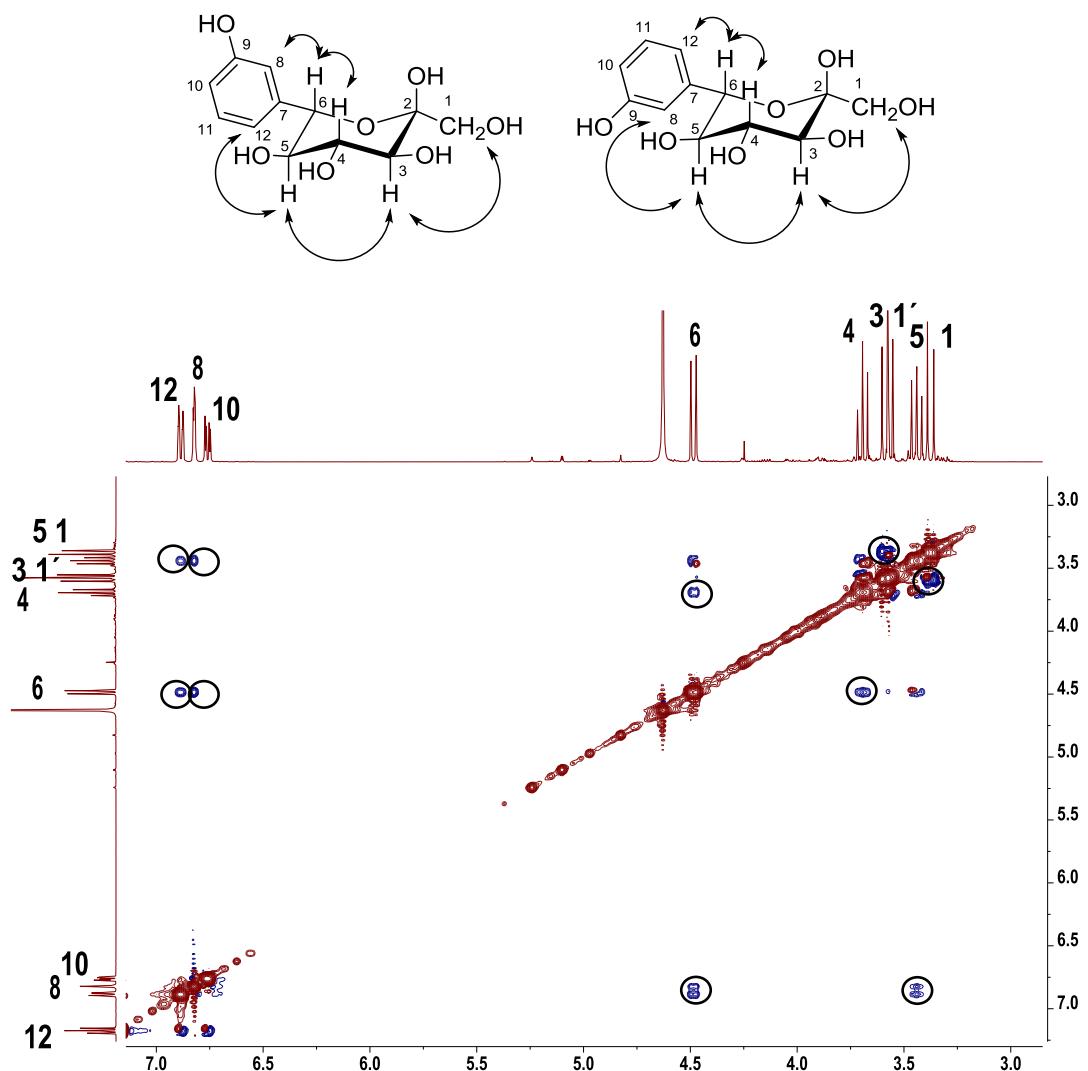
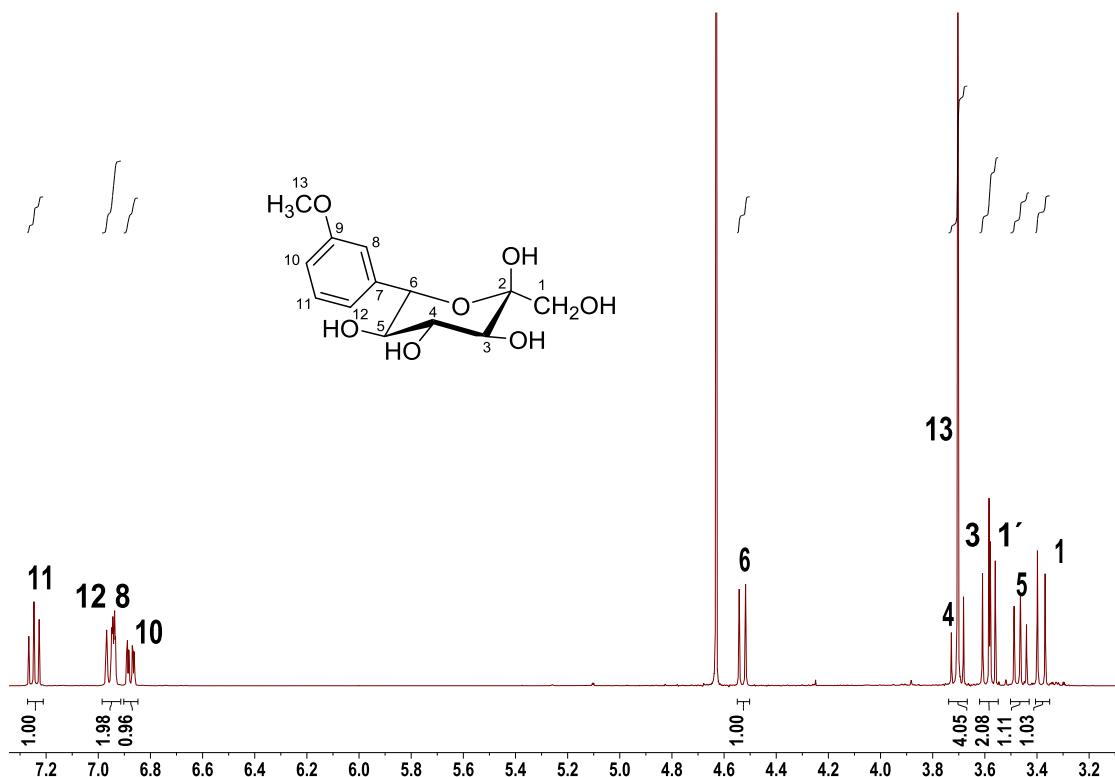
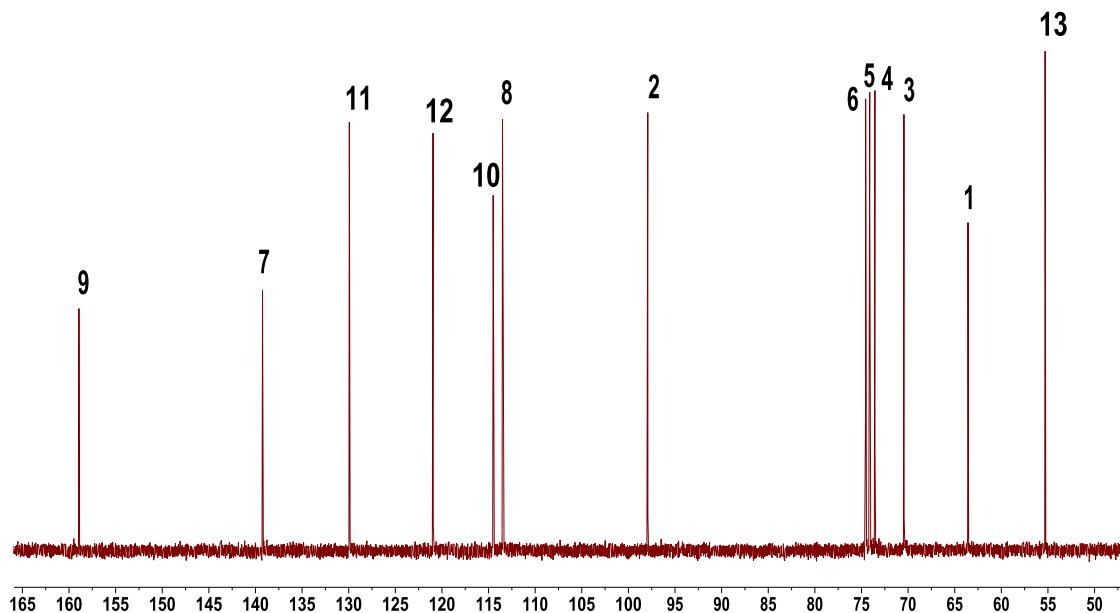


Figura 6S(3.2). Espectros de RMN (D_2O) de **12h**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

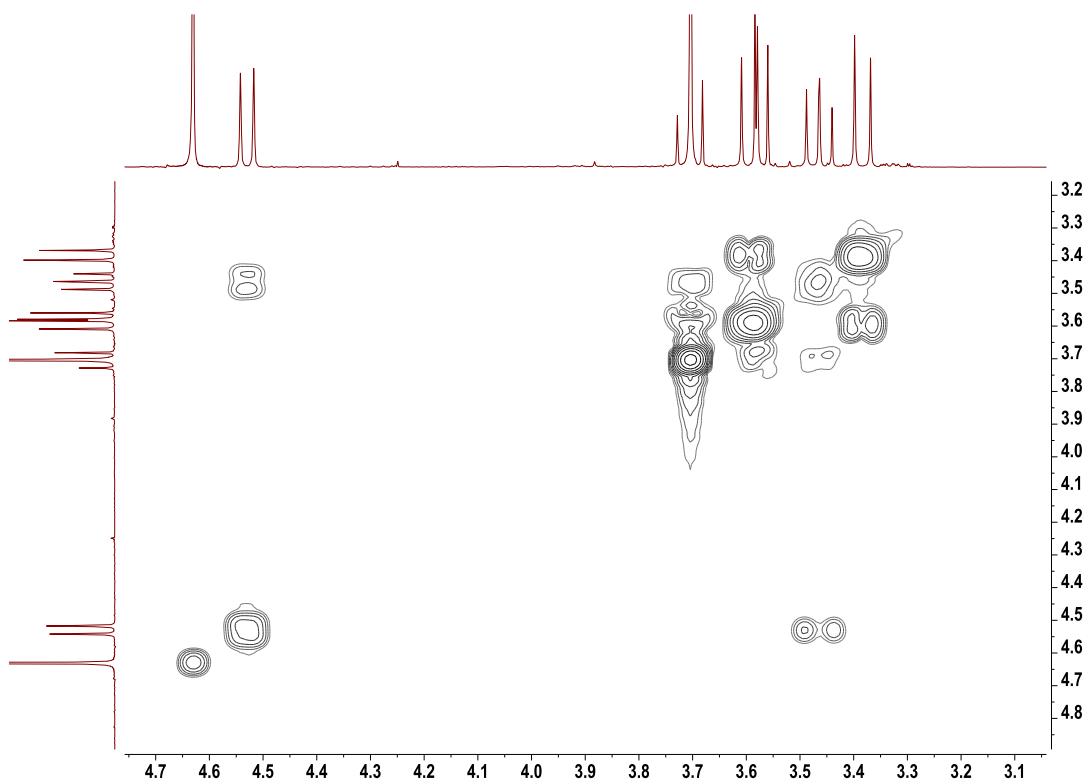
a)



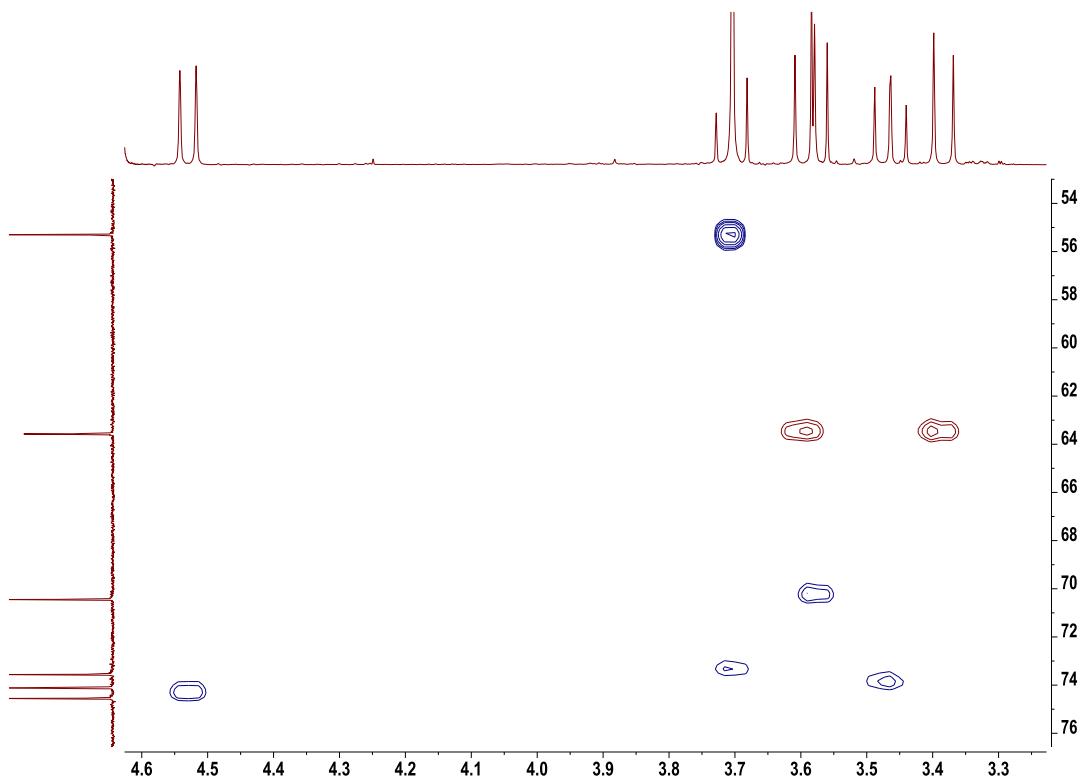
b)



c)



d)



e)

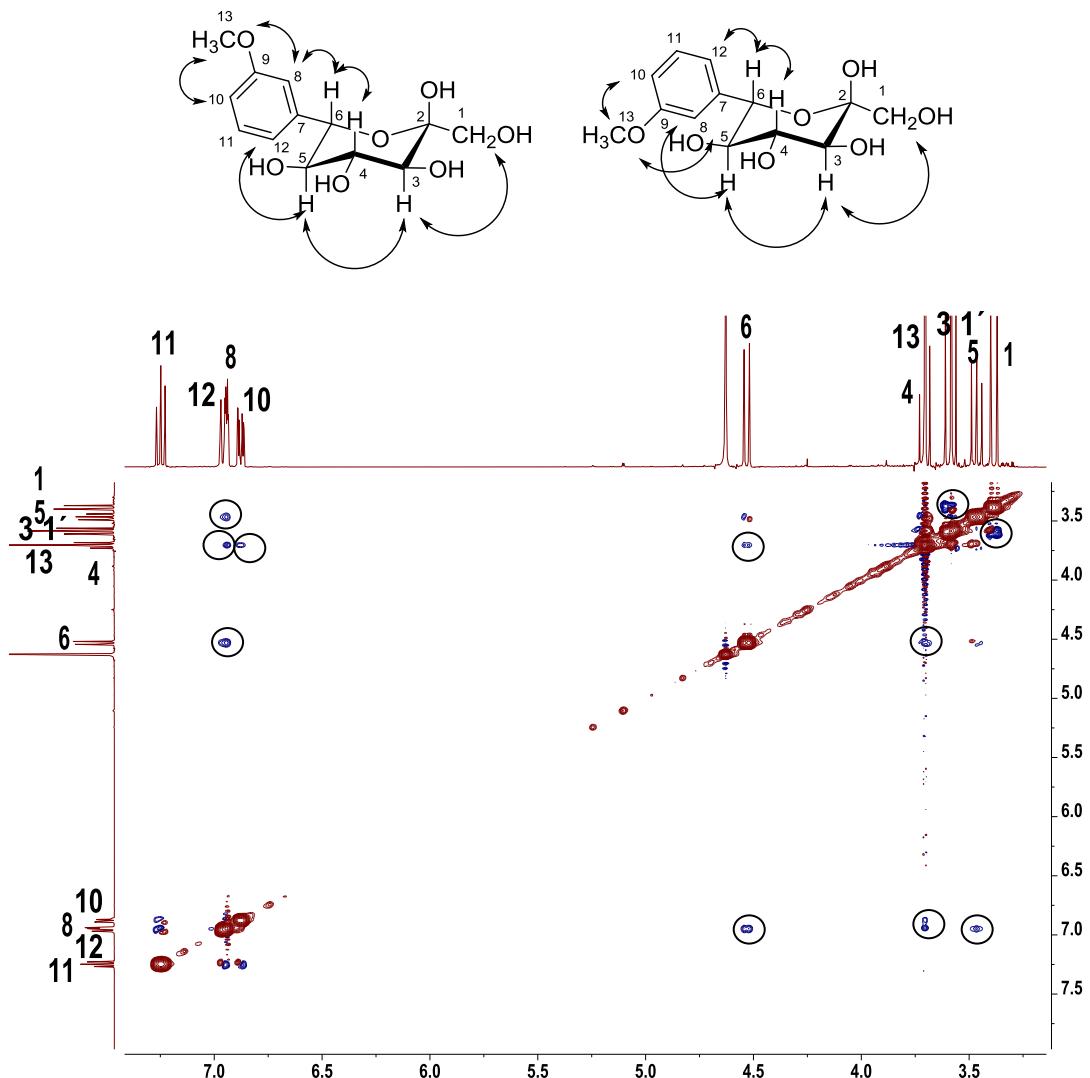
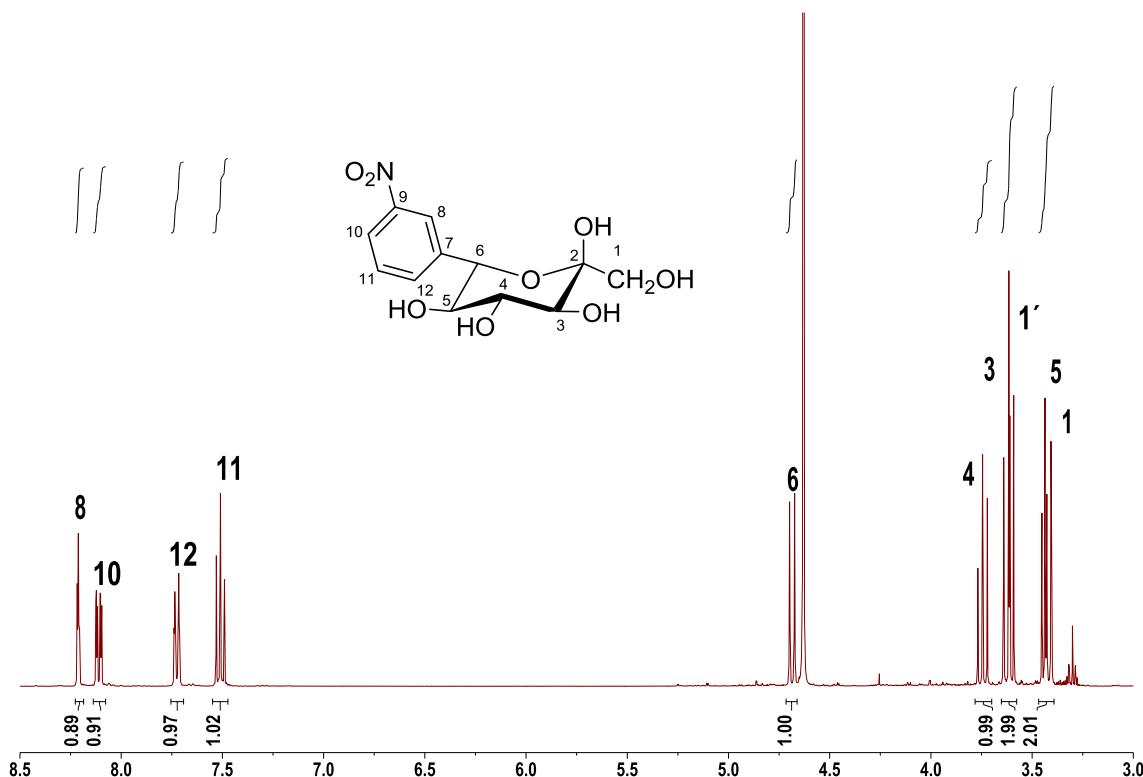
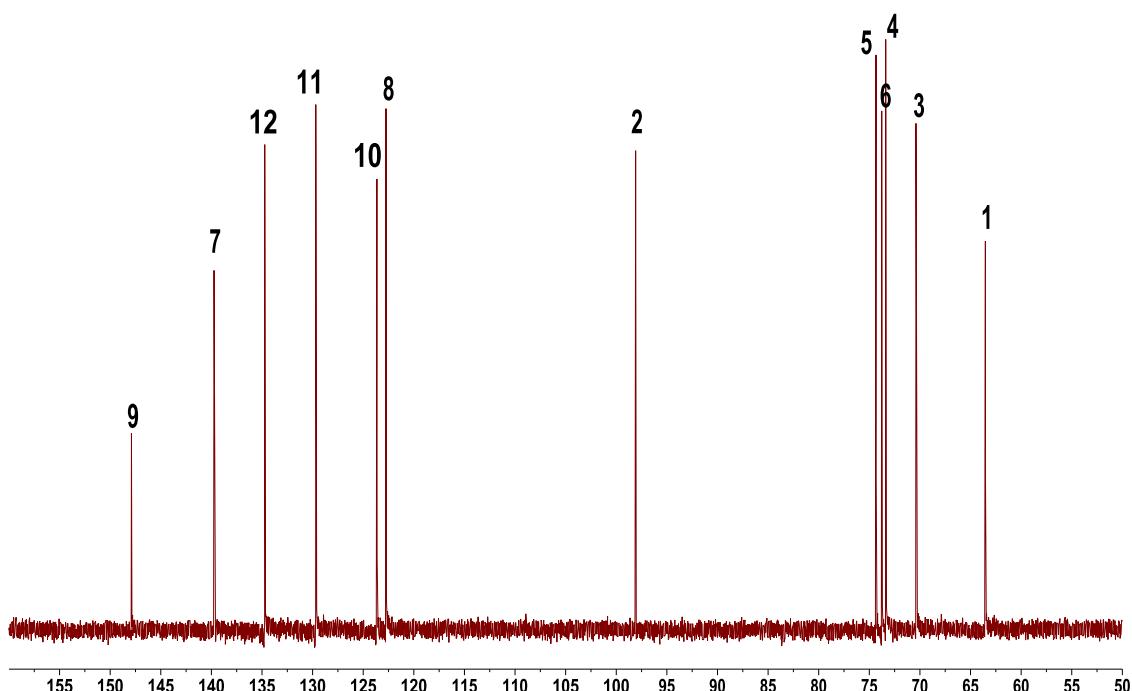


Figura 7S(3.2). Espectros de RMN (D_2O) de **12i**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

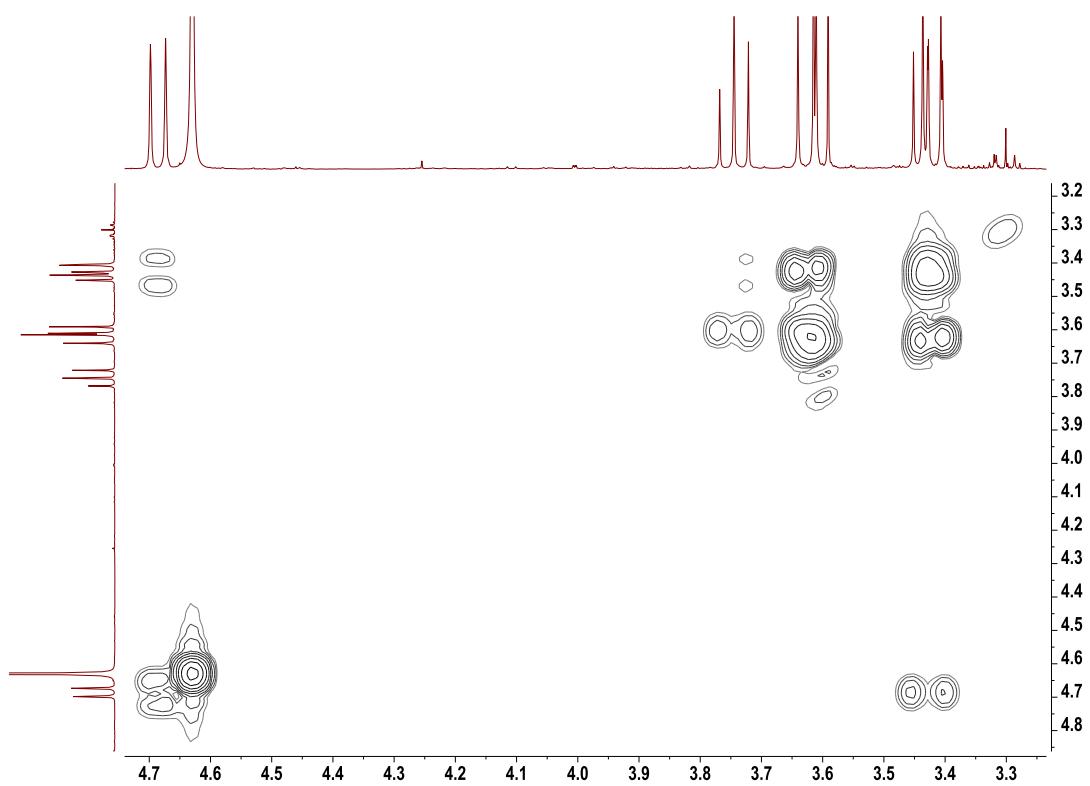
a)



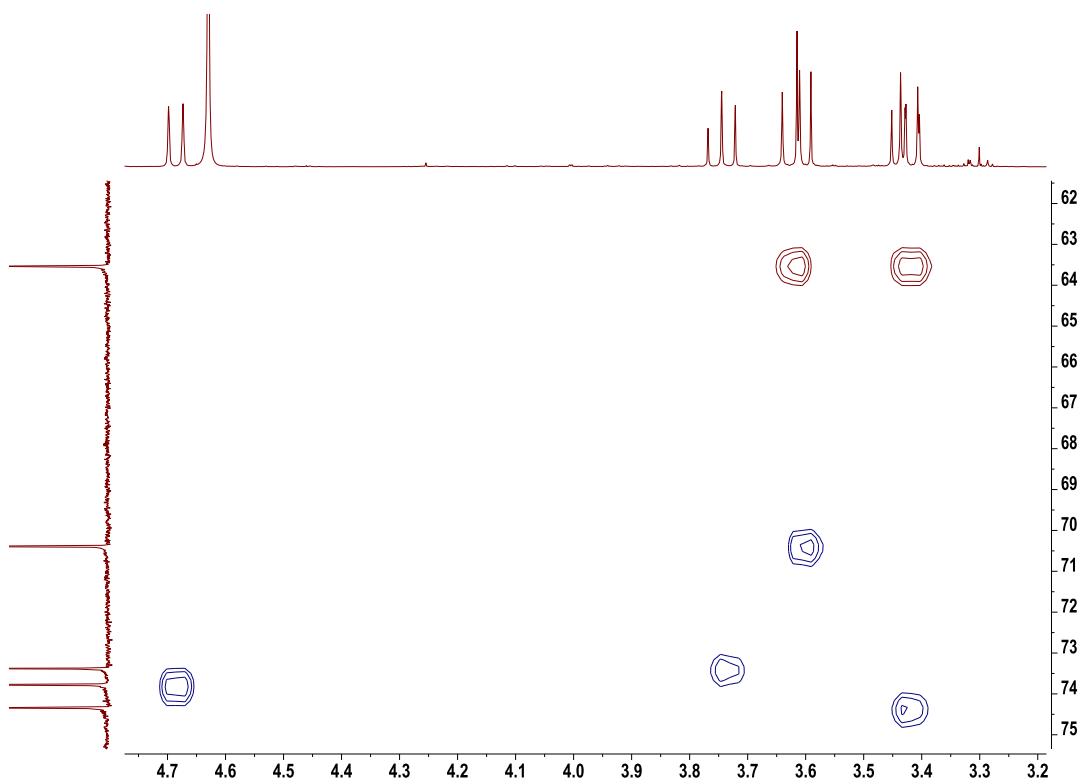
b)



c)



d)



e)

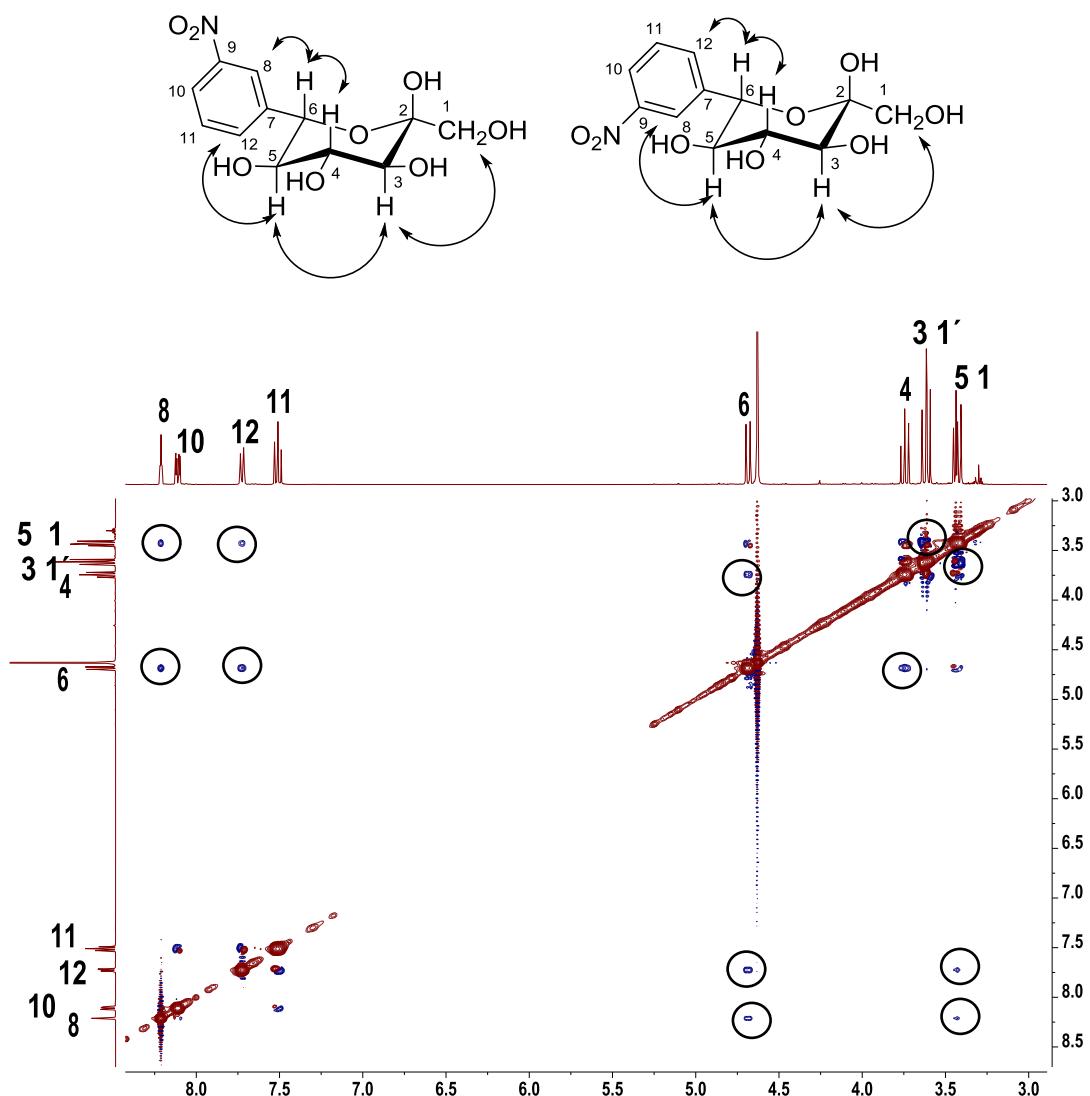
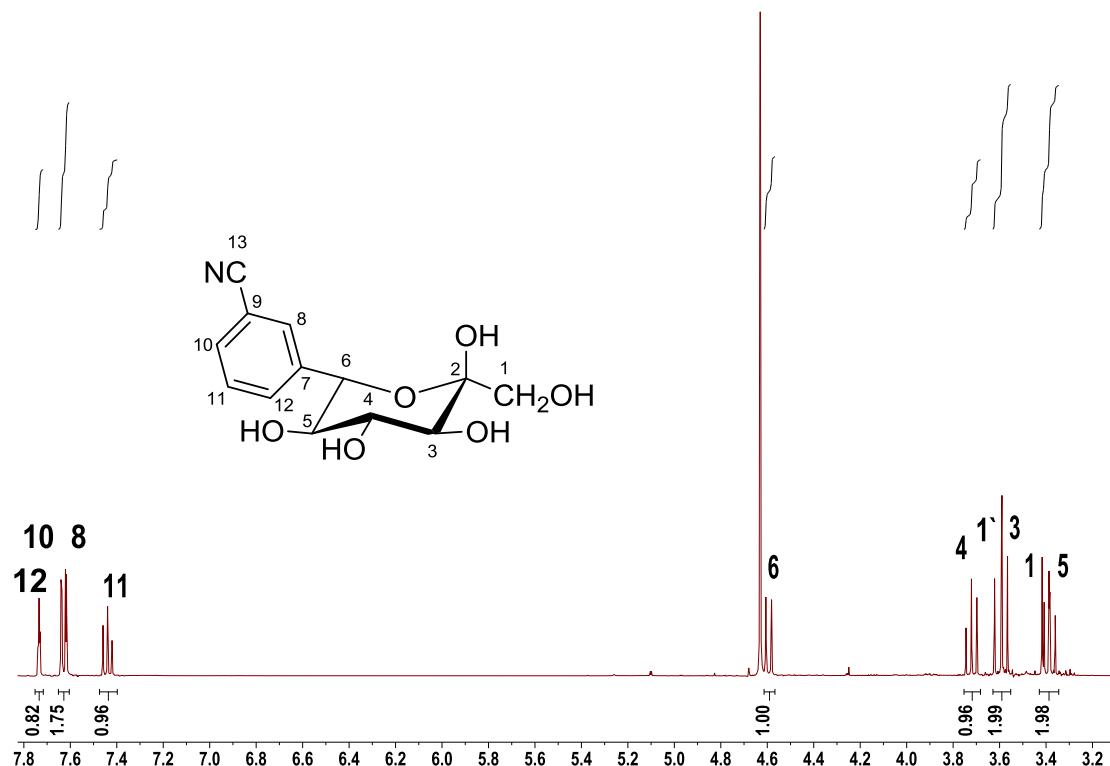
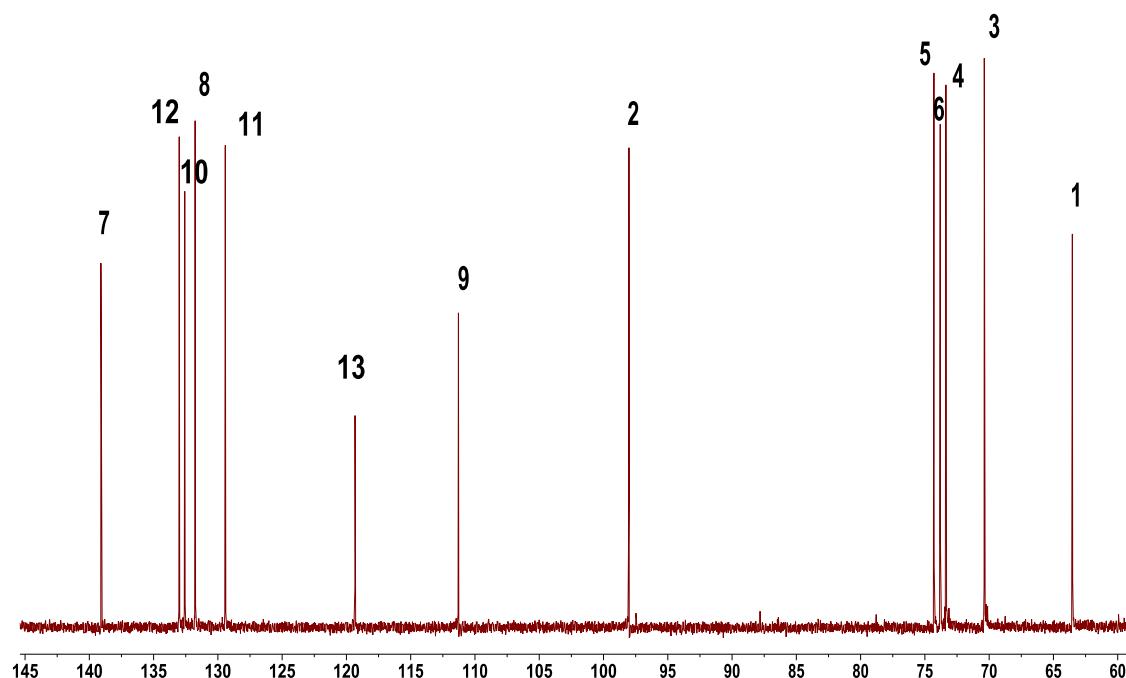


Figura 8S(3.2). Espectros de RMN (D_2O) de **12j**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

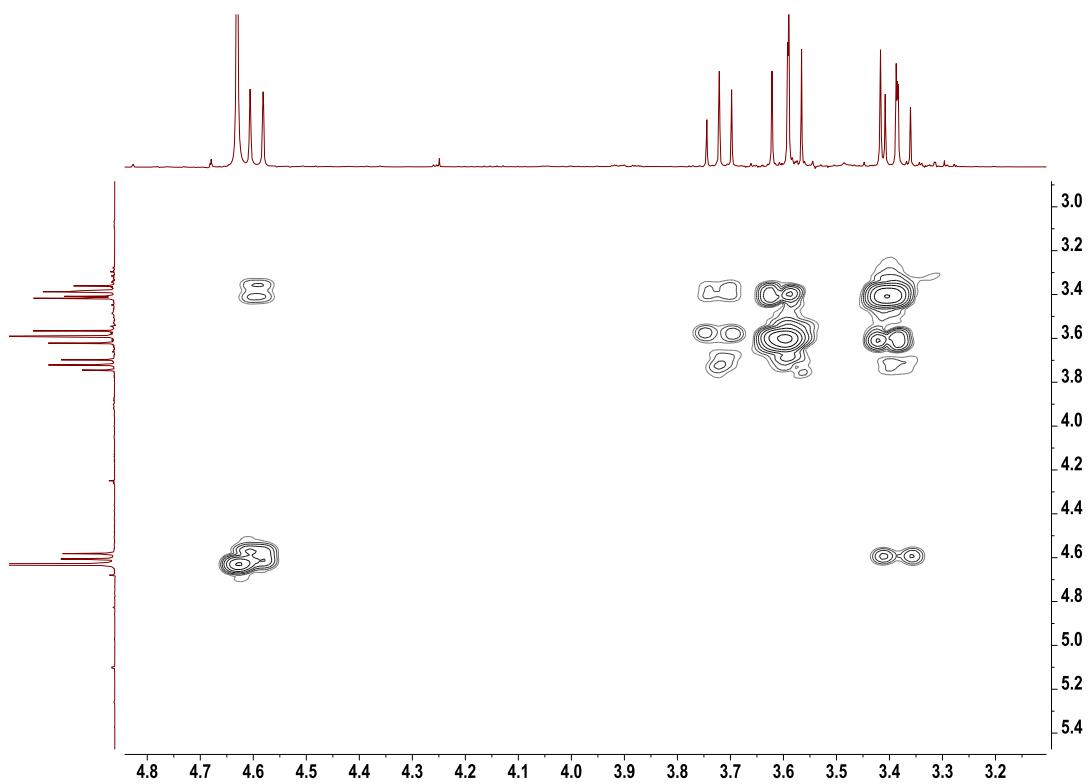
a)



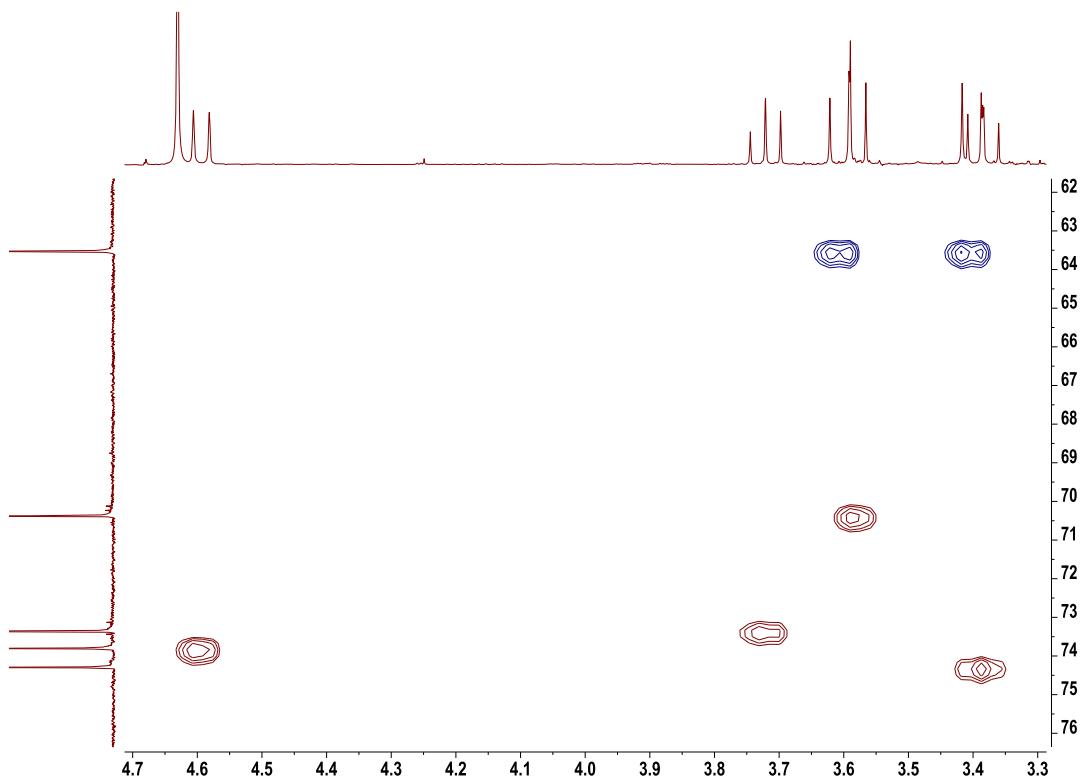
b)



c)



d)



e)

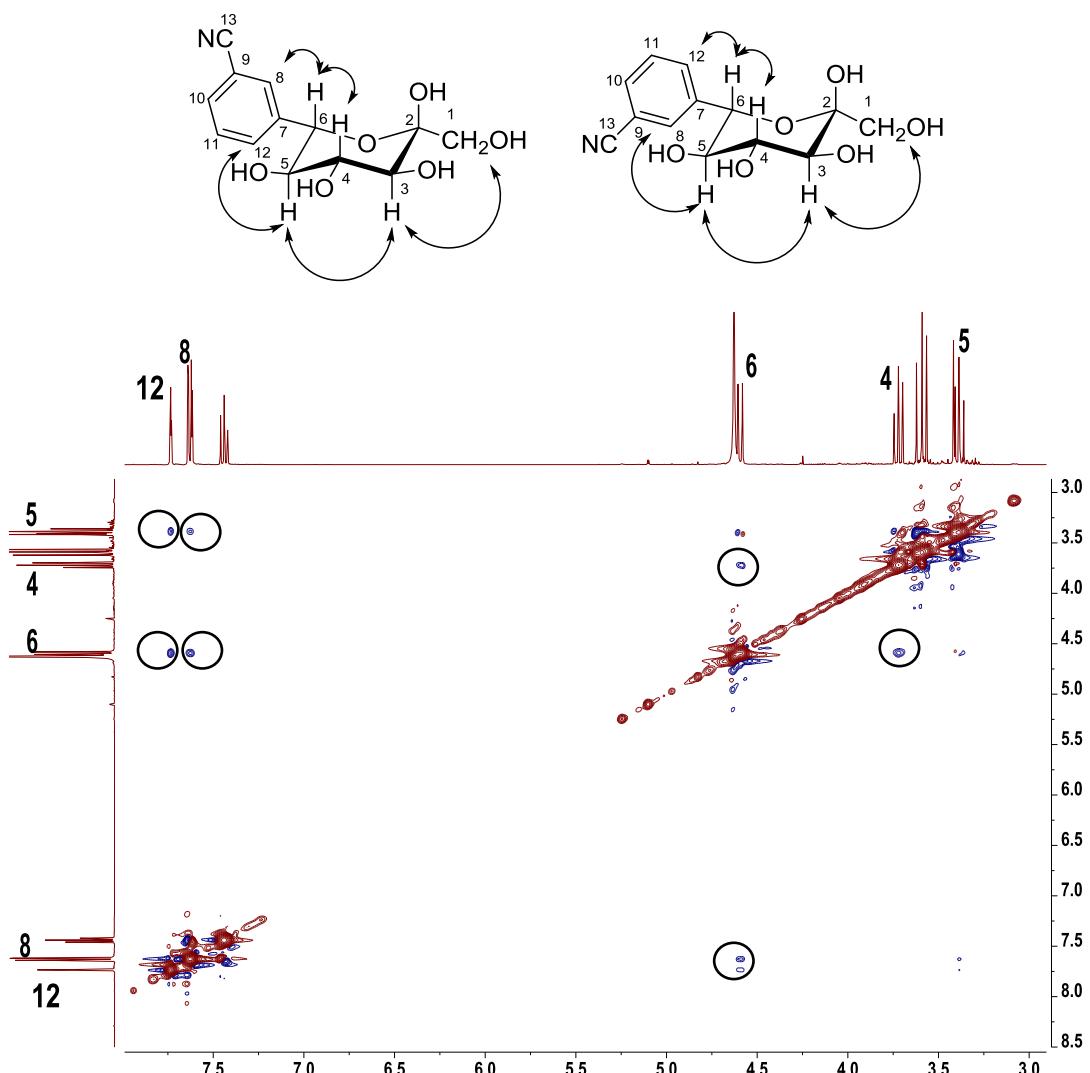
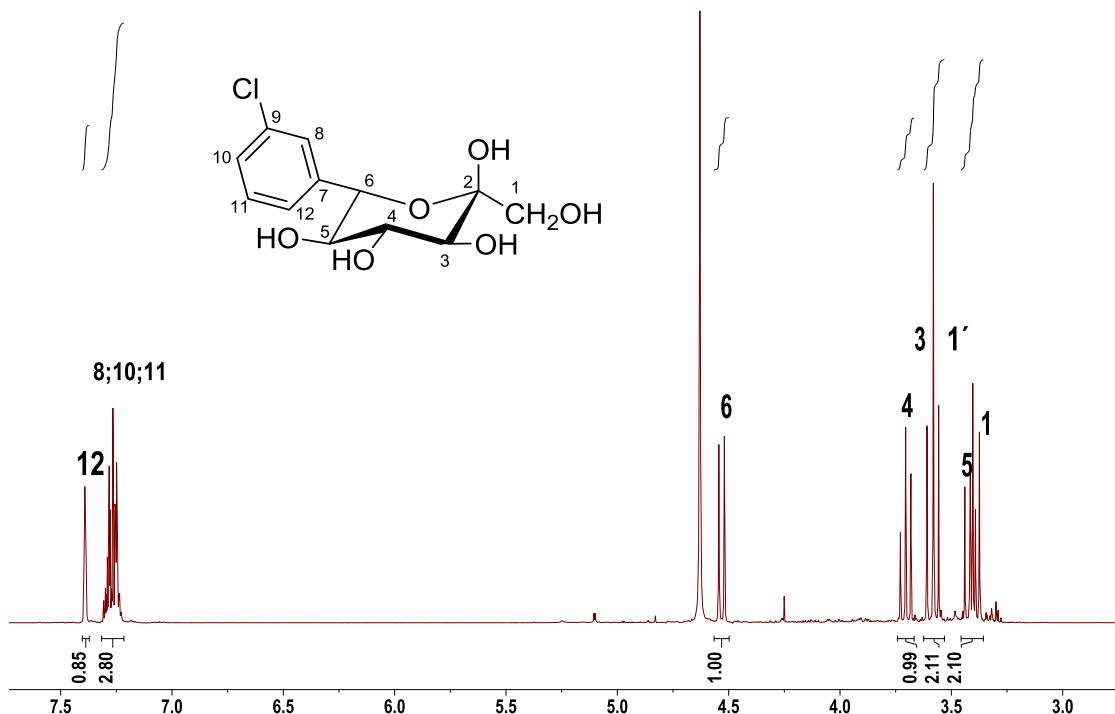
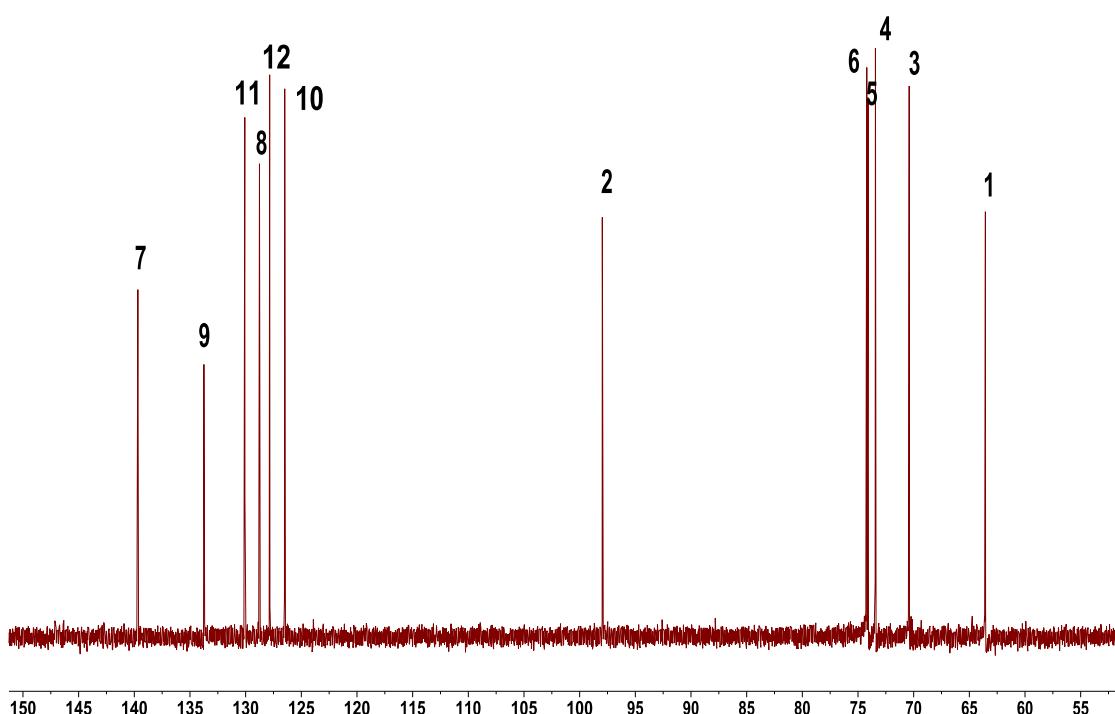


Figura 9S(3.2) Espectros de RMN (D_2O) de **12k**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

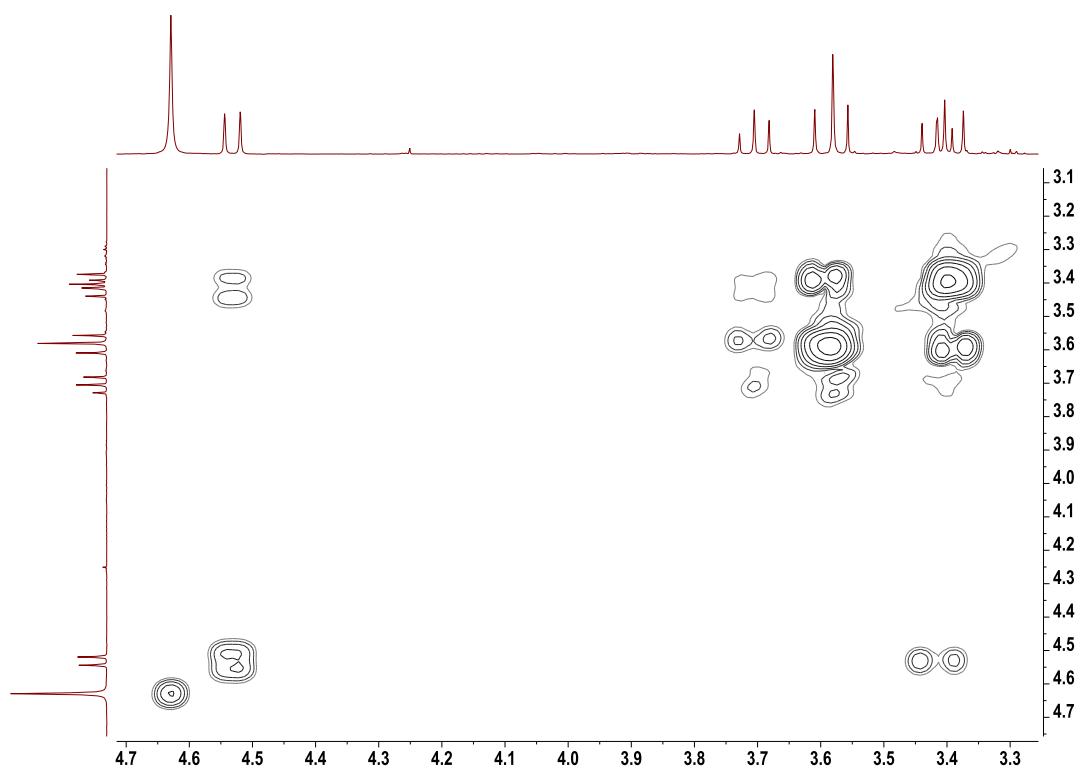
a)



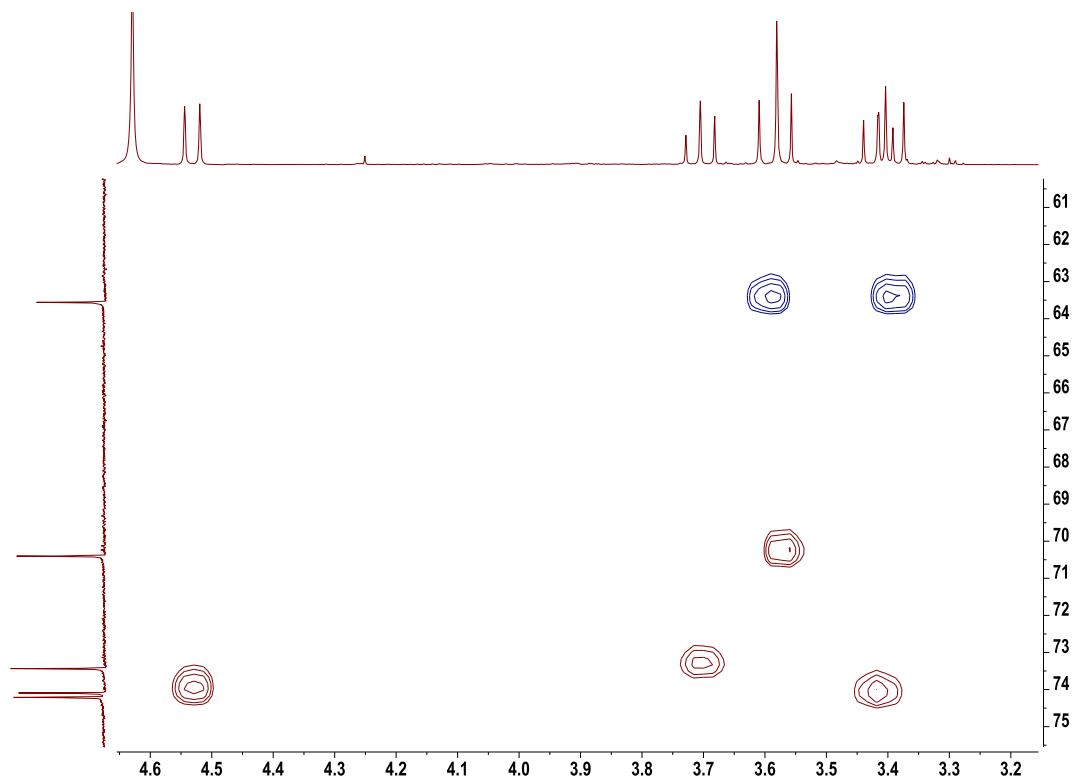
b)



c)



d)



e)

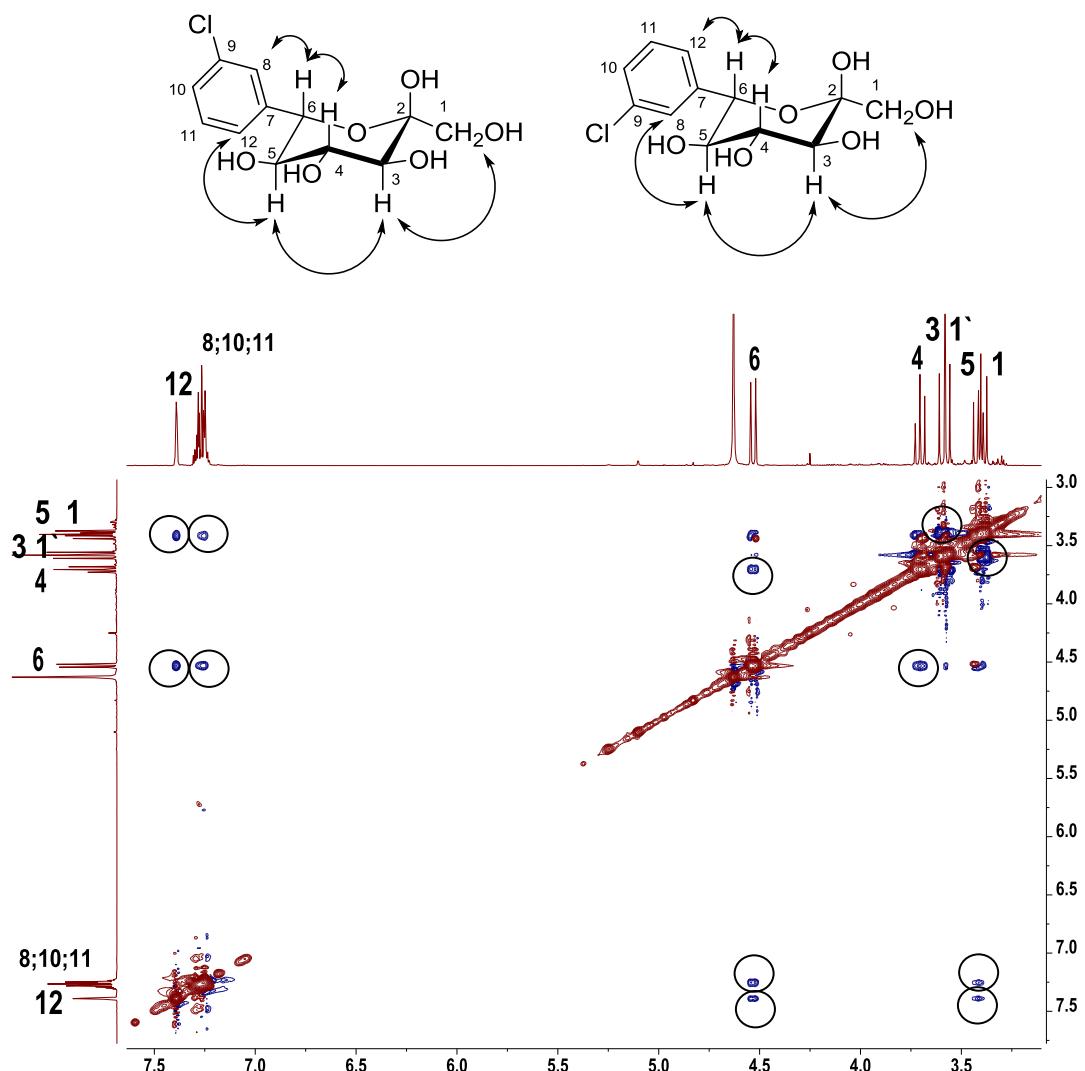
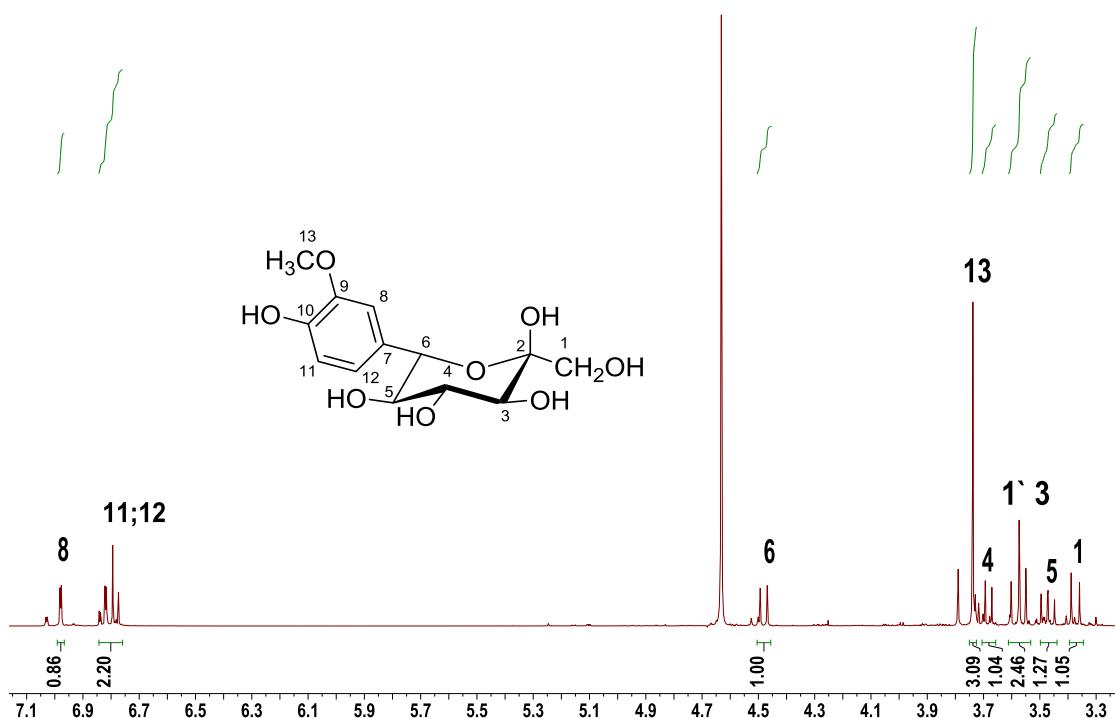
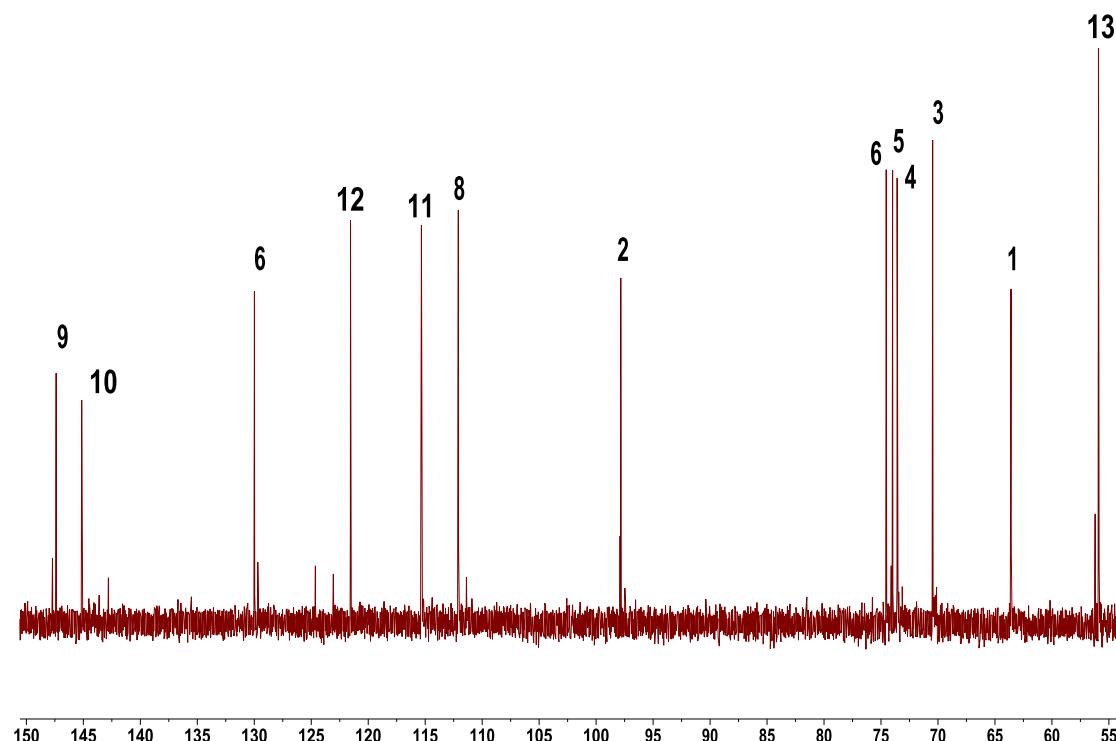


Figura 10S(3.2) Espectros de RMN (D_2O) de **12t**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

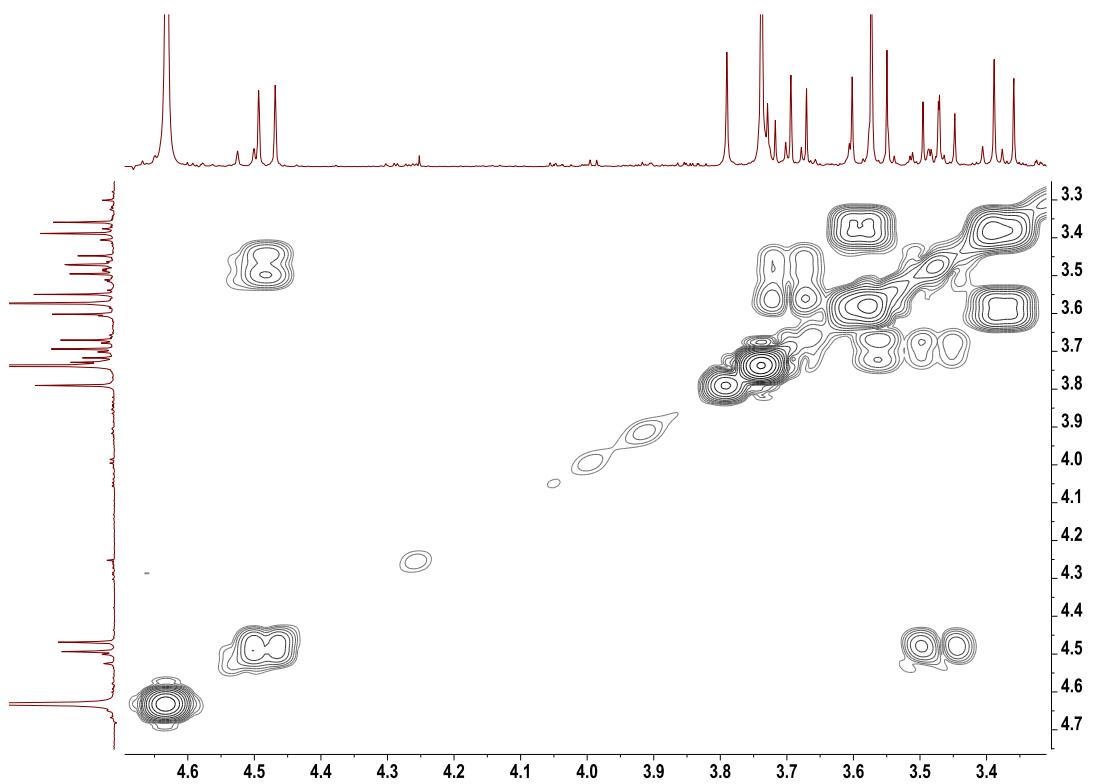
a)



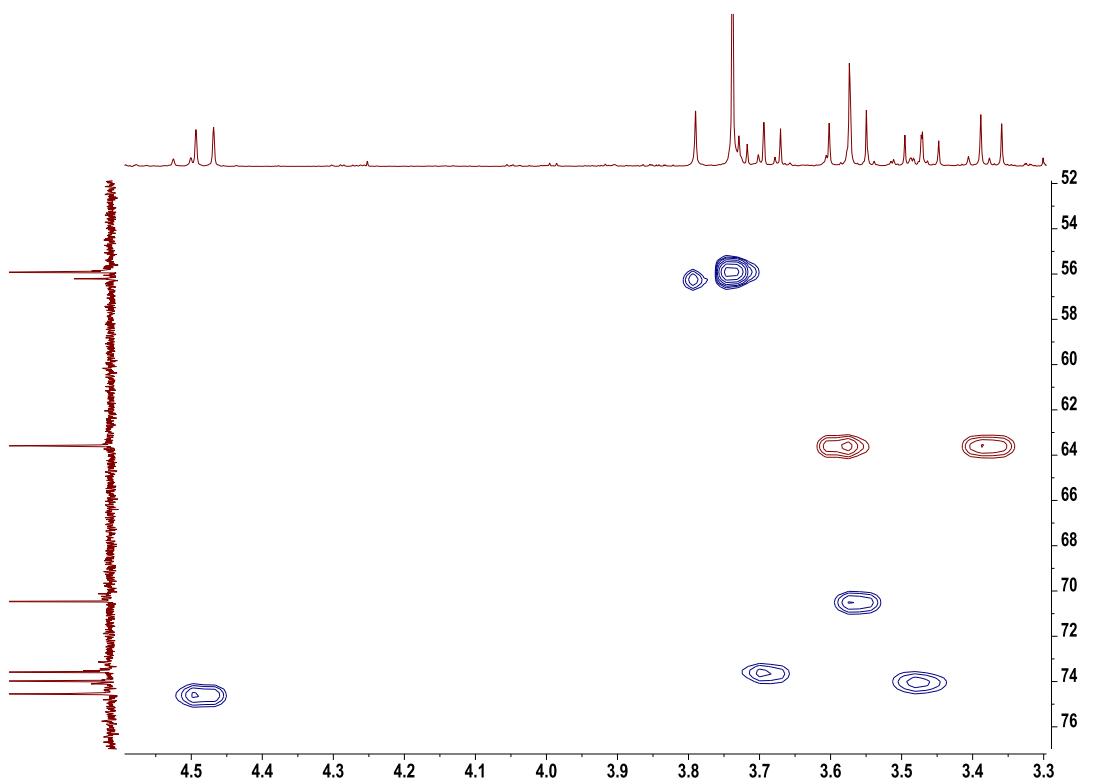
b)



c)



d)



e)

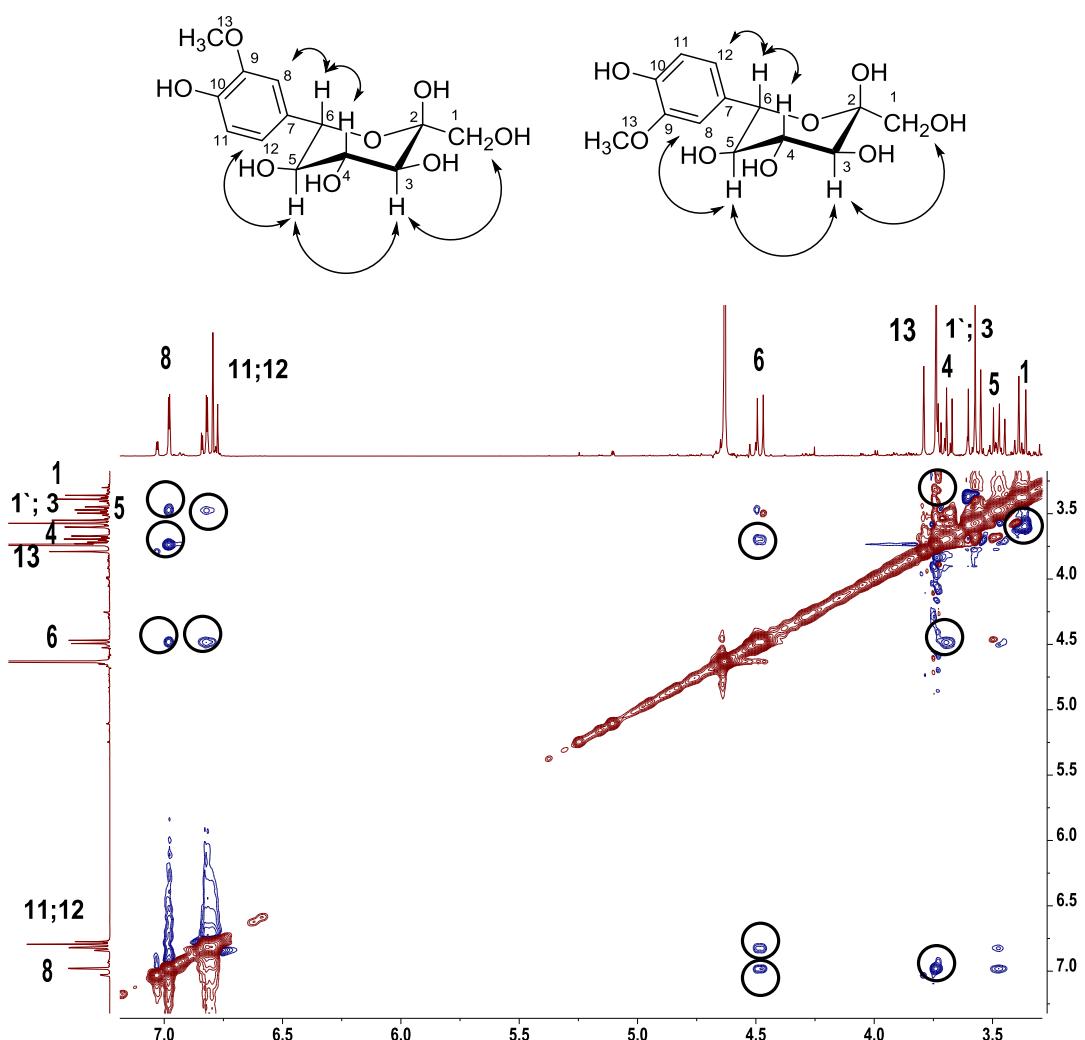
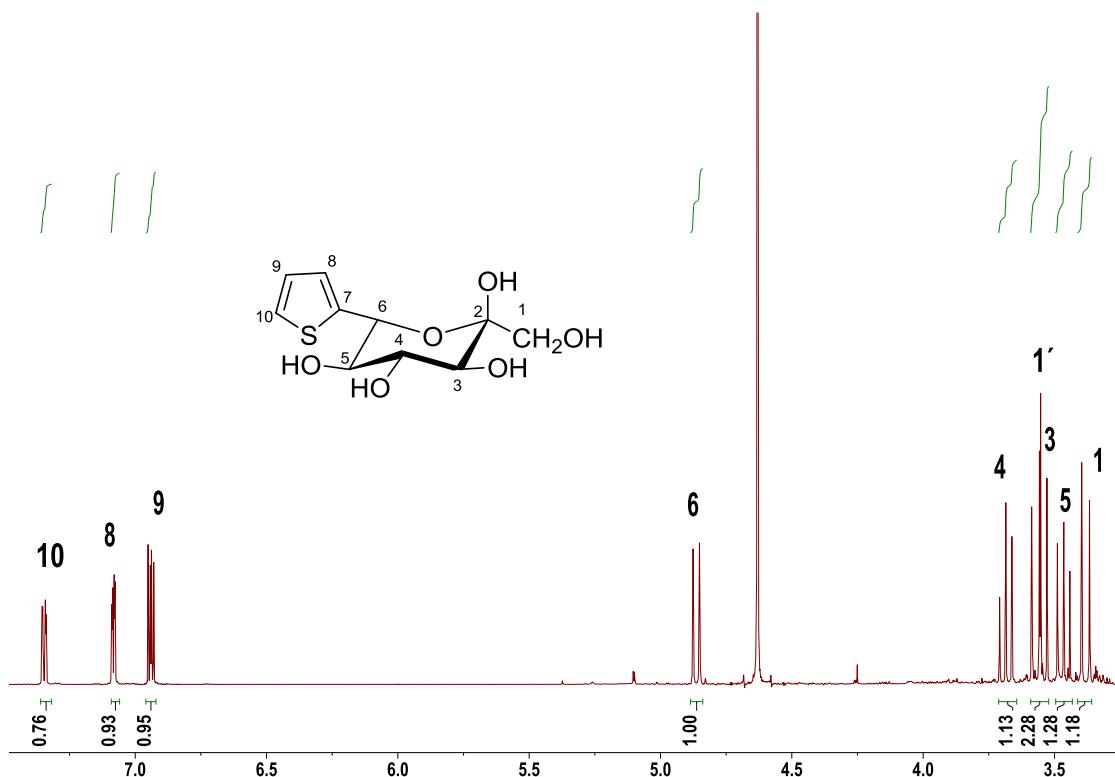
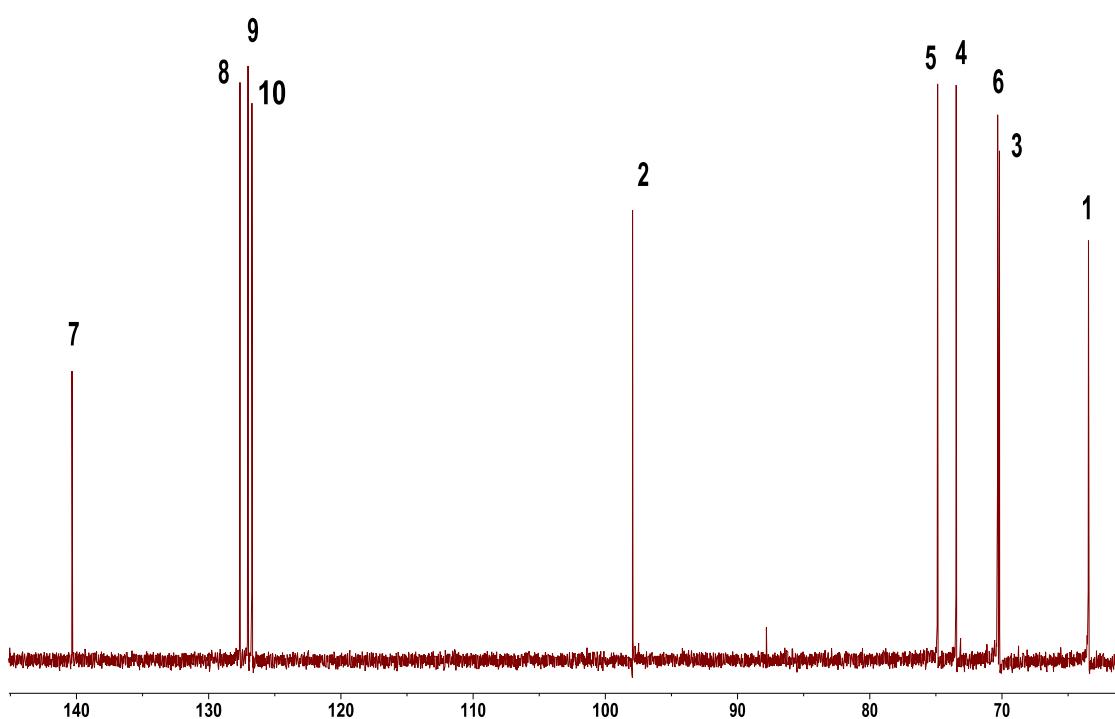


Figura 11S(3.2) Espectros de RMN (D_2O) de **12x**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

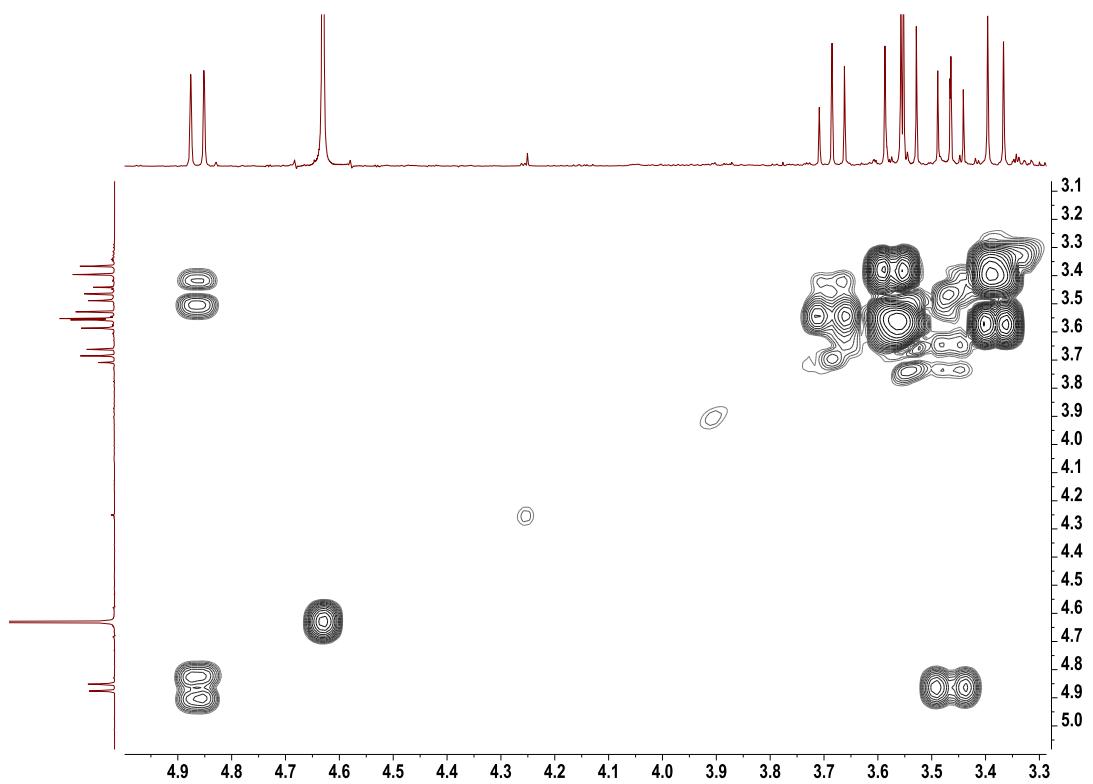
a)



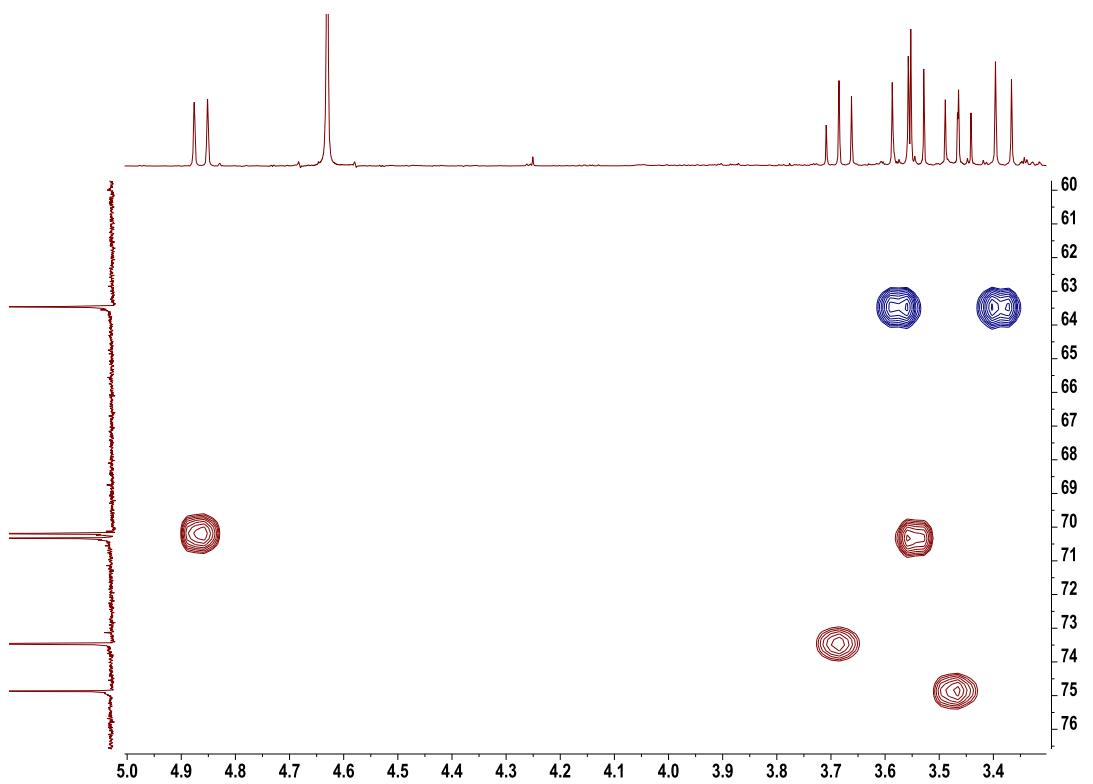
b)



c)



d)



e)

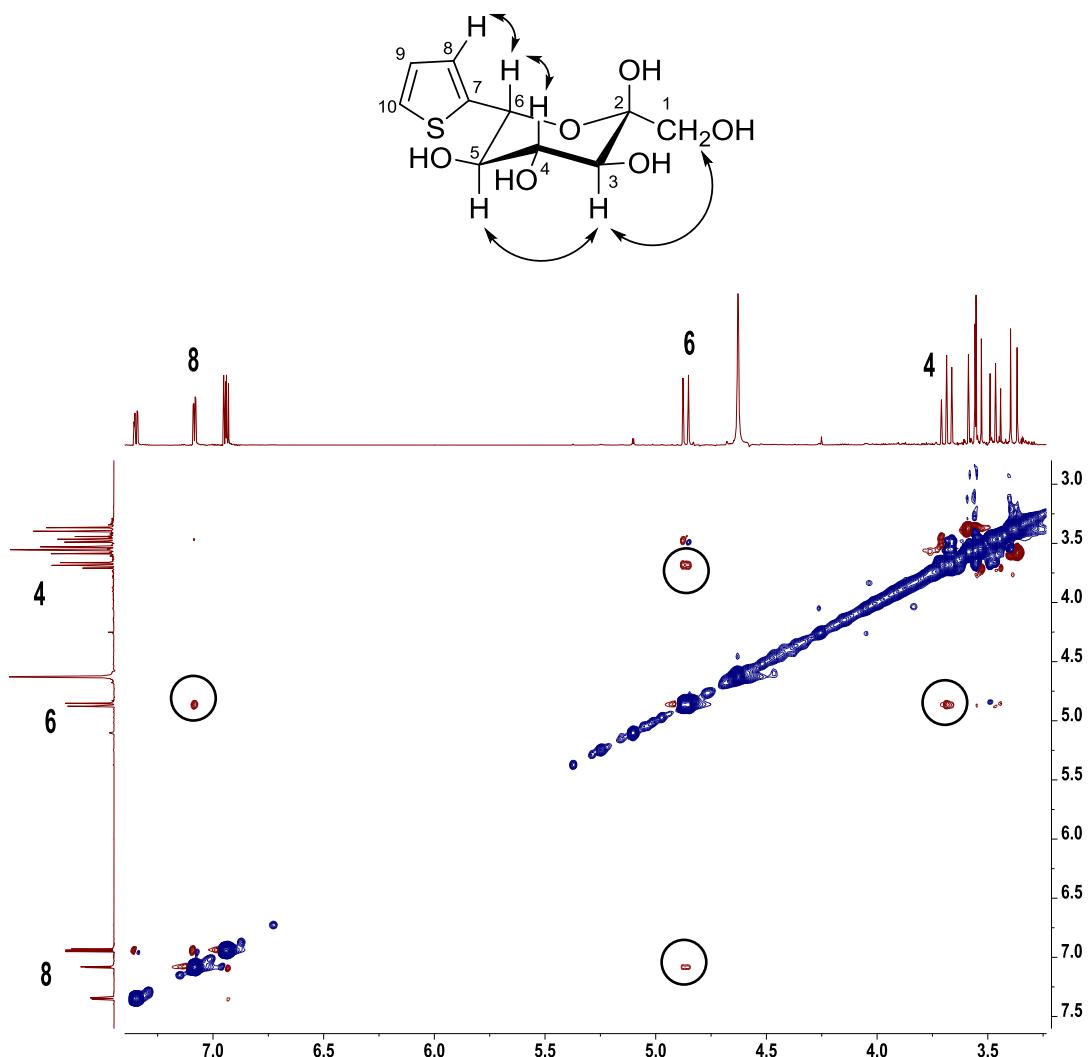
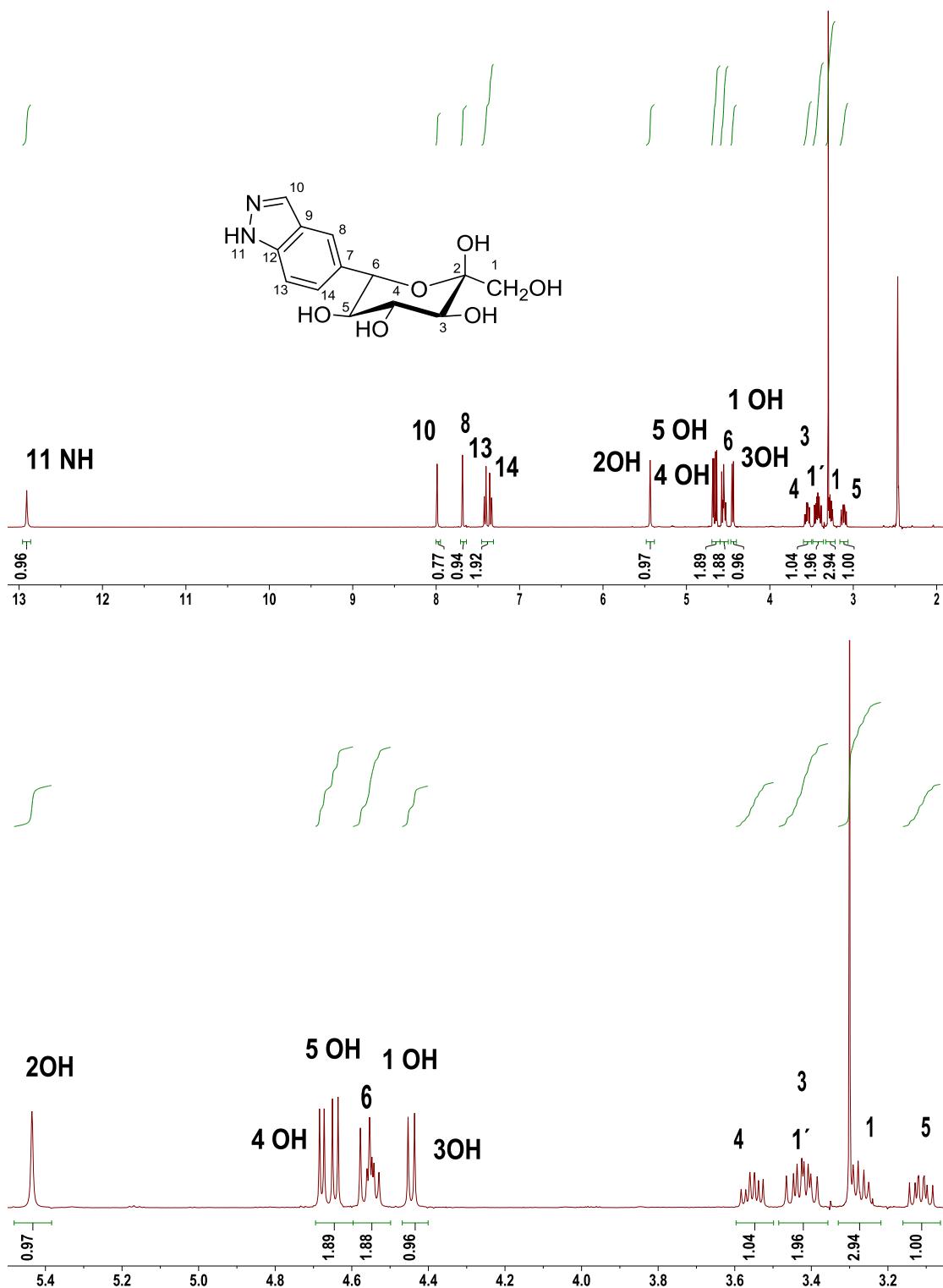
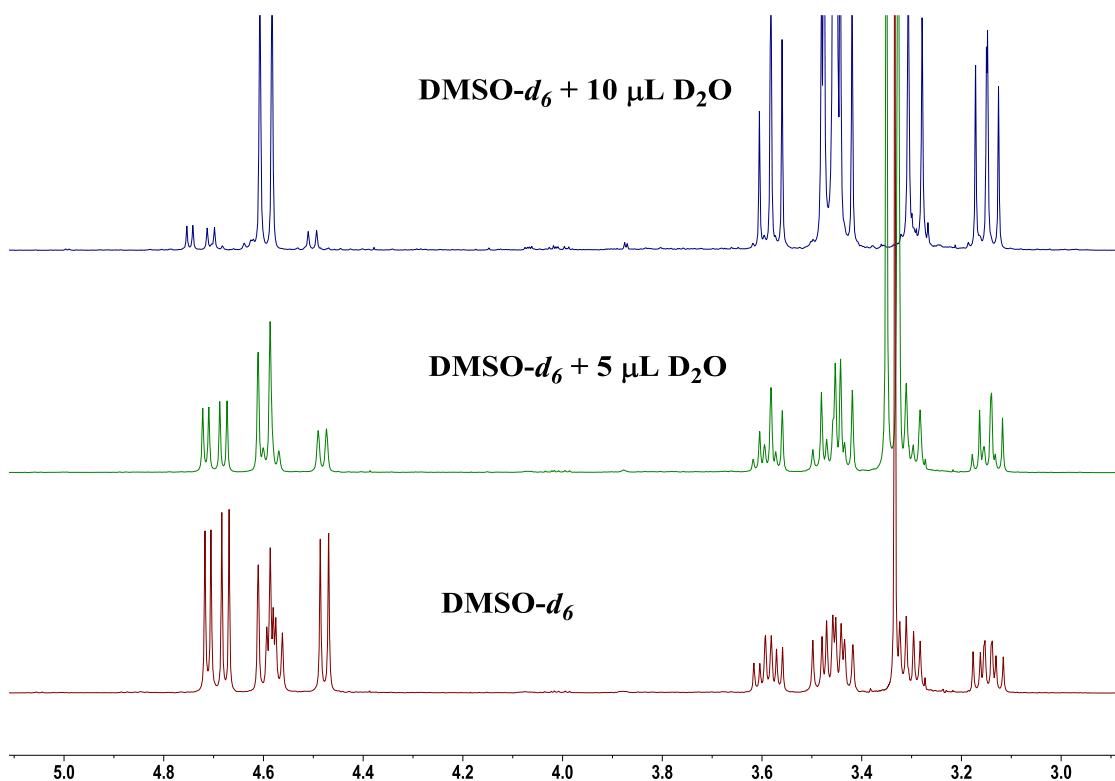


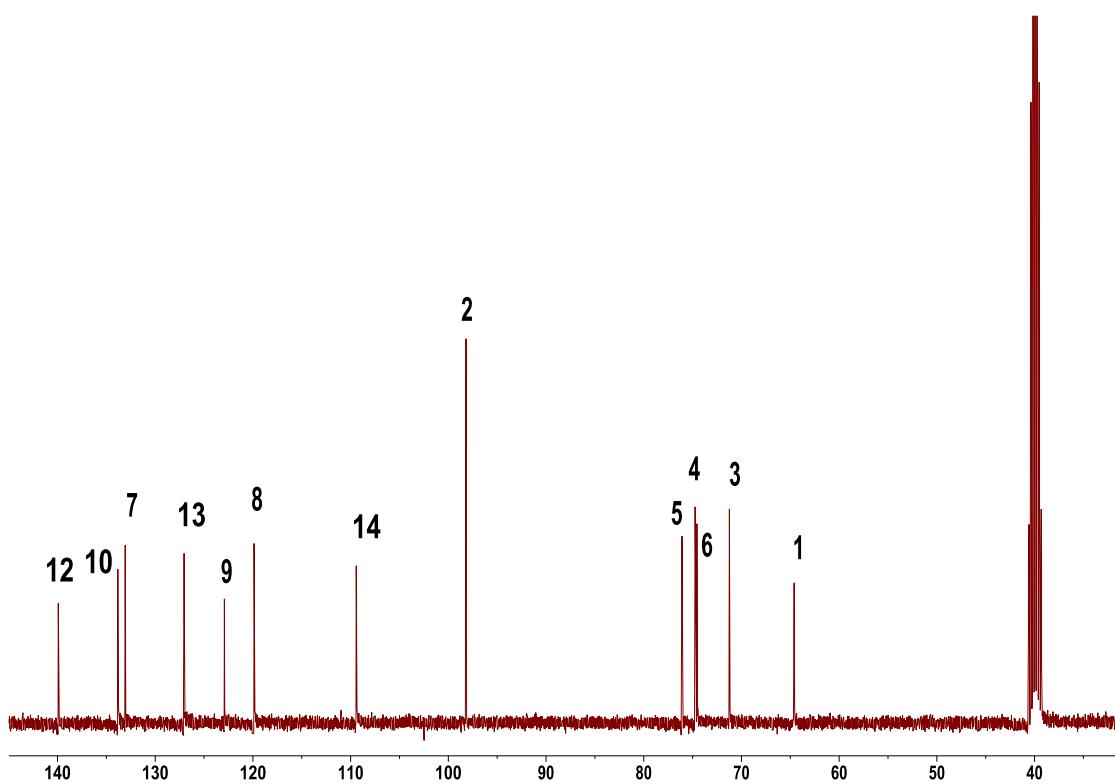
Figura 12S(3.2) Espectros de RMN (DMSO- d_6) de **12ad**: a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOE-1D.

a)

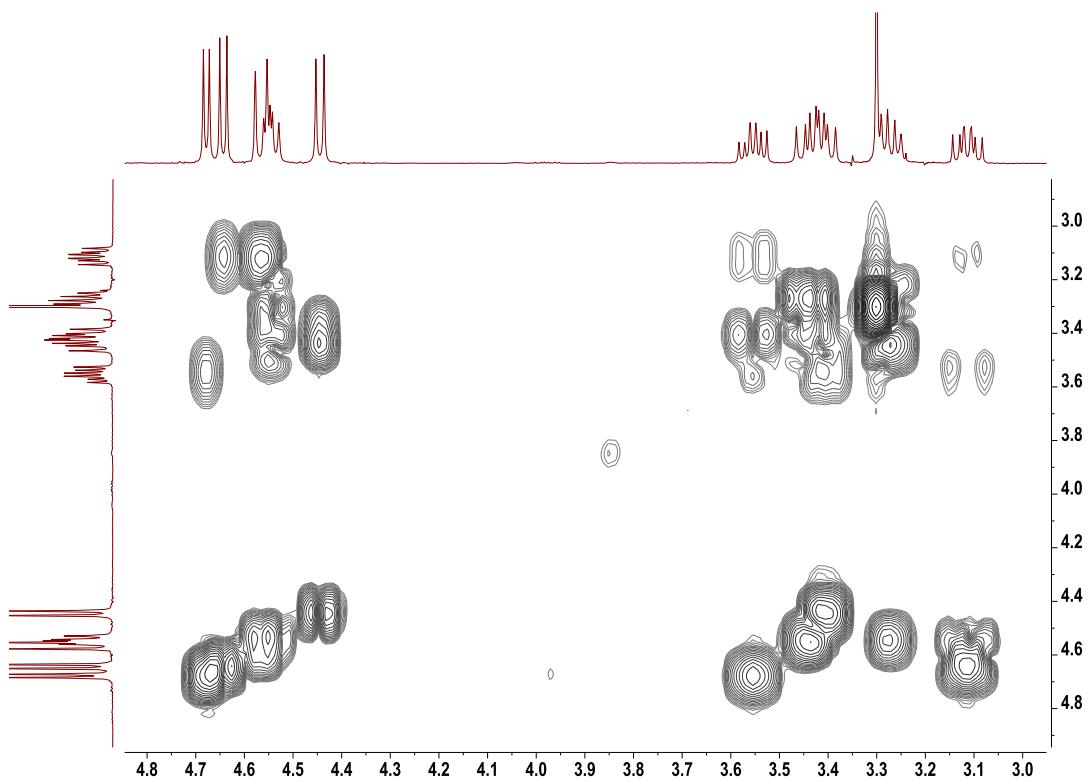




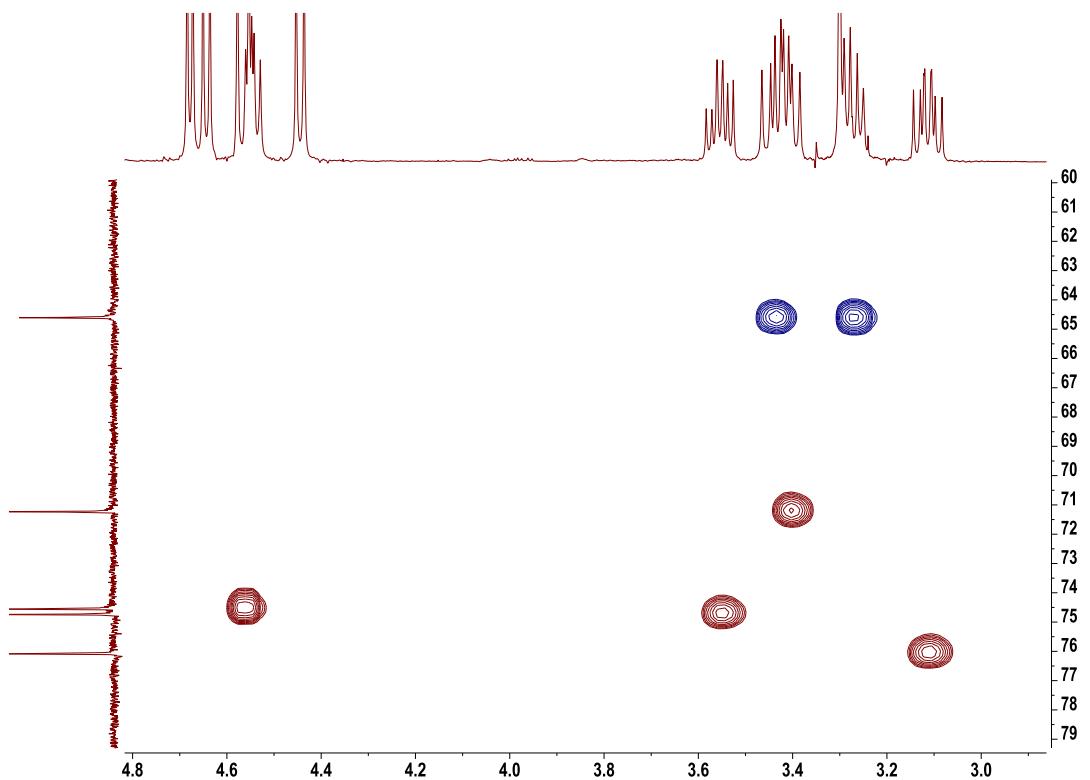
b)



c)



d)



e)

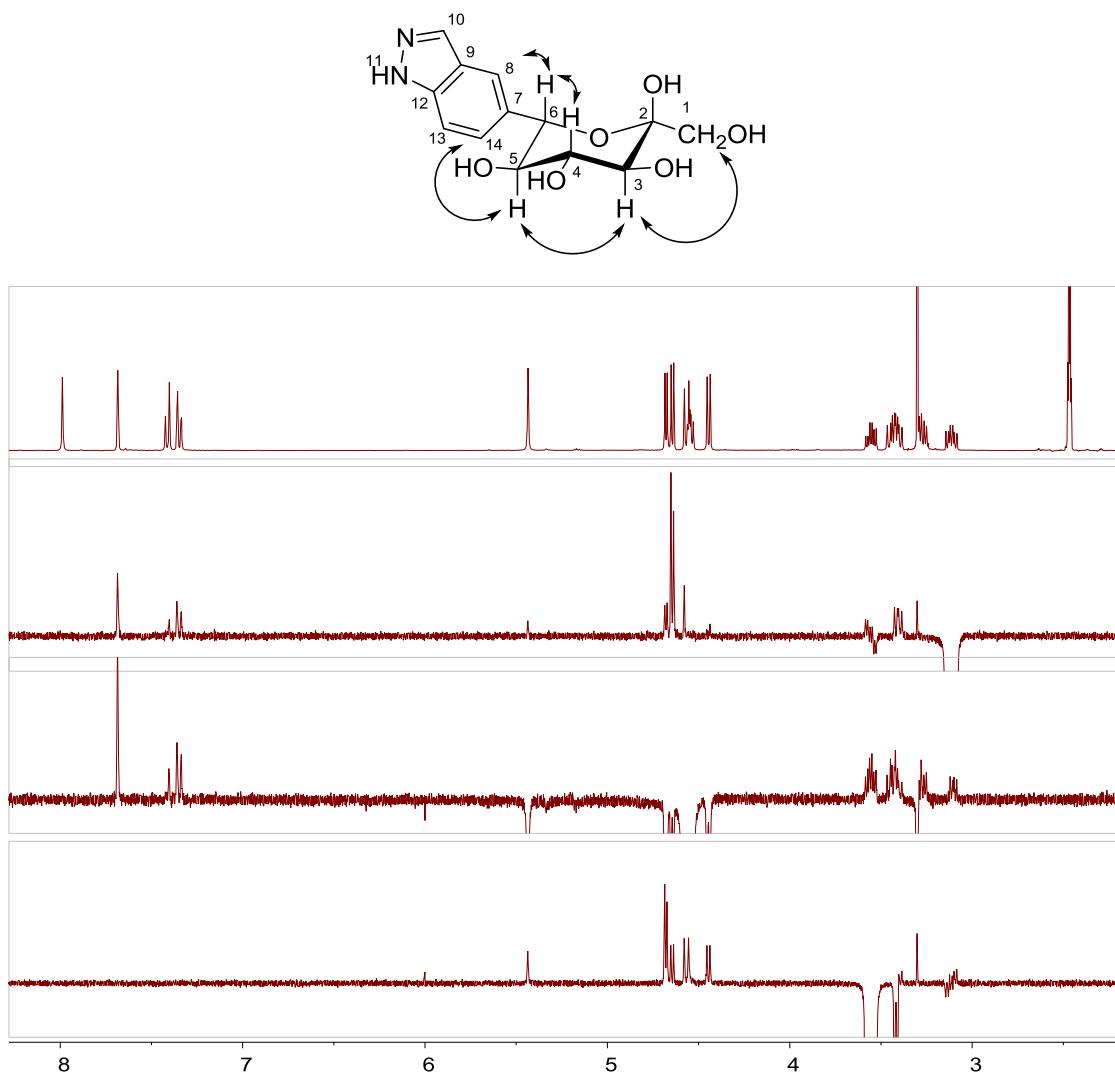
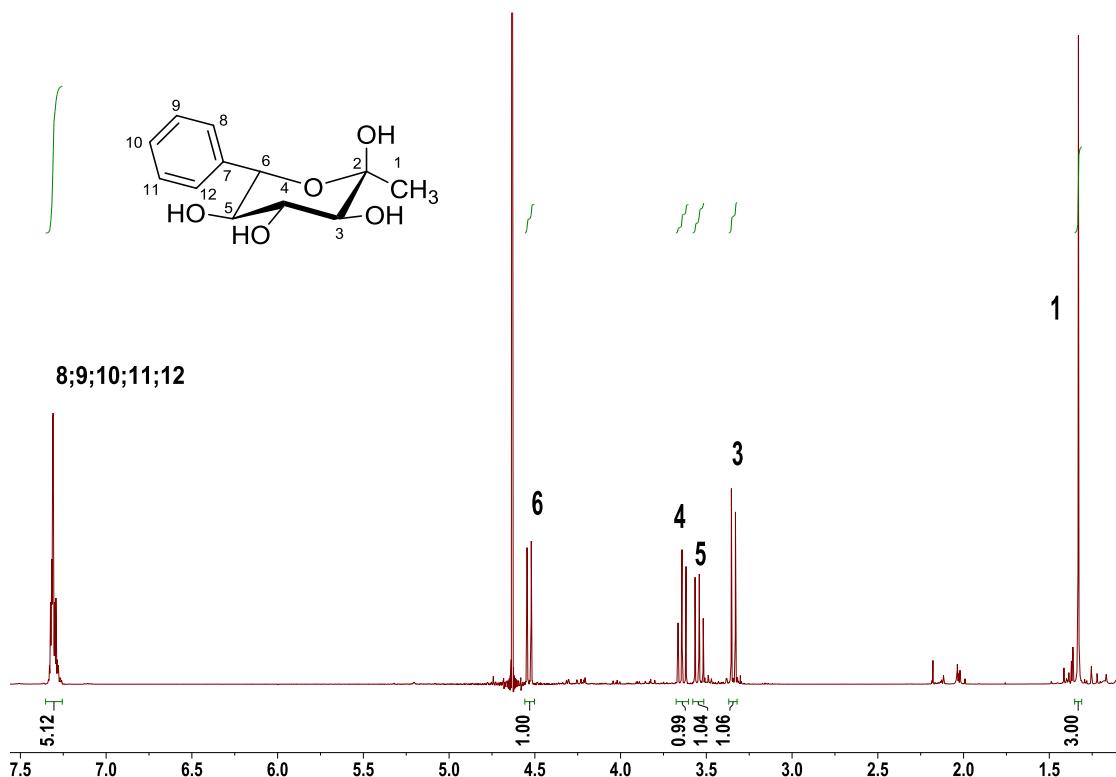
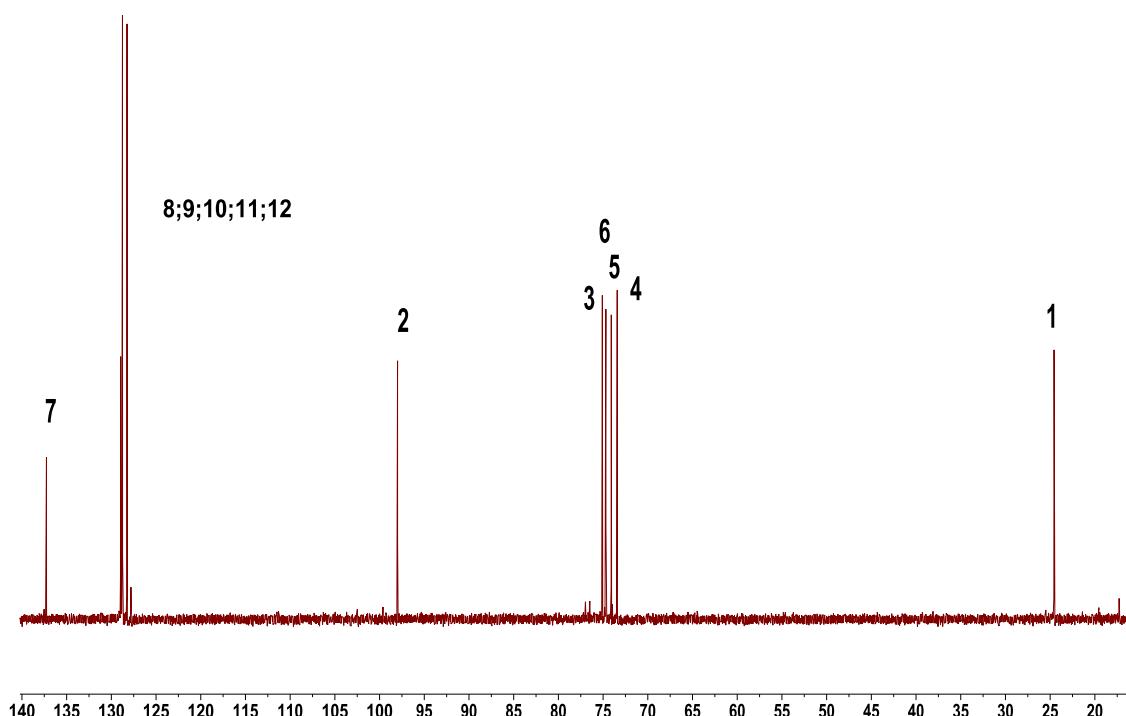


Figura 13S(3.2) Espectros de RMN (D_2O) de **13a**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

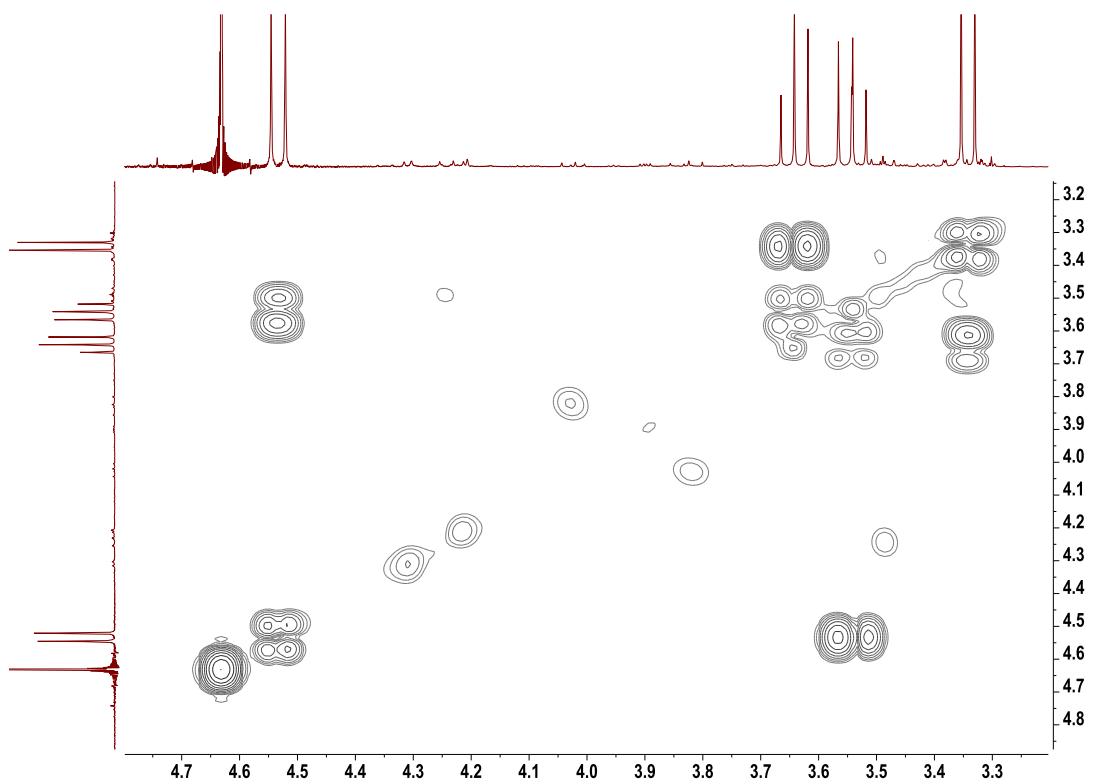
a)



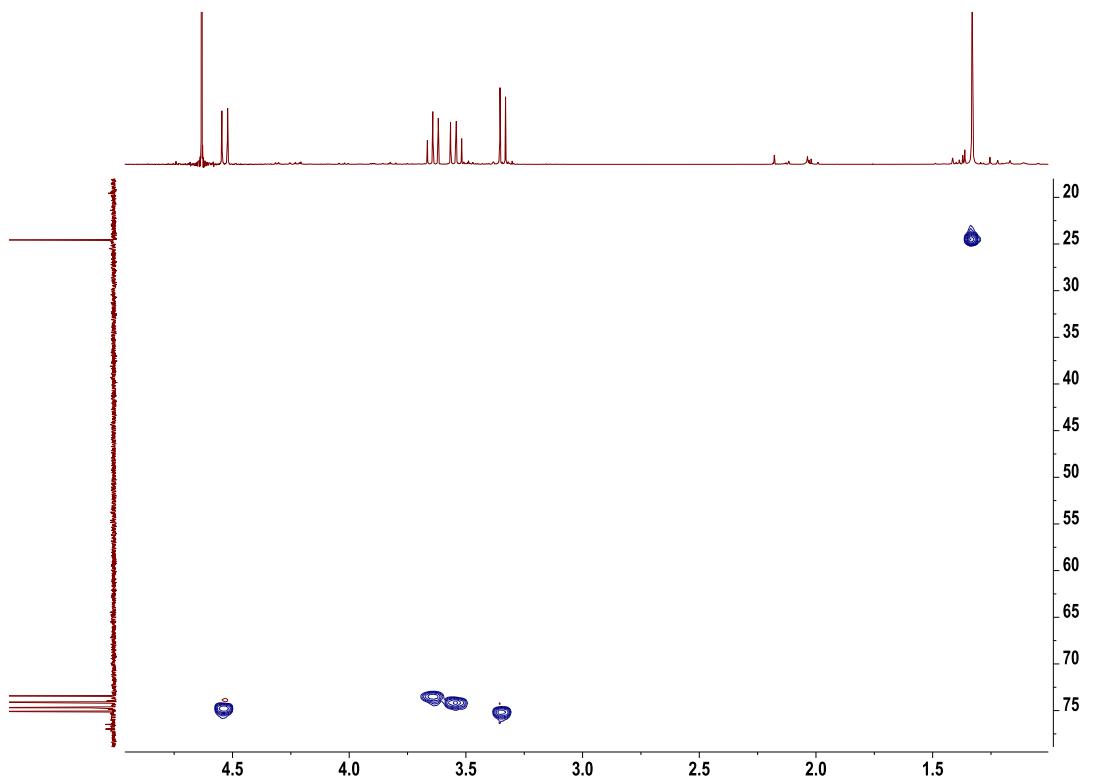
b)



c)



d)



e)

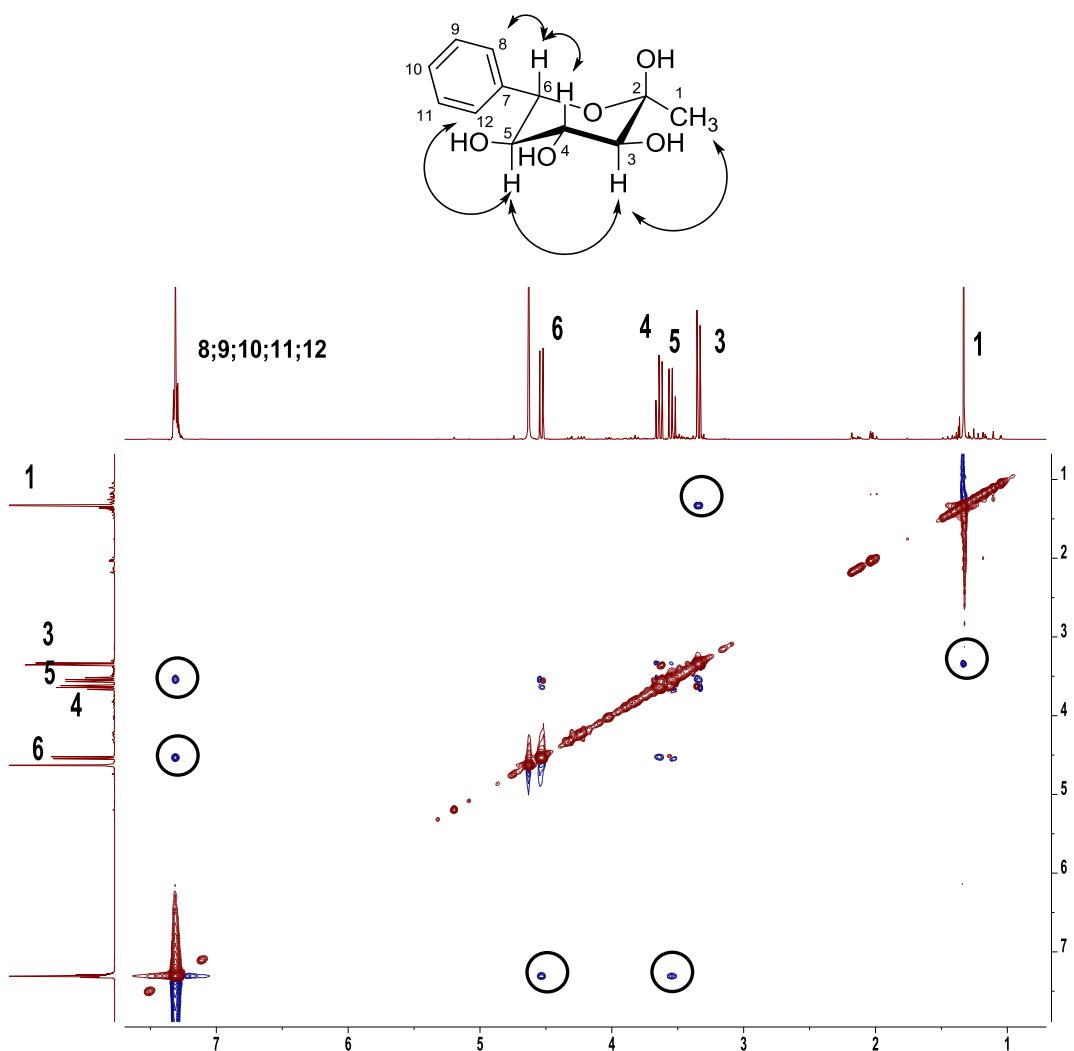
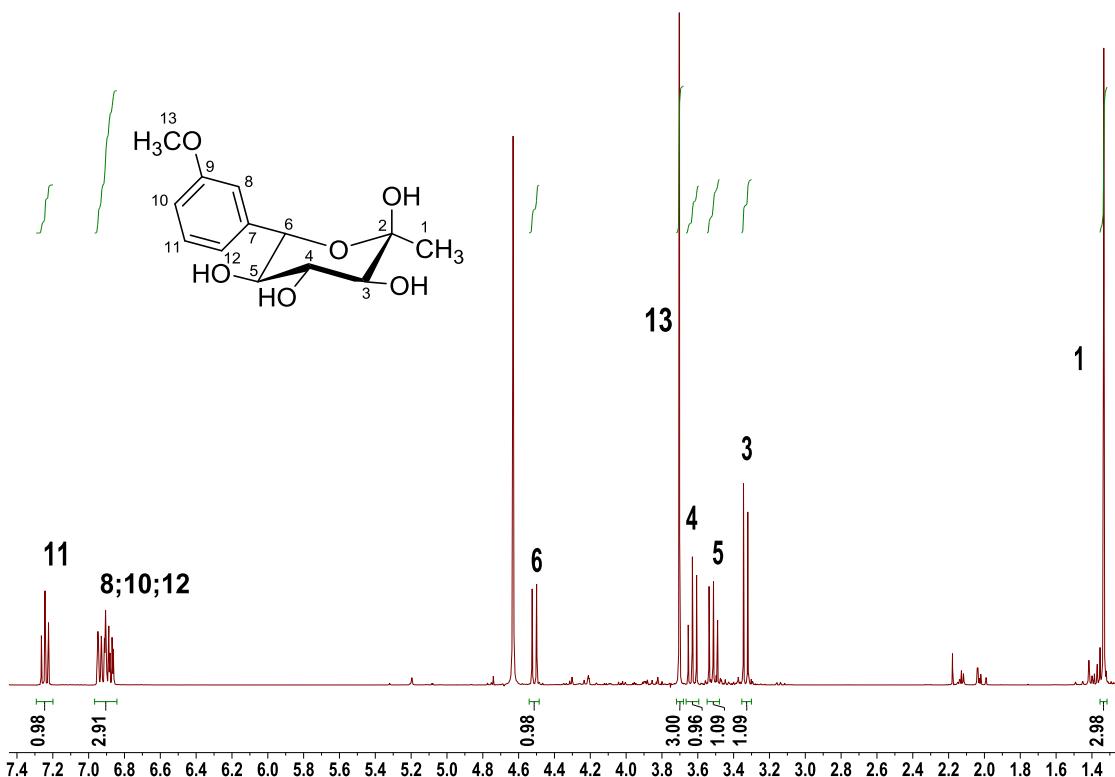
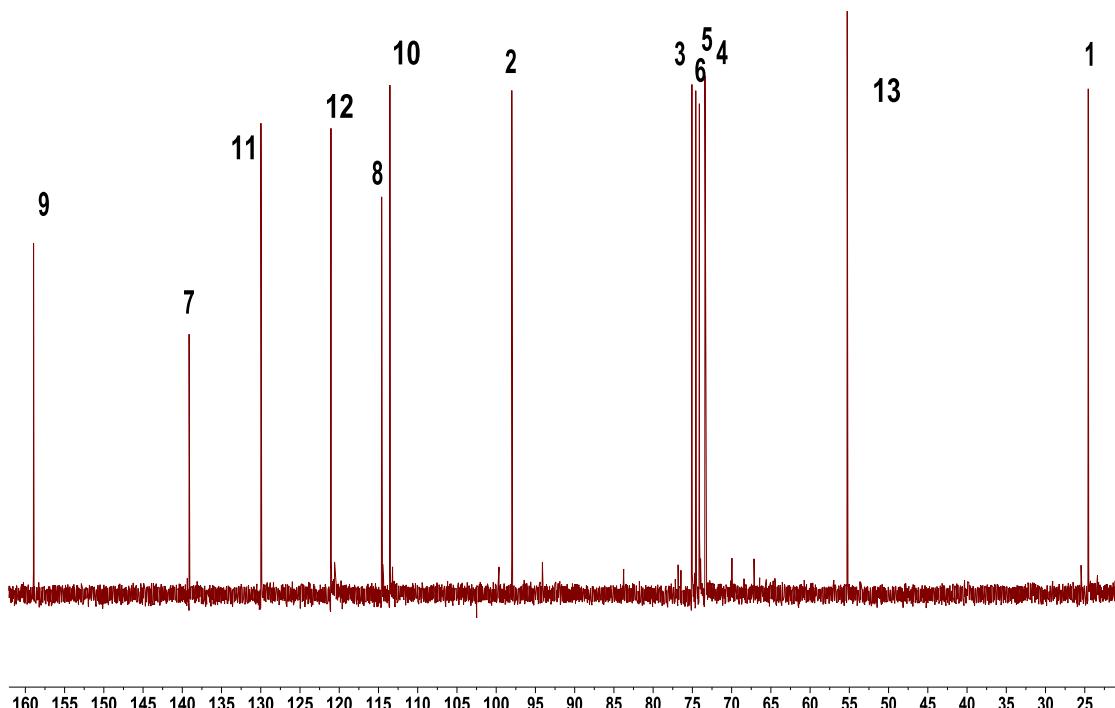


Figura 14S(3.2) Espectros de RMN (D_2O) de **13h**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

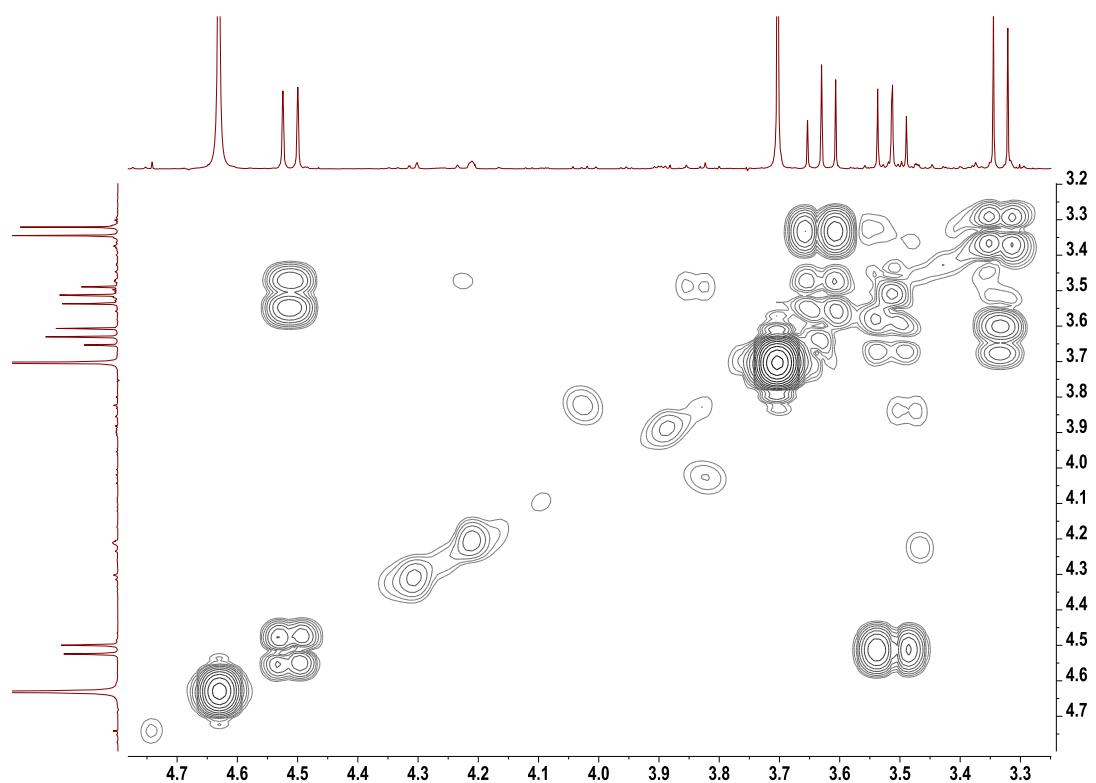
a)



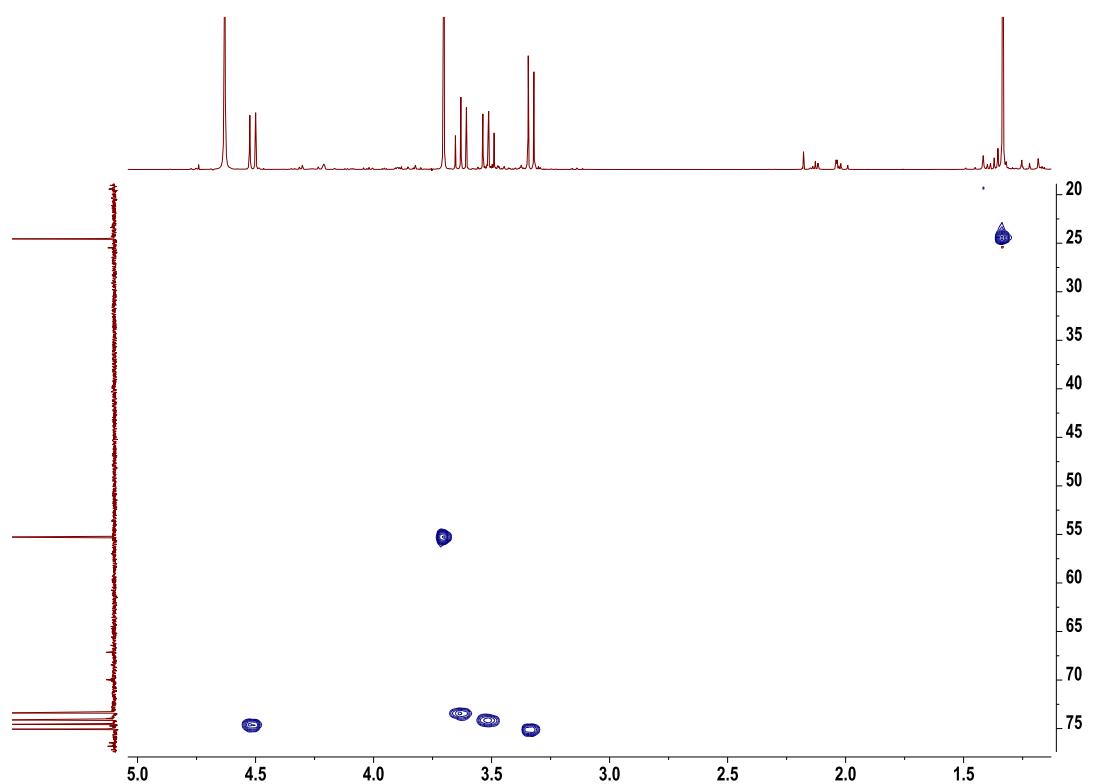
b)



c)



d)



e)

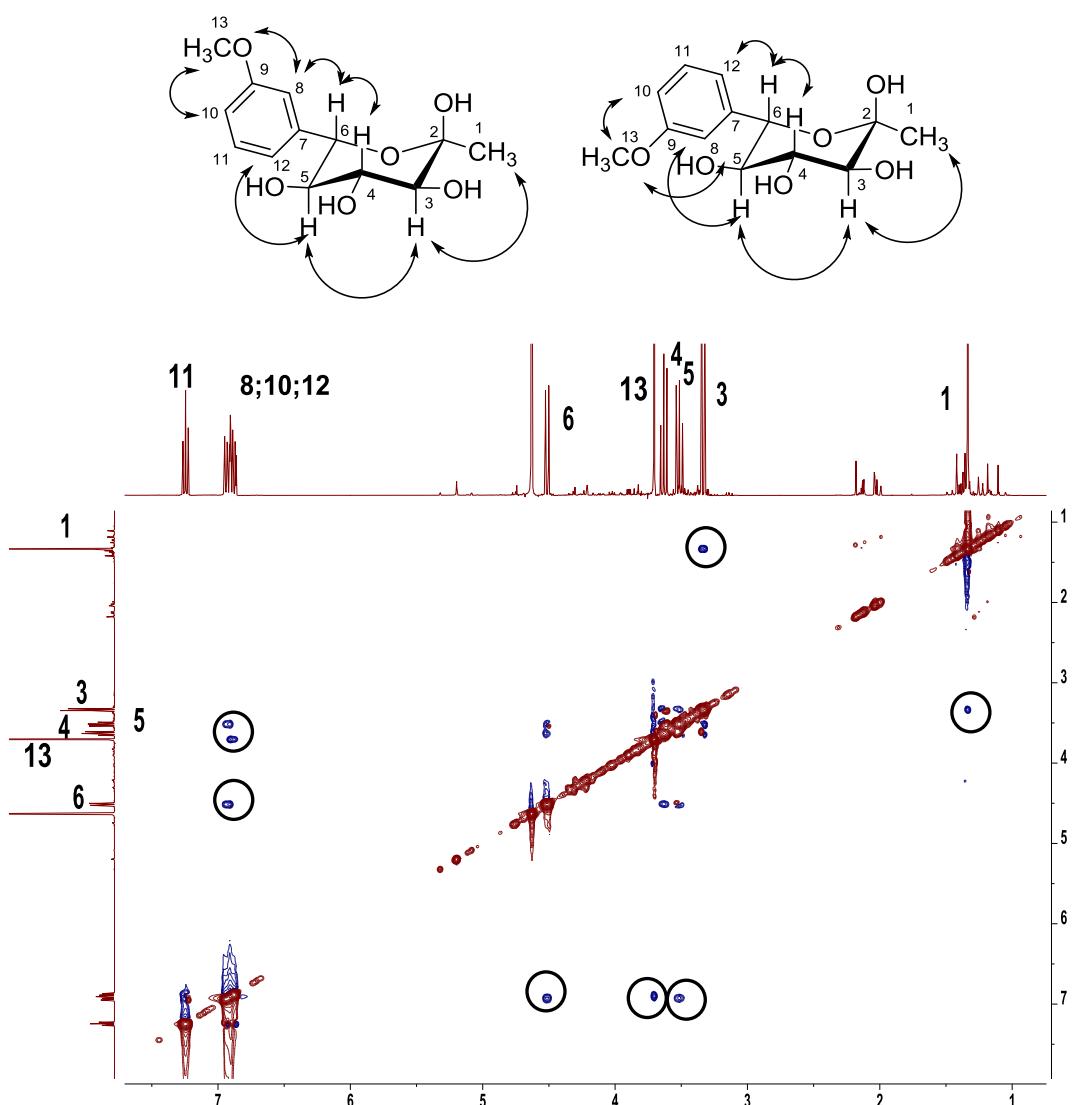
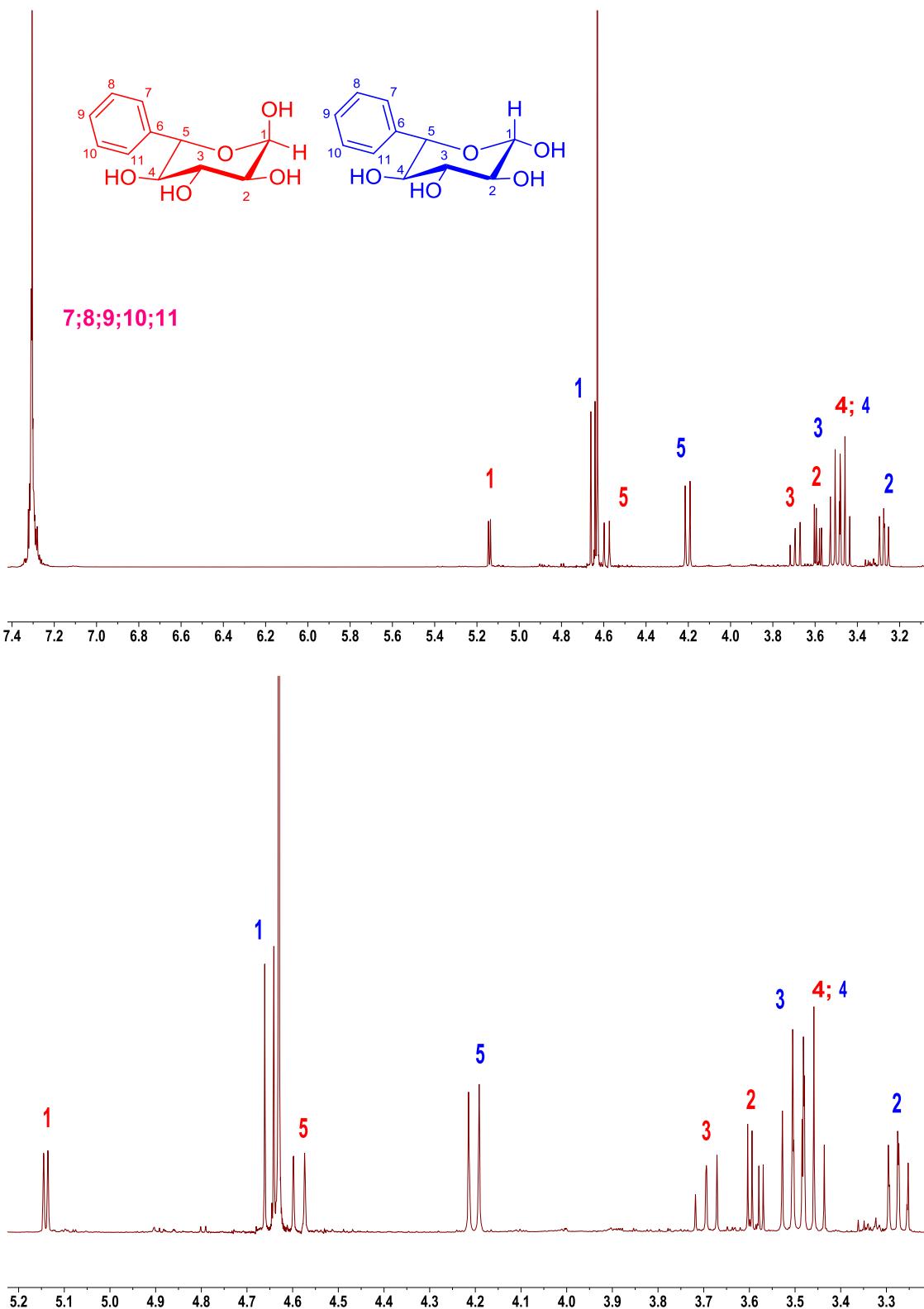
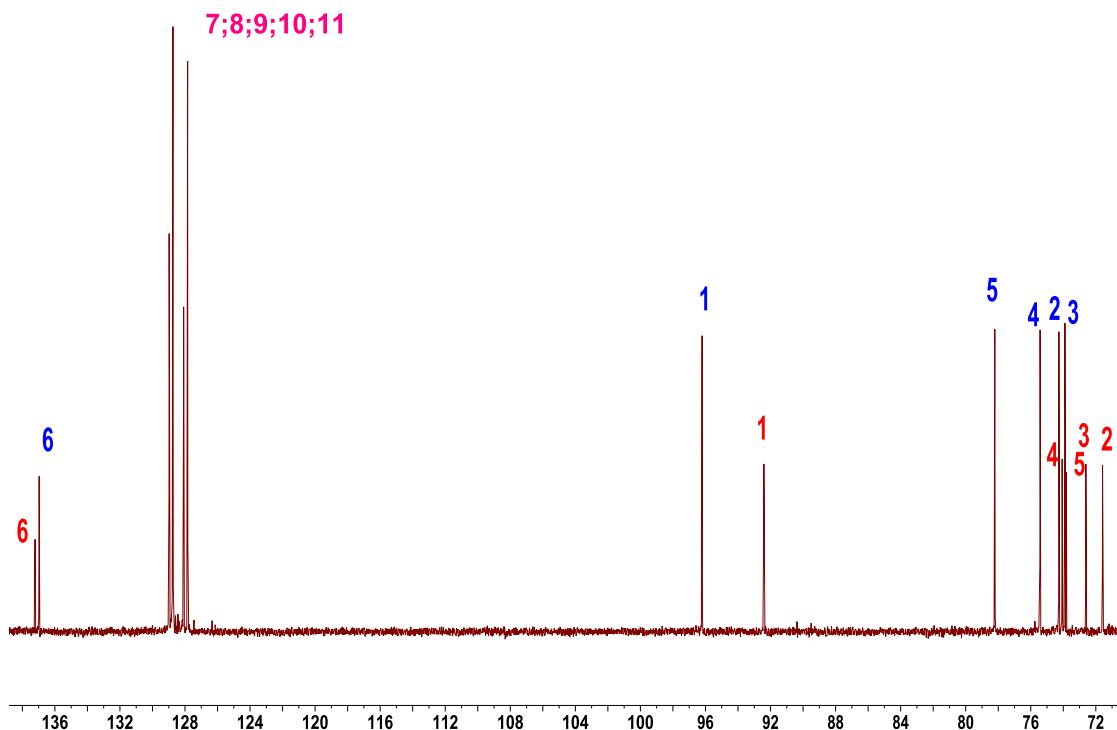


Figura15S(3.2) Espectros de RMN (D_2O) de **14a**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

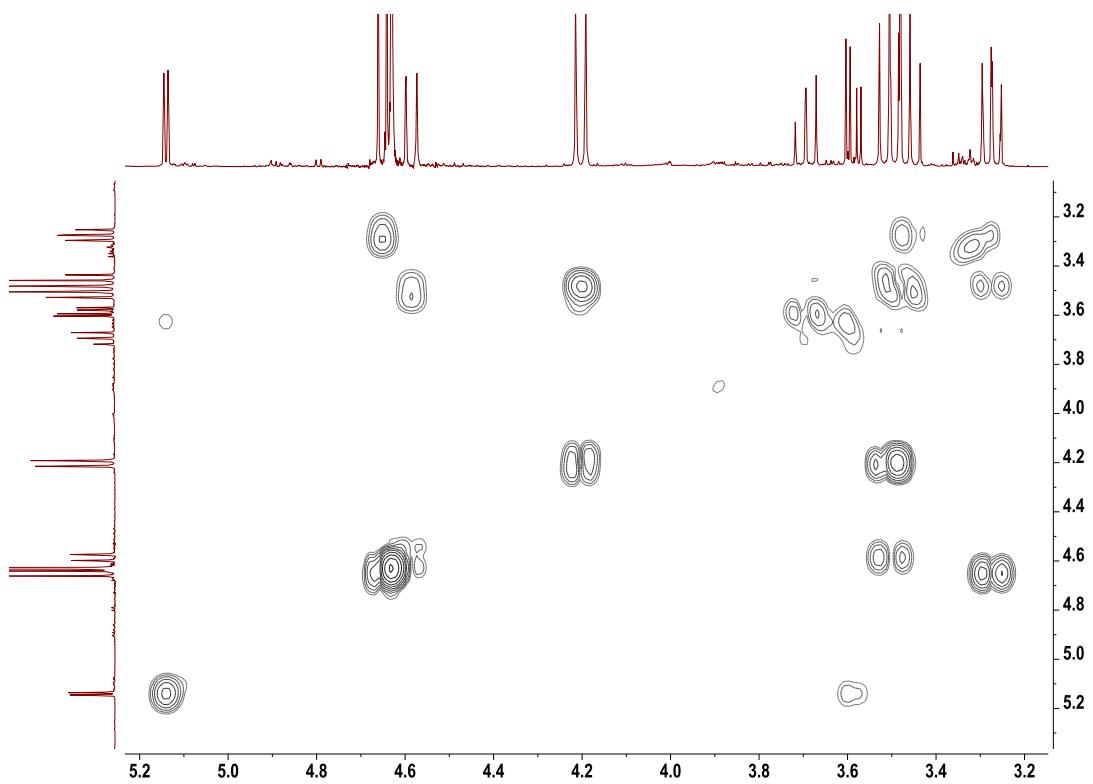
a)



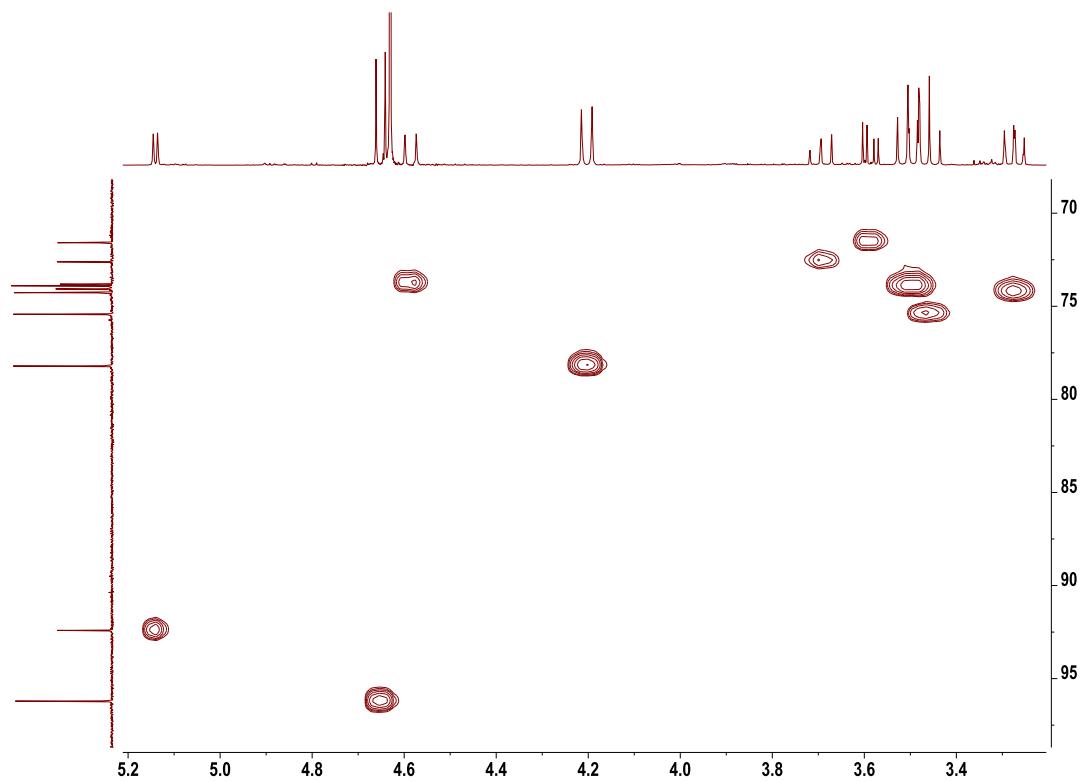
b)



c)



d)



e)

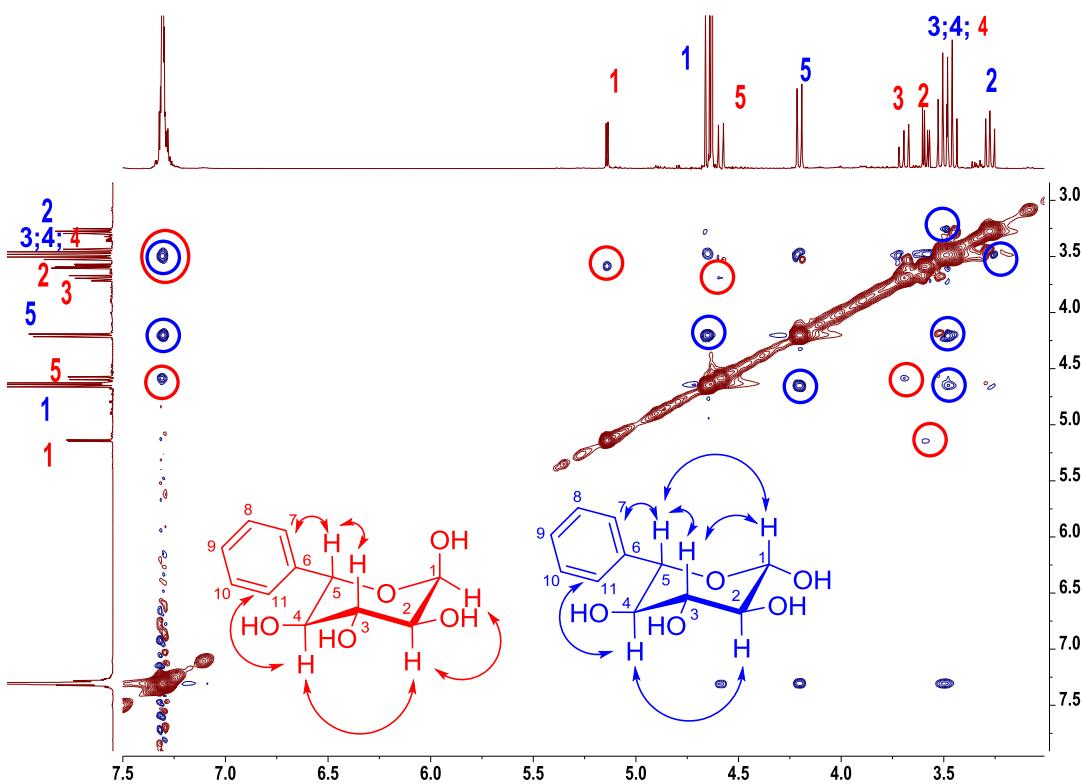
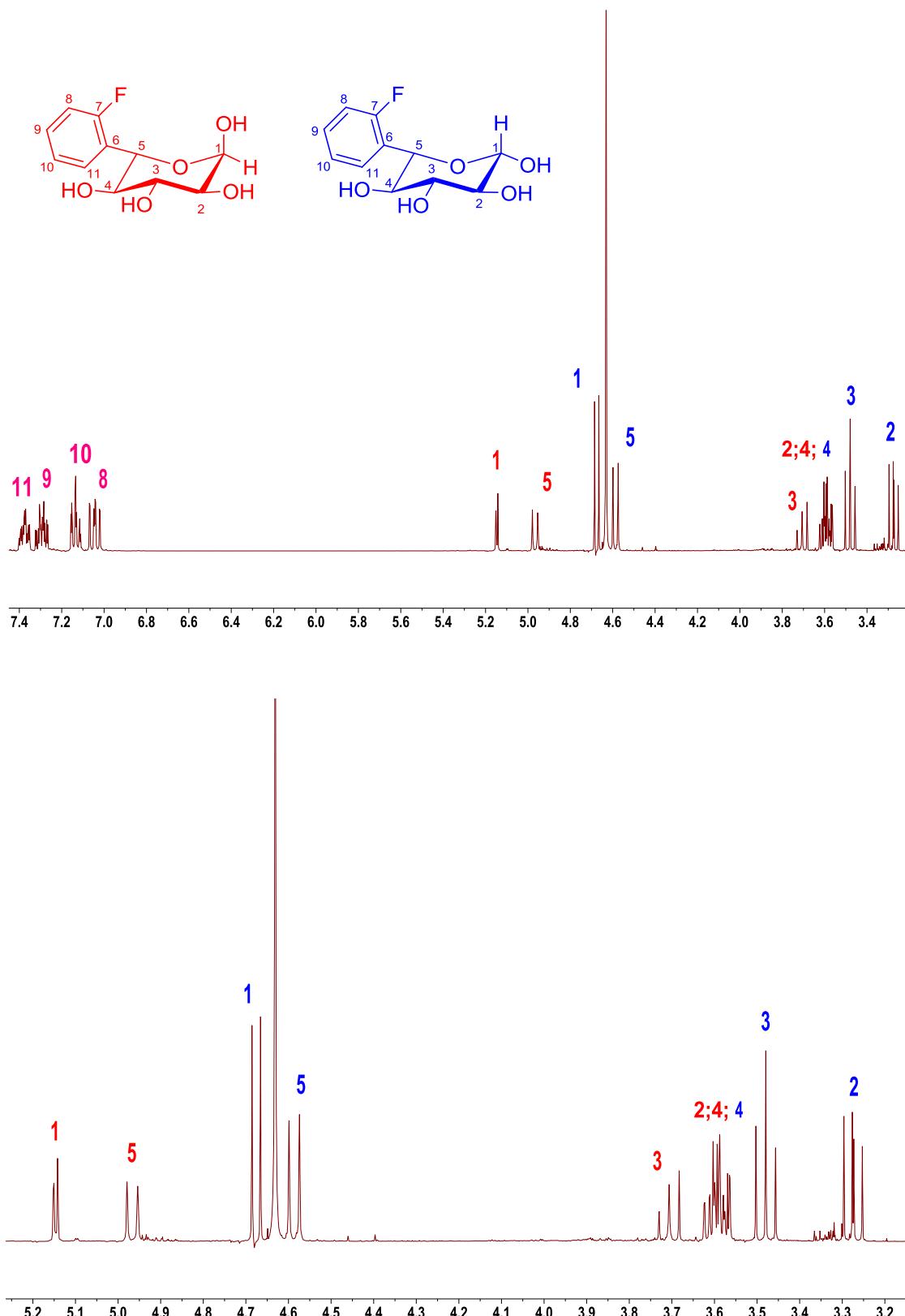
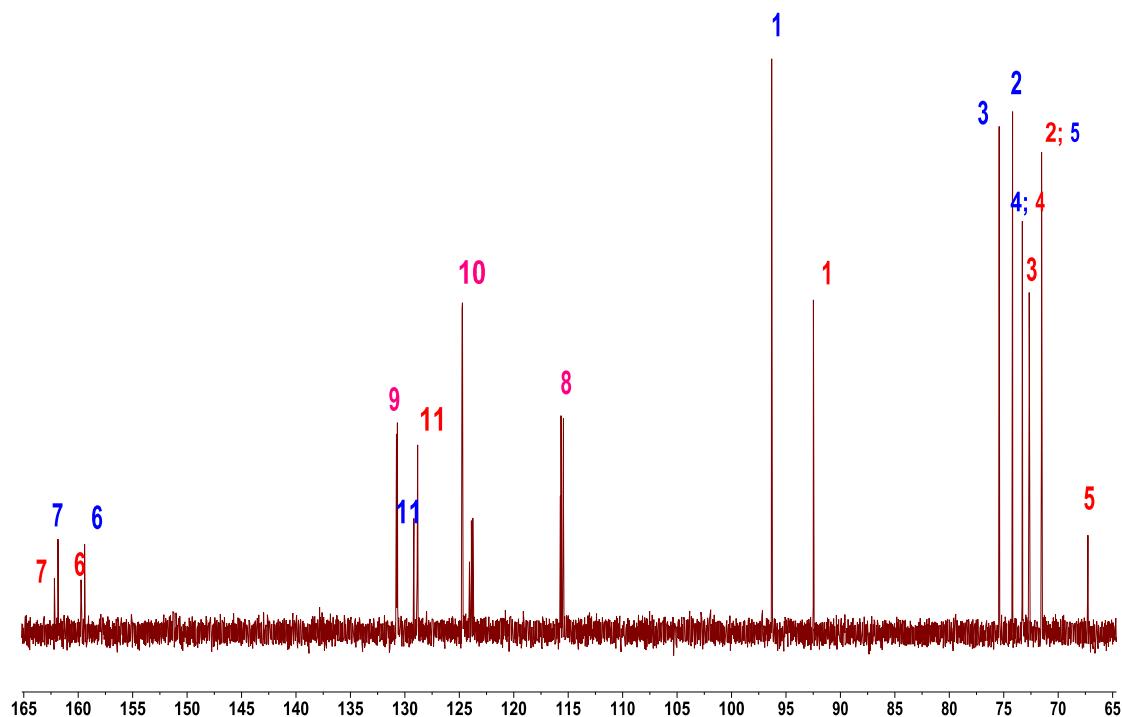


Figura 16S(3.2) Espectros de RMN (D_2O) de **14b**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

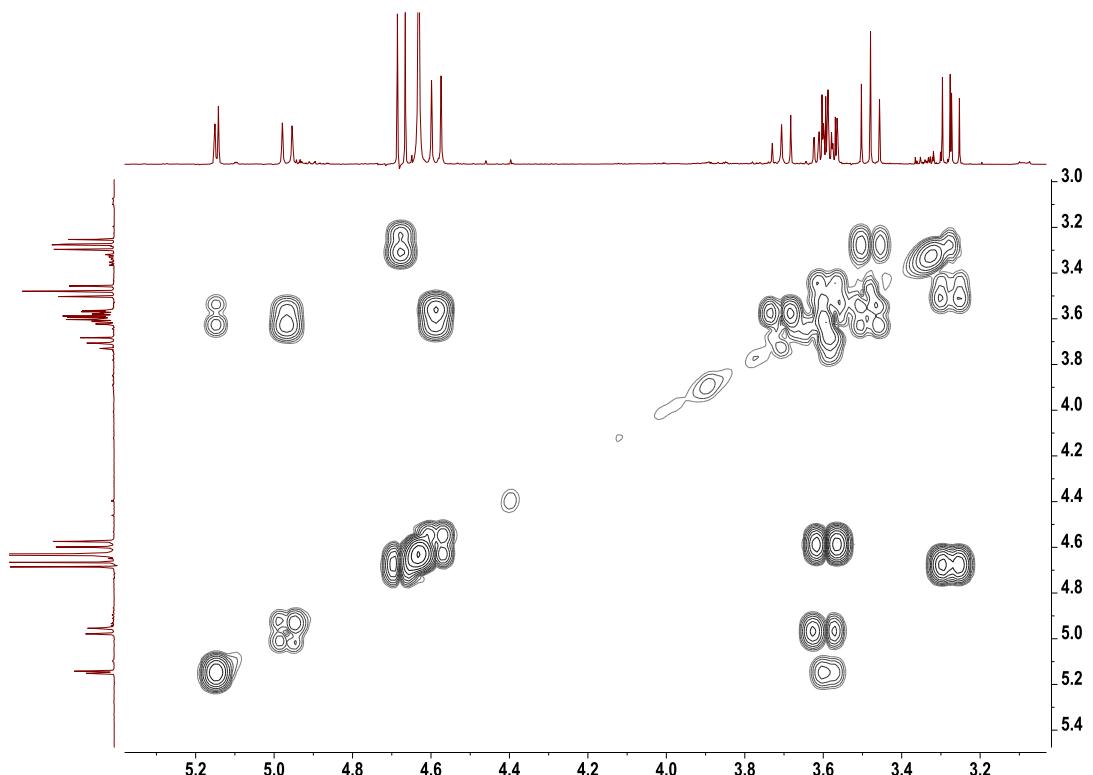
a)



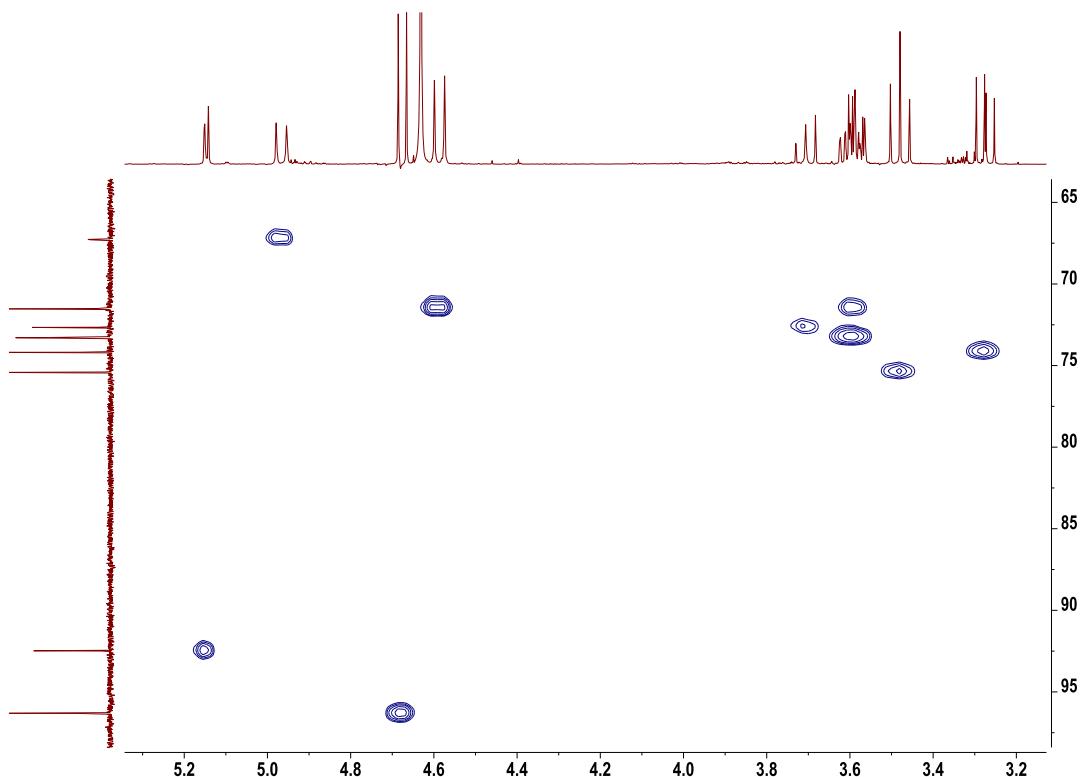
b)



c)



d)



e)

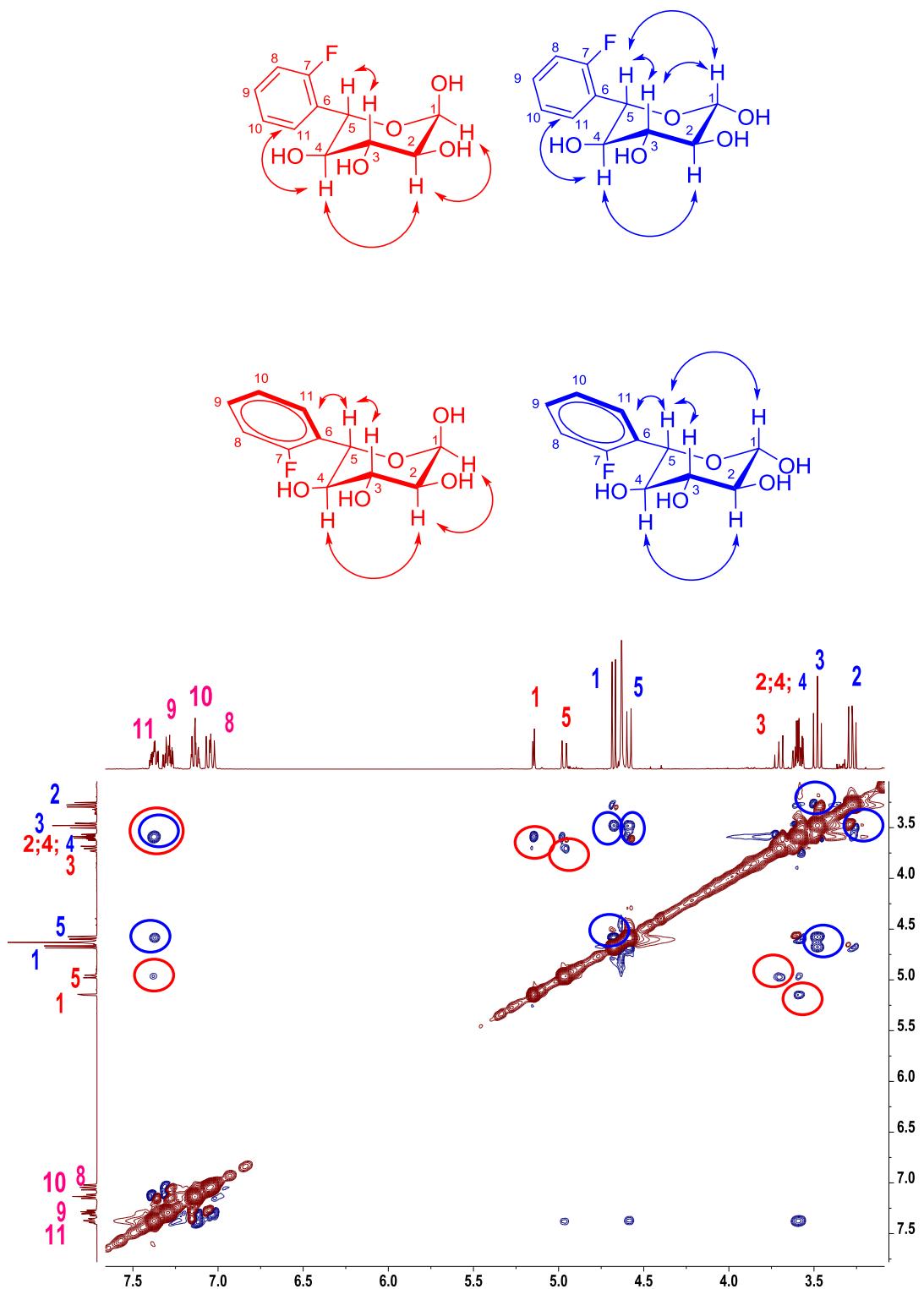
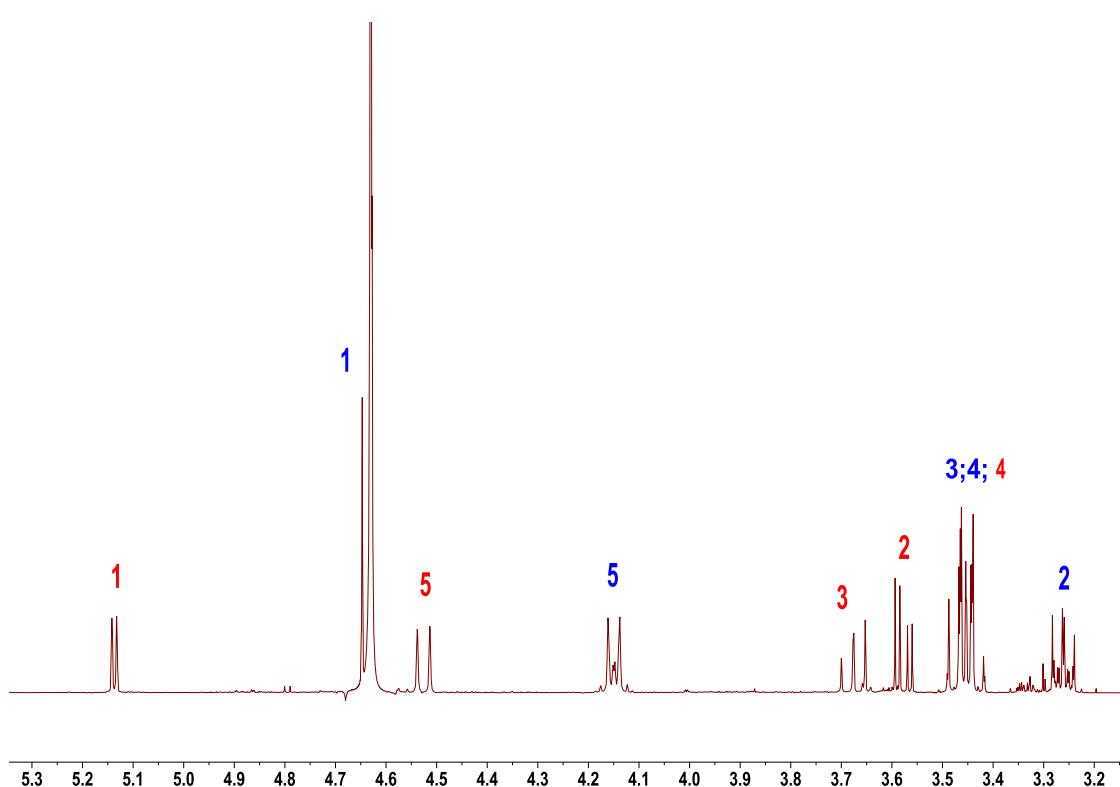
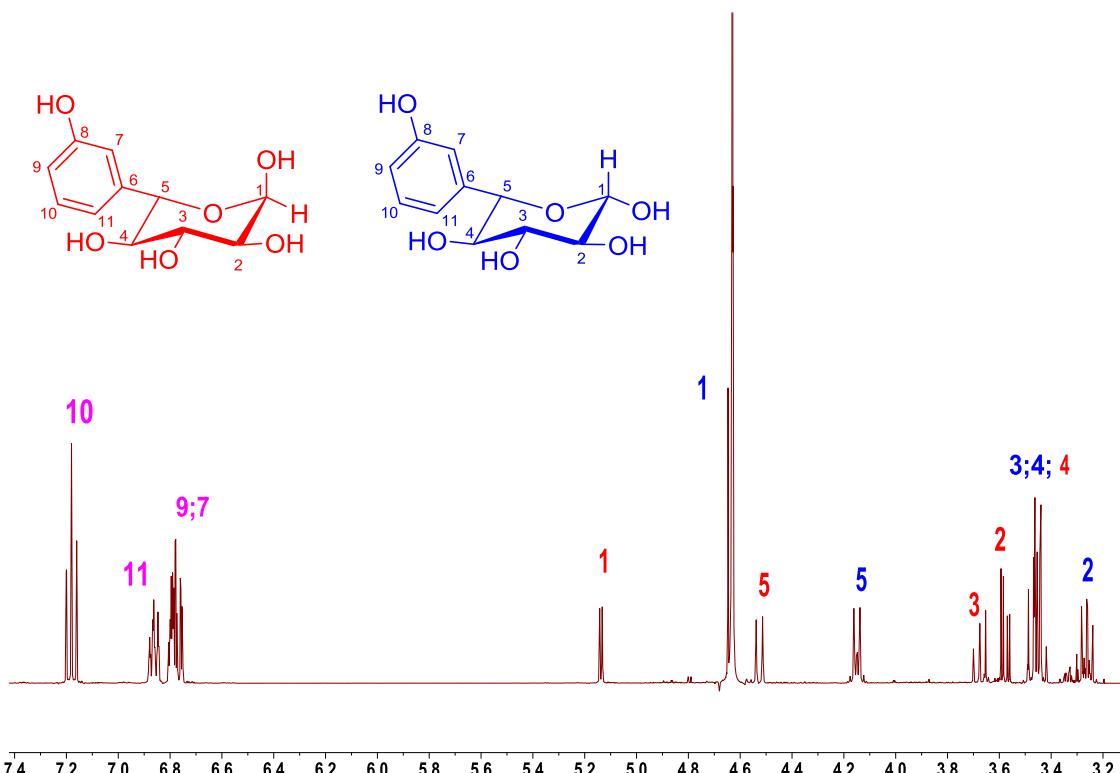
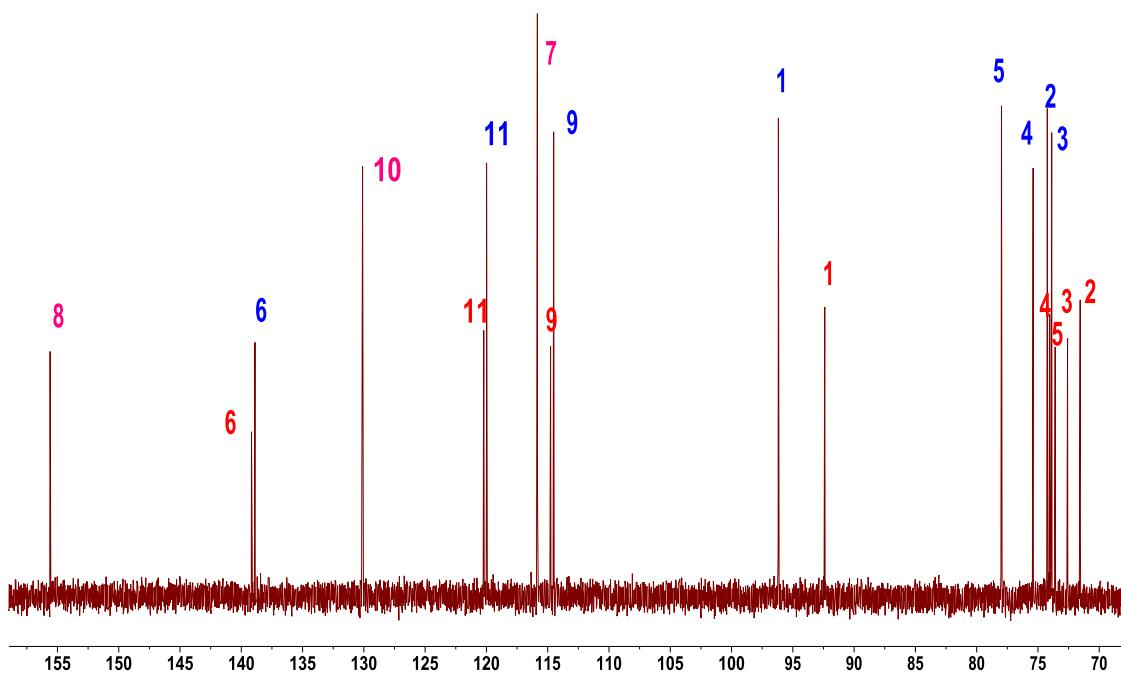


Figura 17S(3.2) Espectros de RMN (D_2O) de **14g**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

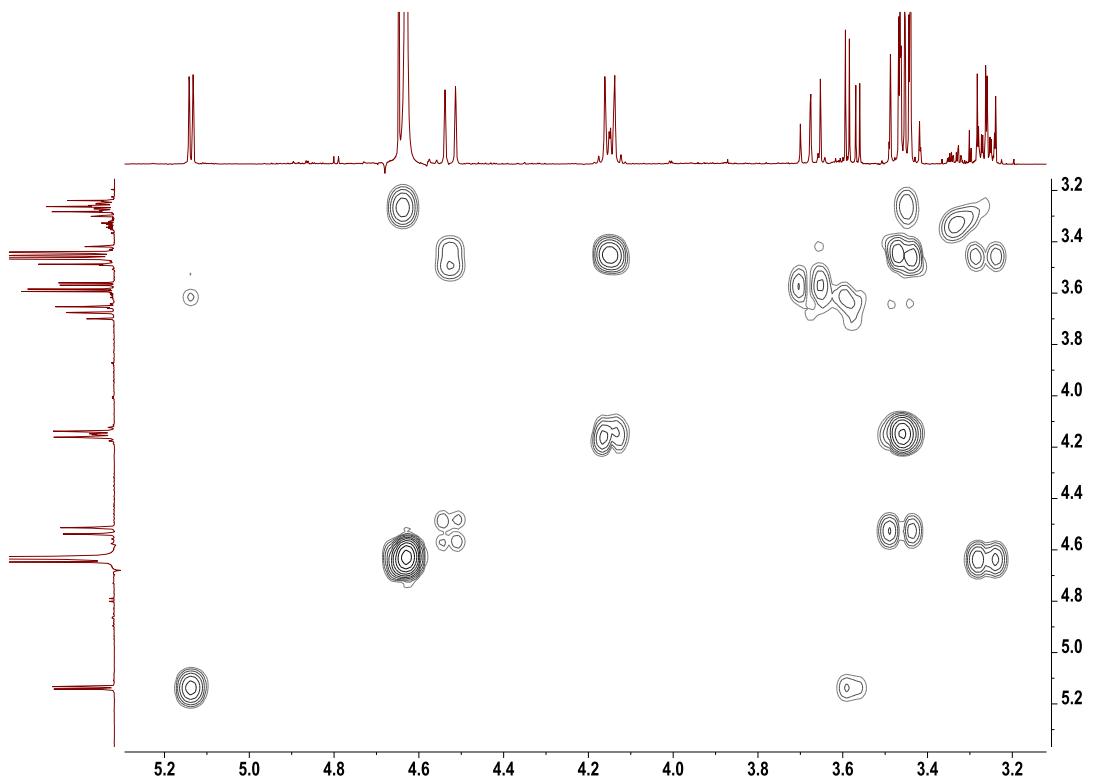
a)



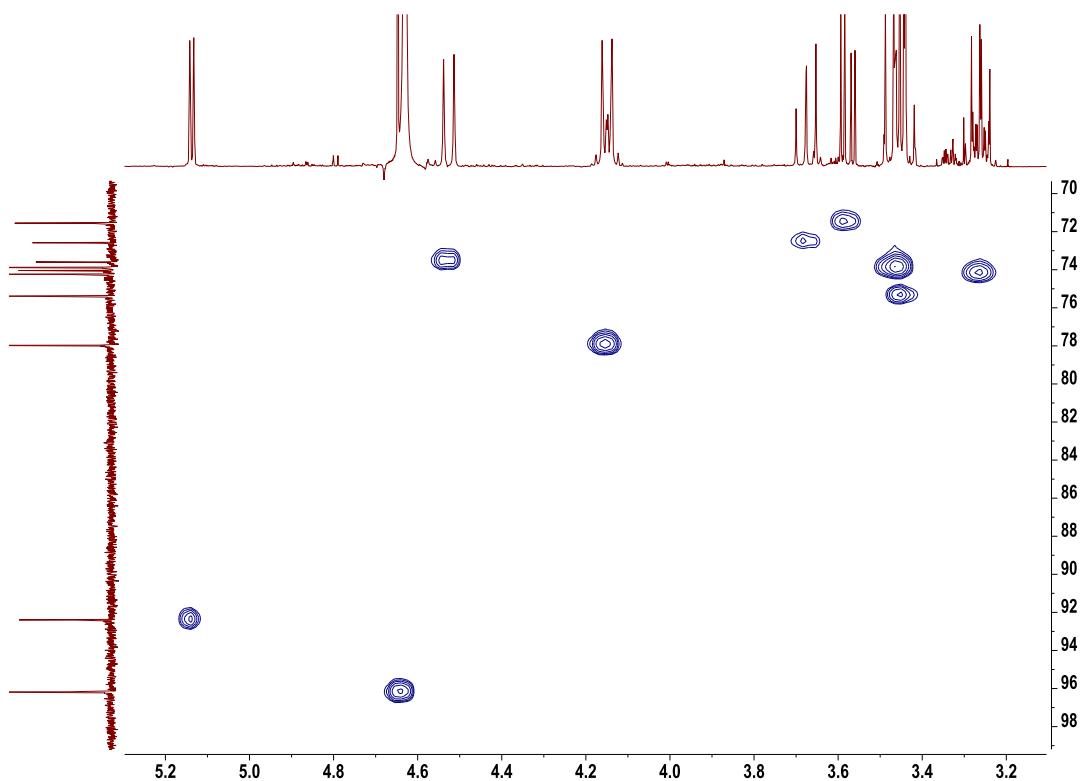
b)



c)



d)



e)

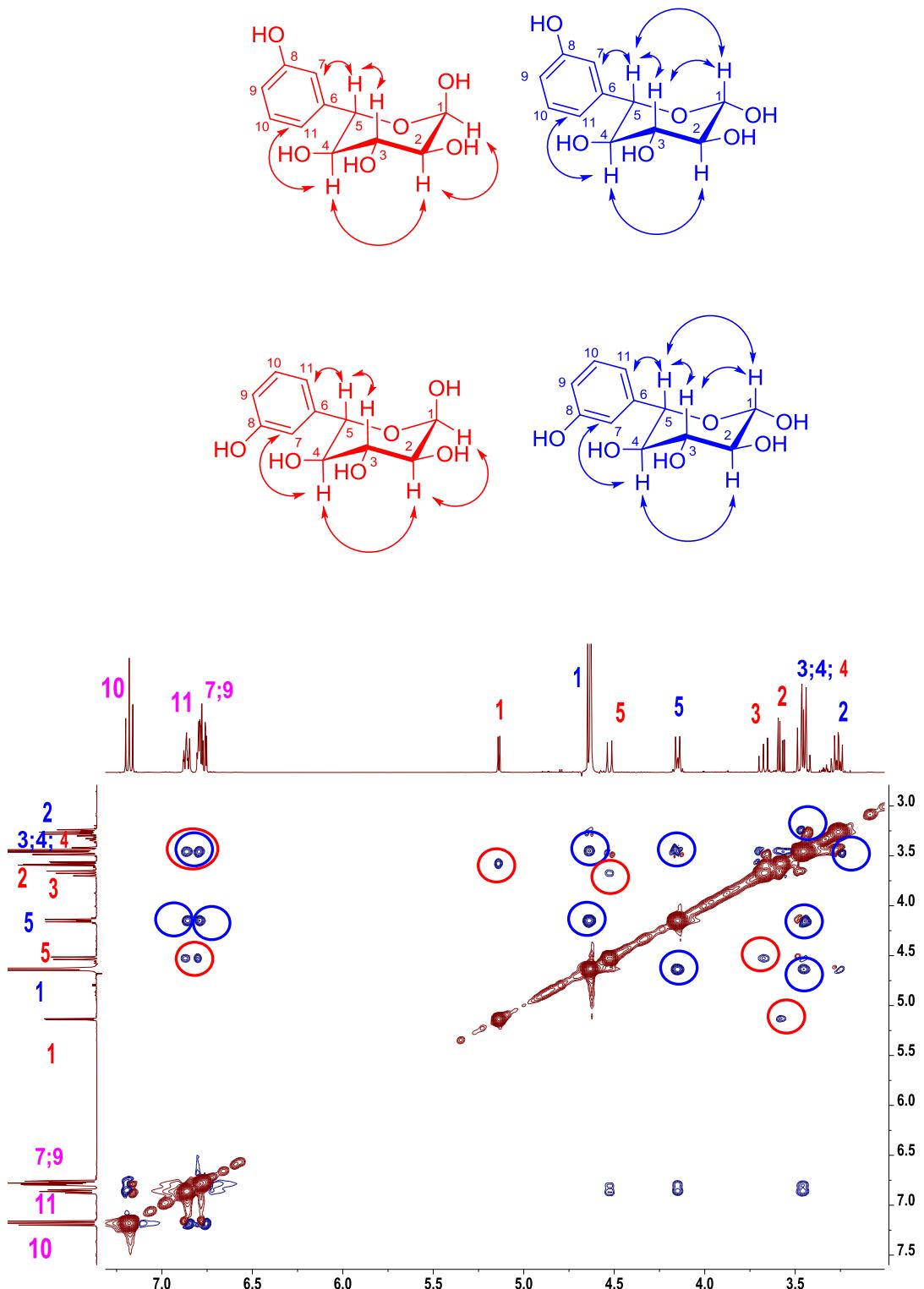
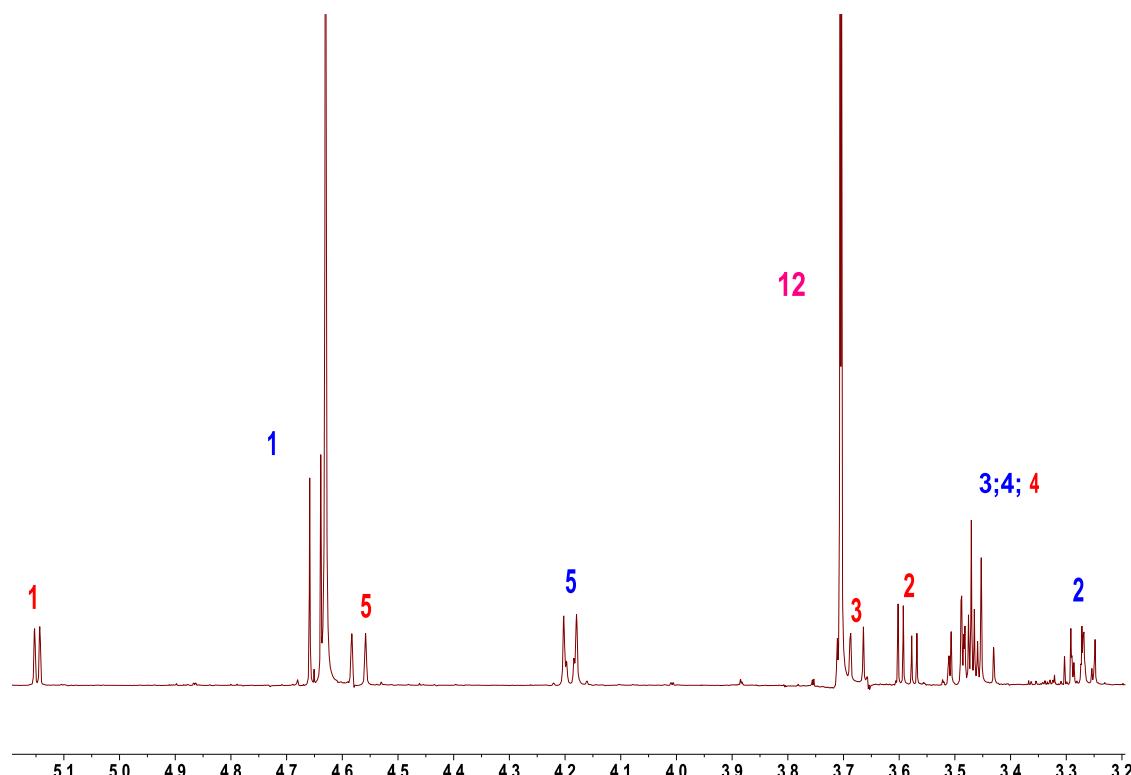
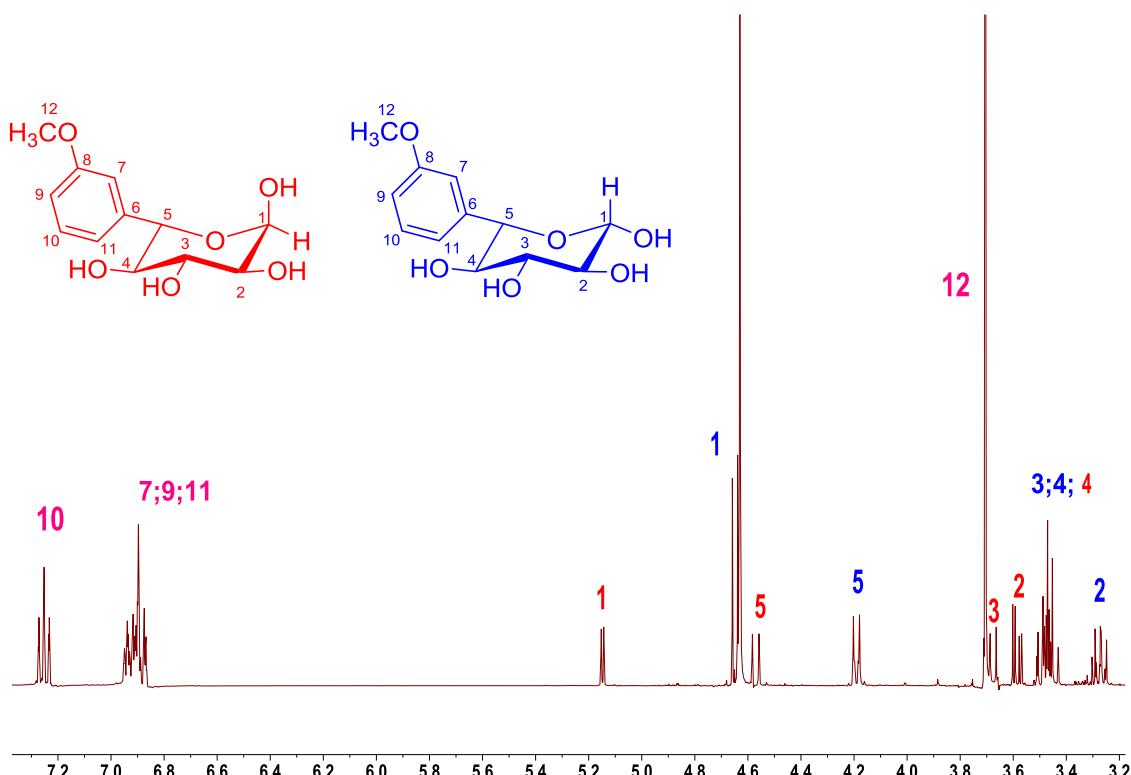
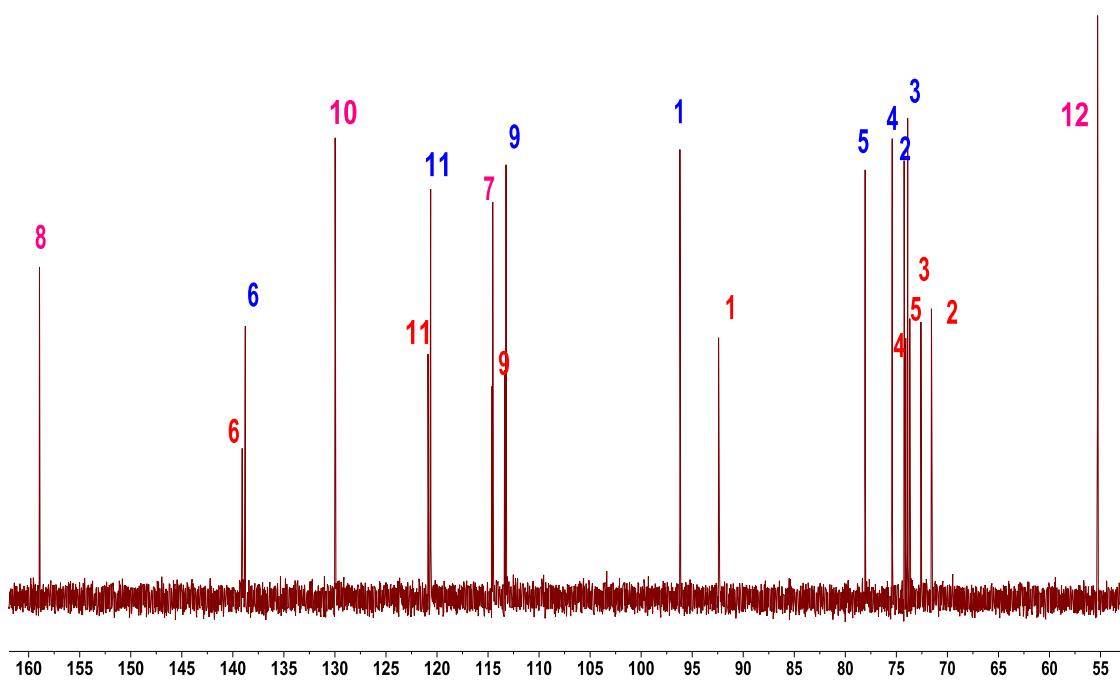


Figura 18S(3.2) Espectros de RMN (D_2O) de **14h**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

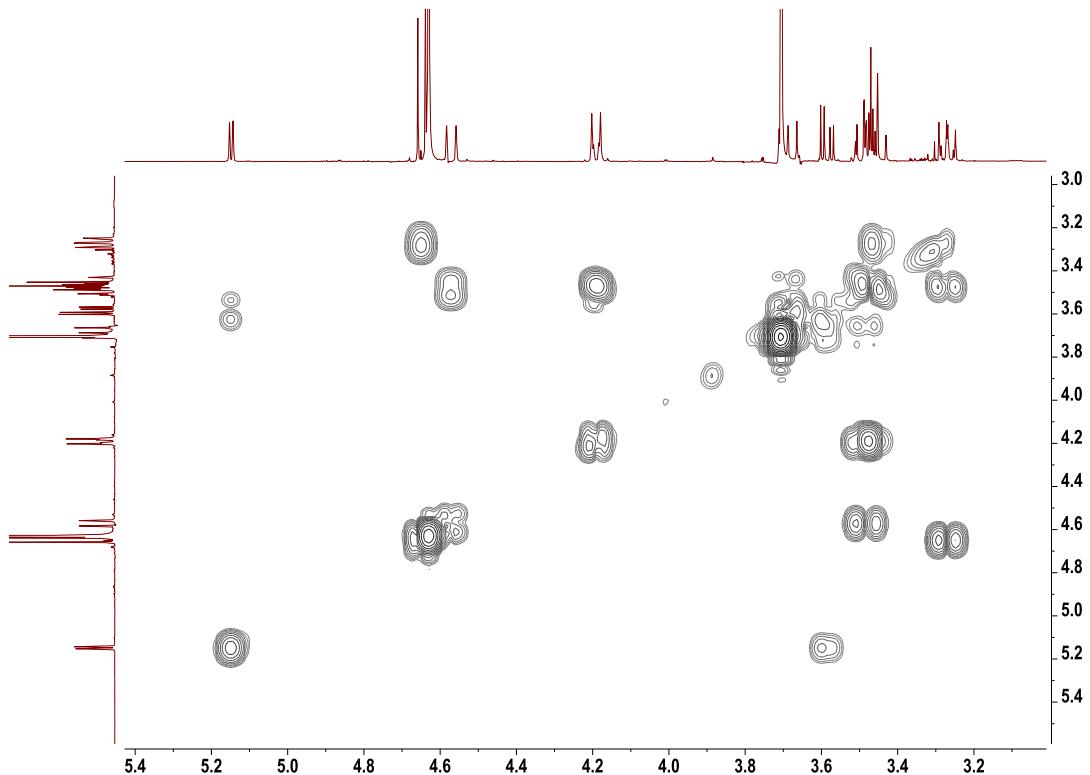
a)



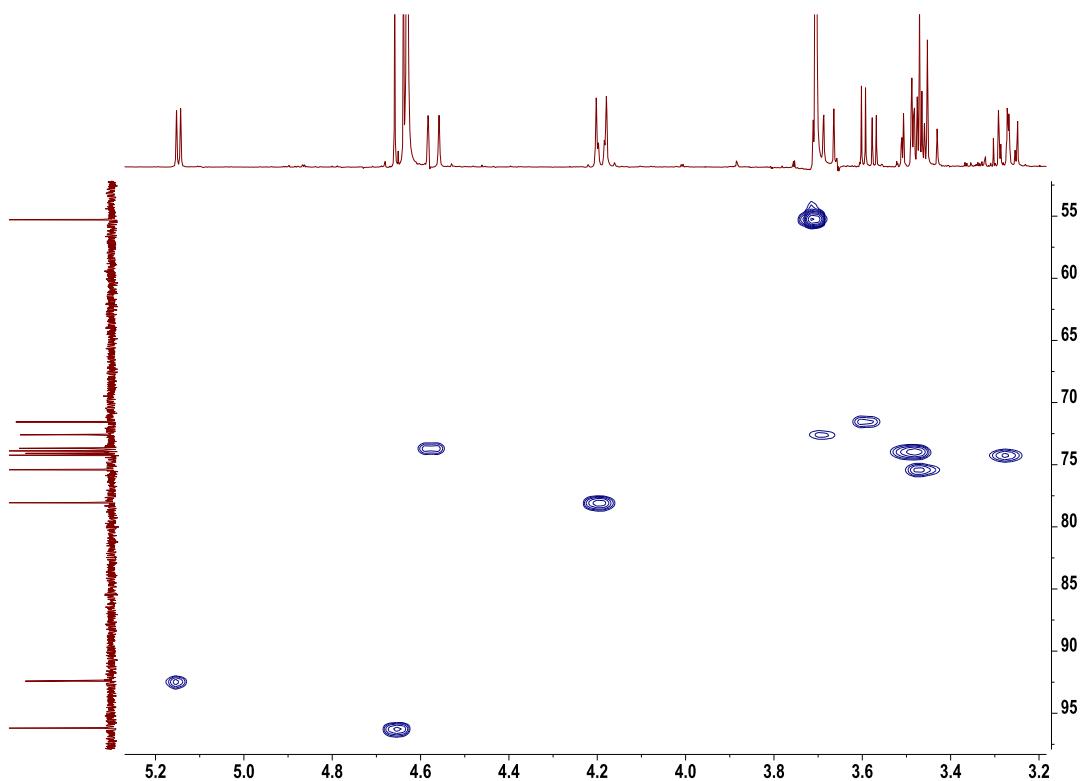
b)



c)



d)



e)

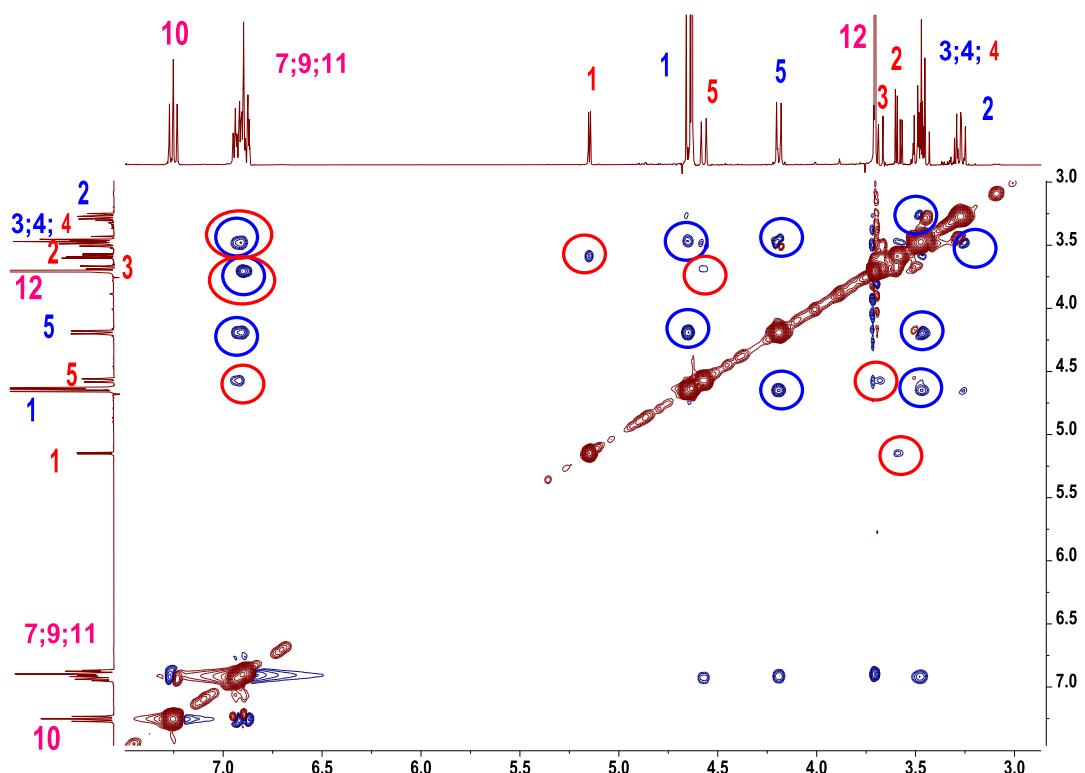
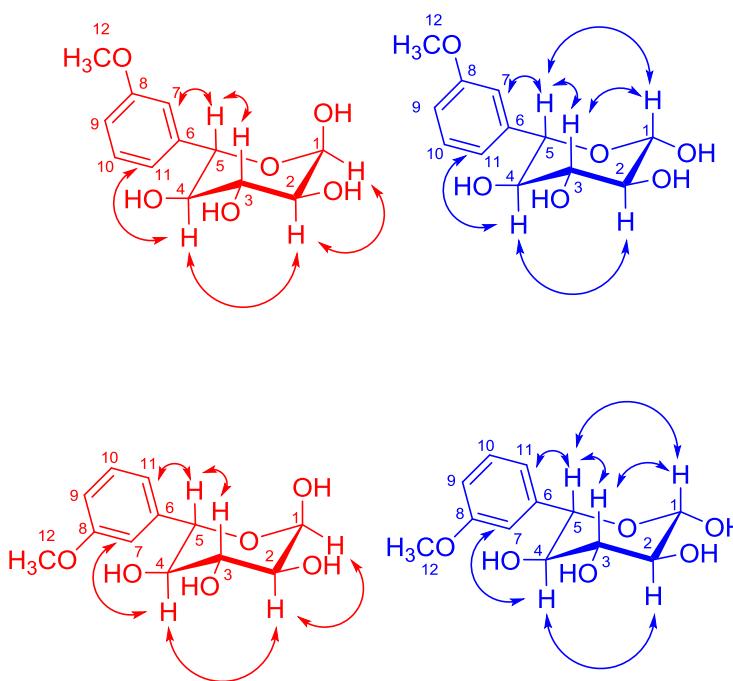
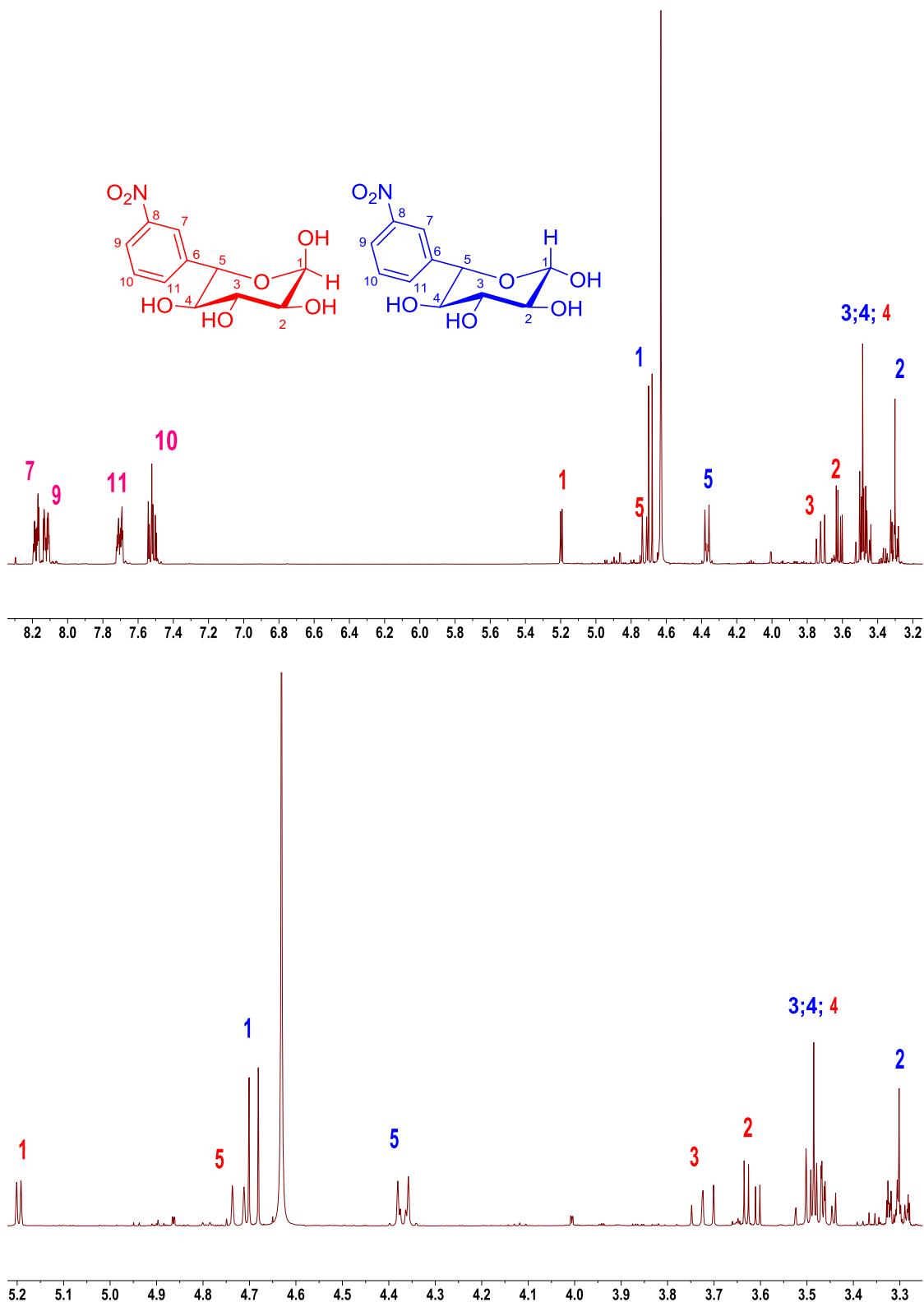
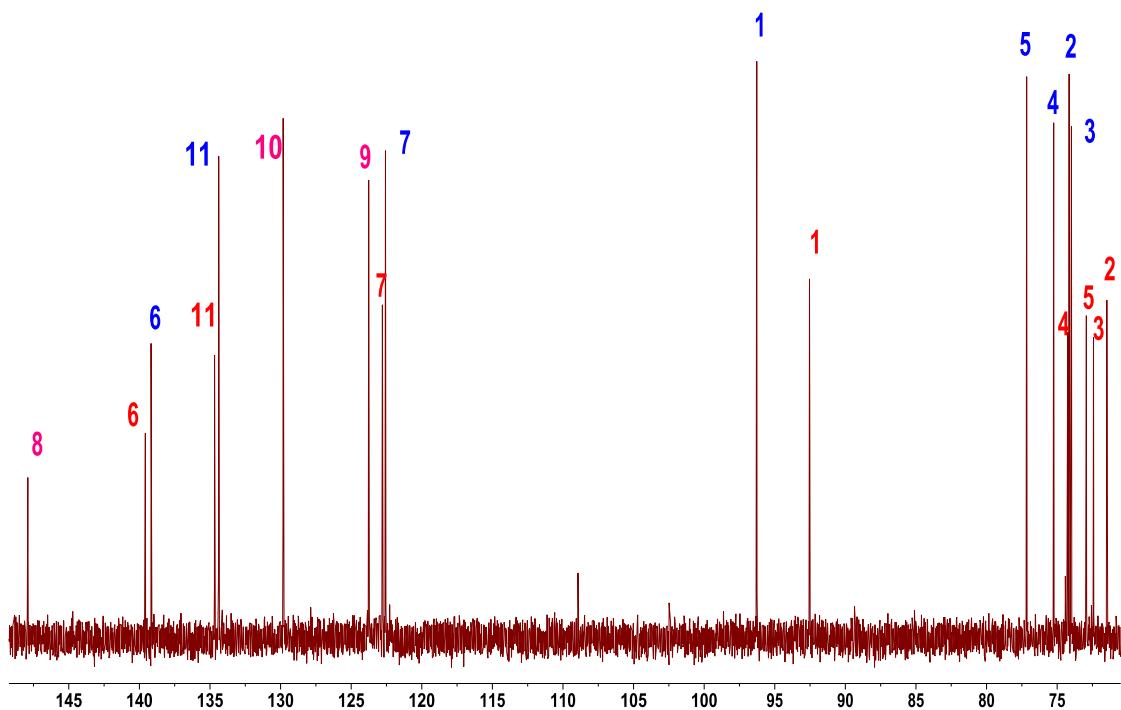


Figura 19S(3.2) Espectros de RMN (D_2O) de **14i**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

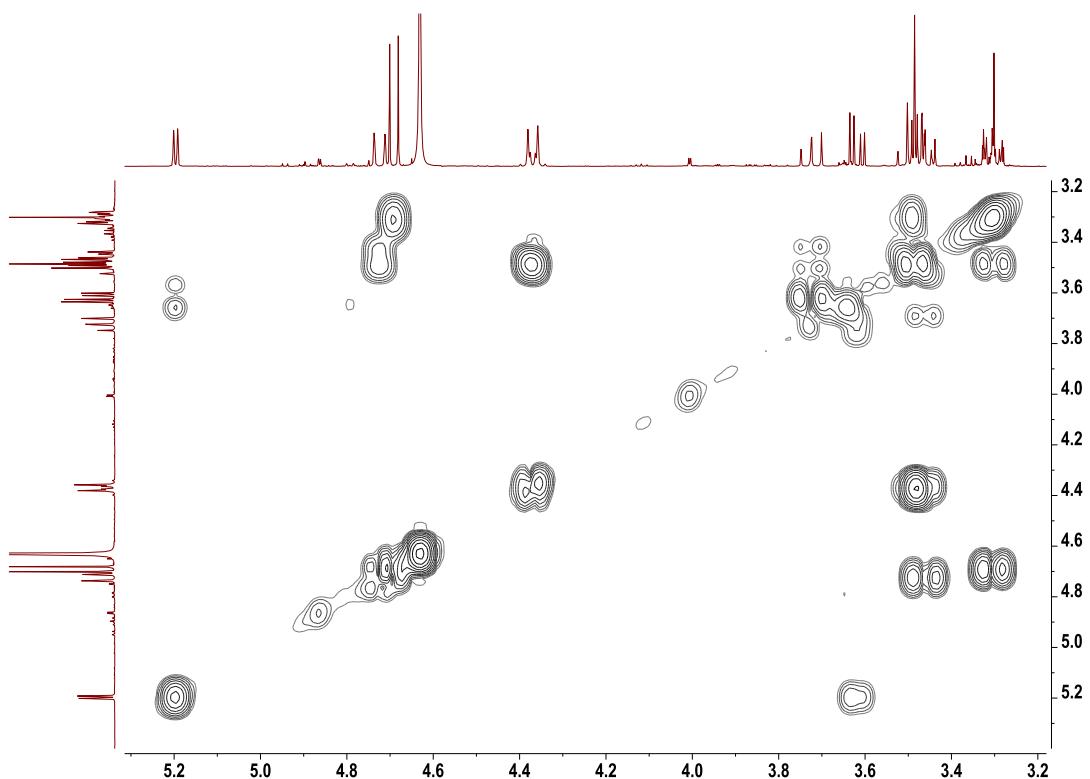
a)



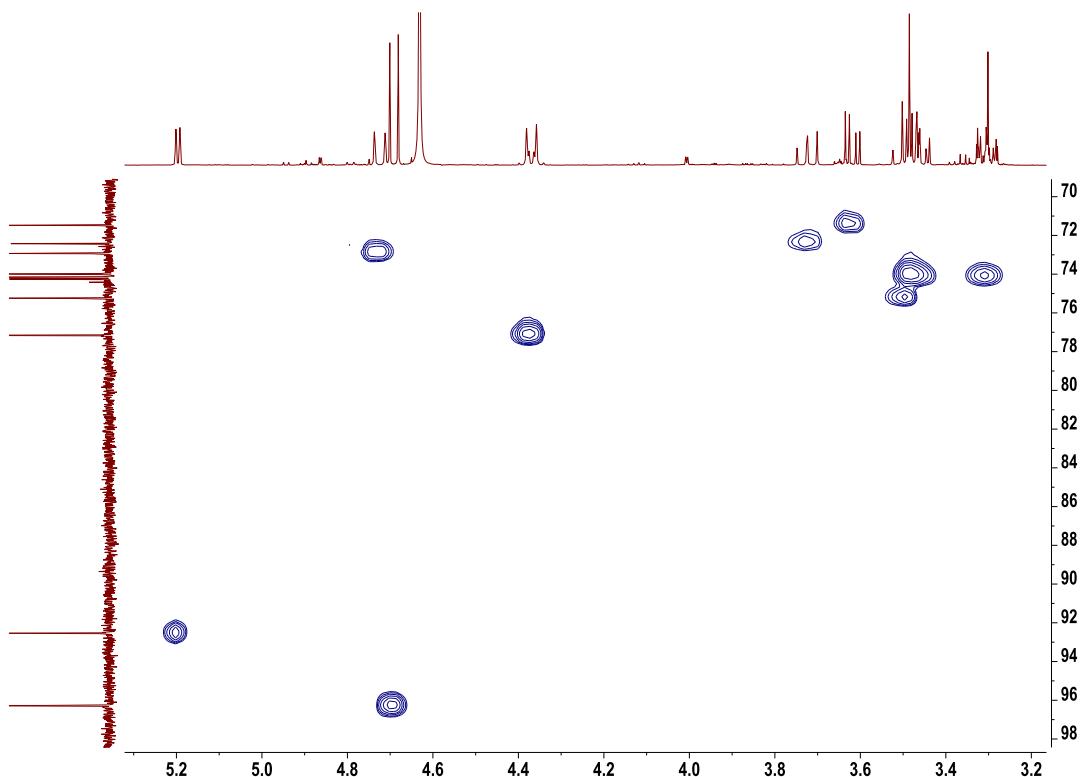
b)



c)



d)



e)

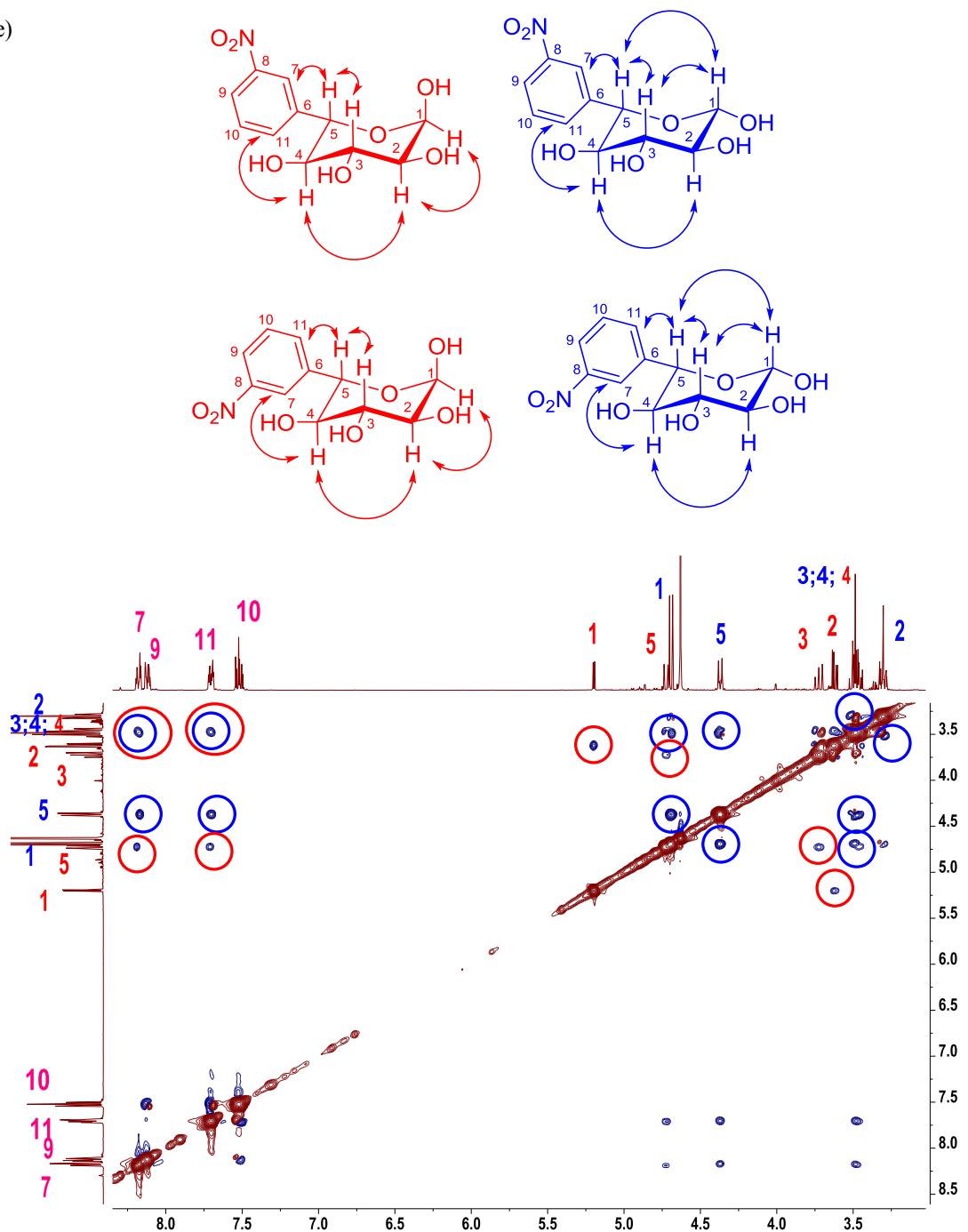
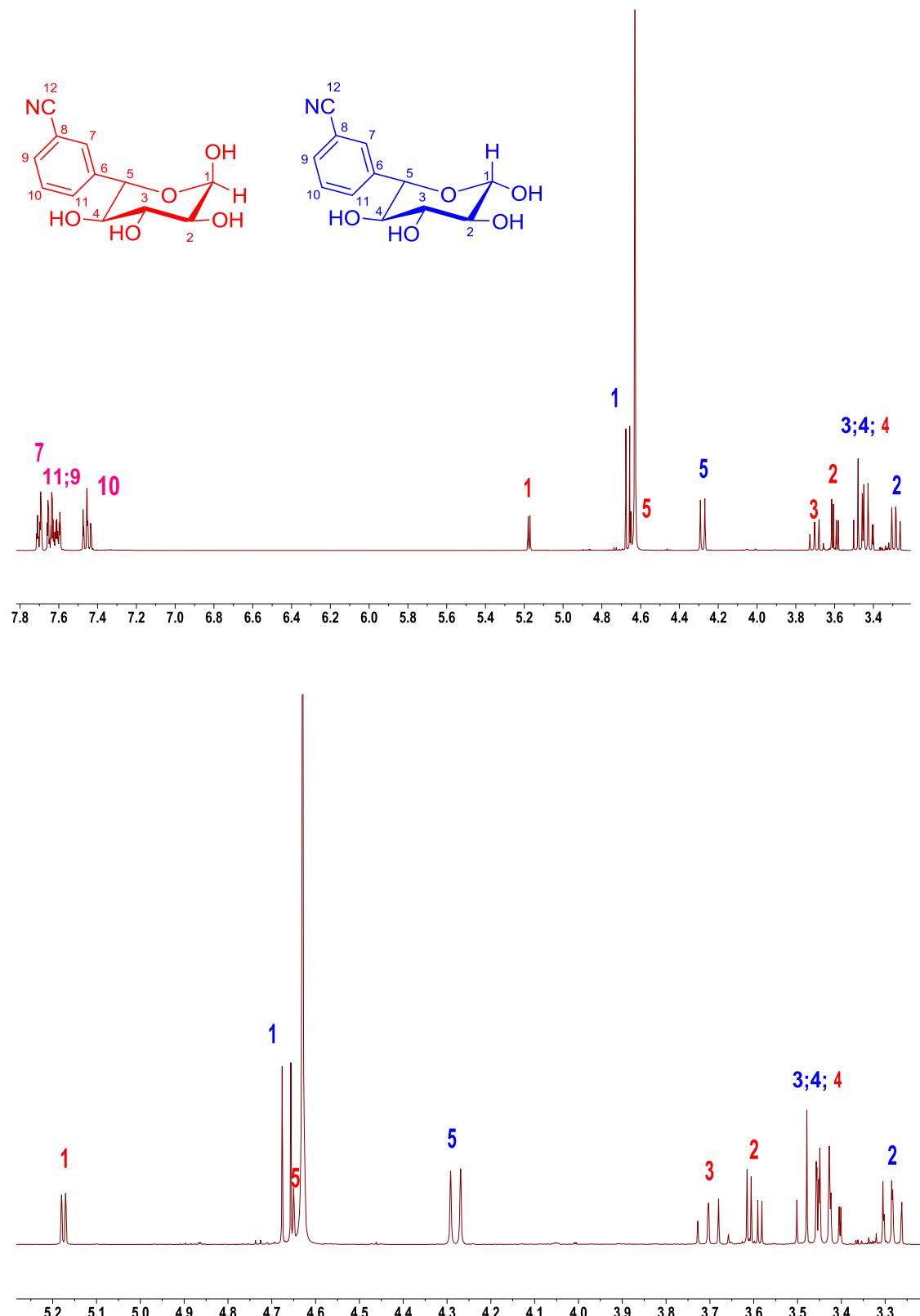
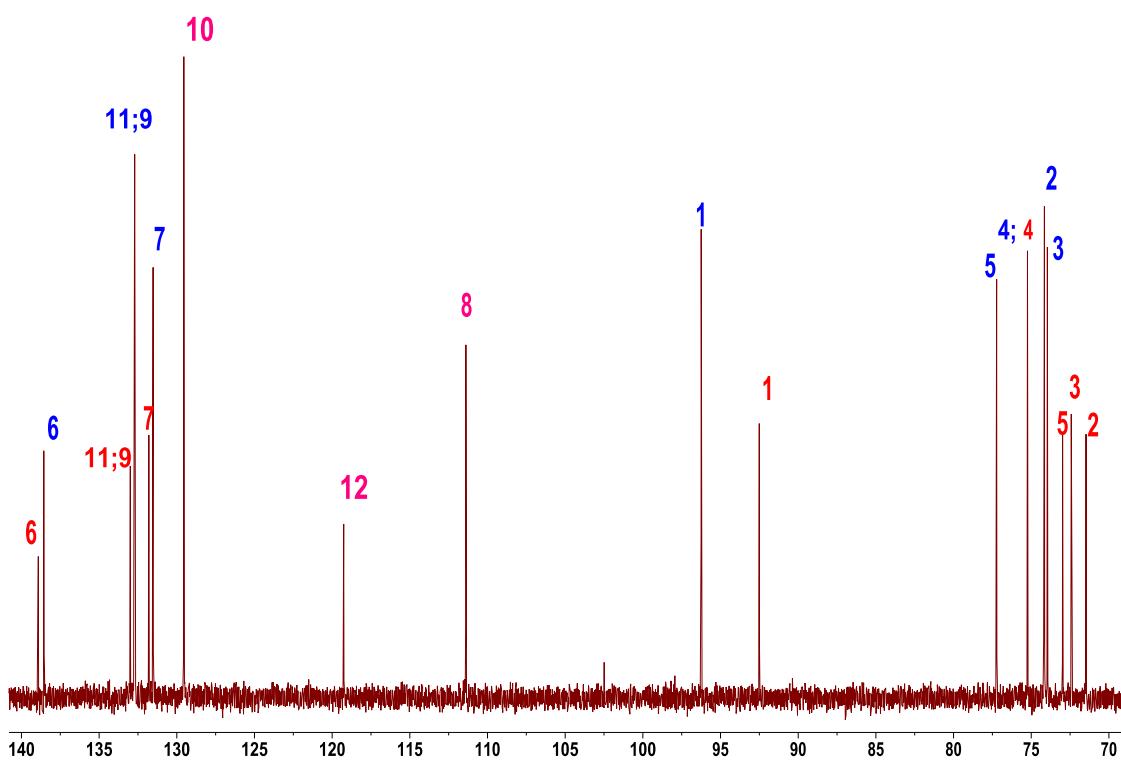


Figura 20S(3.2) Espectros de RMN (D_2O) de **14j**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

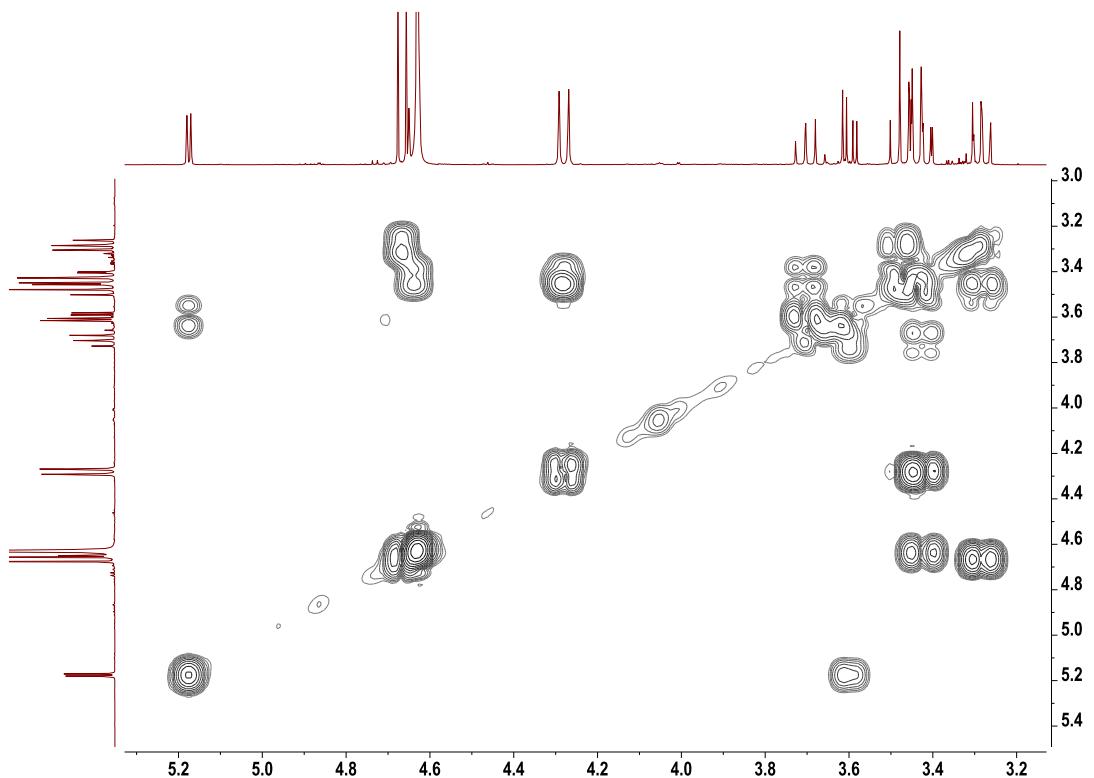
a)



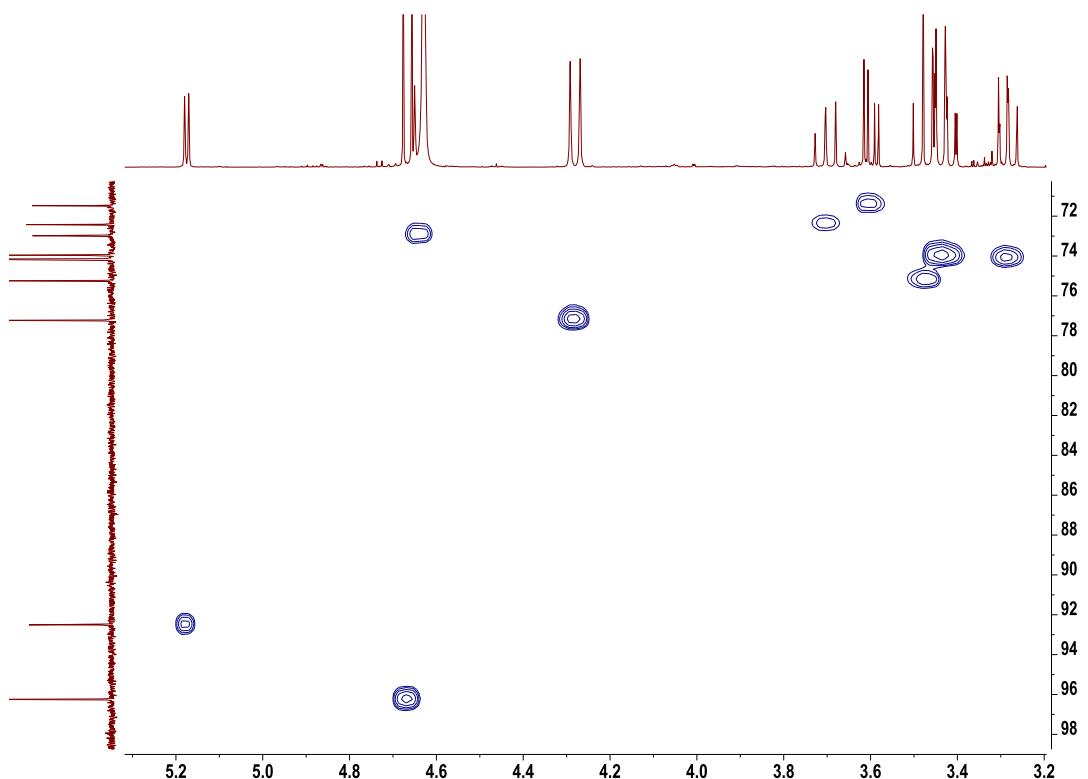
b)



c)



d)



e)

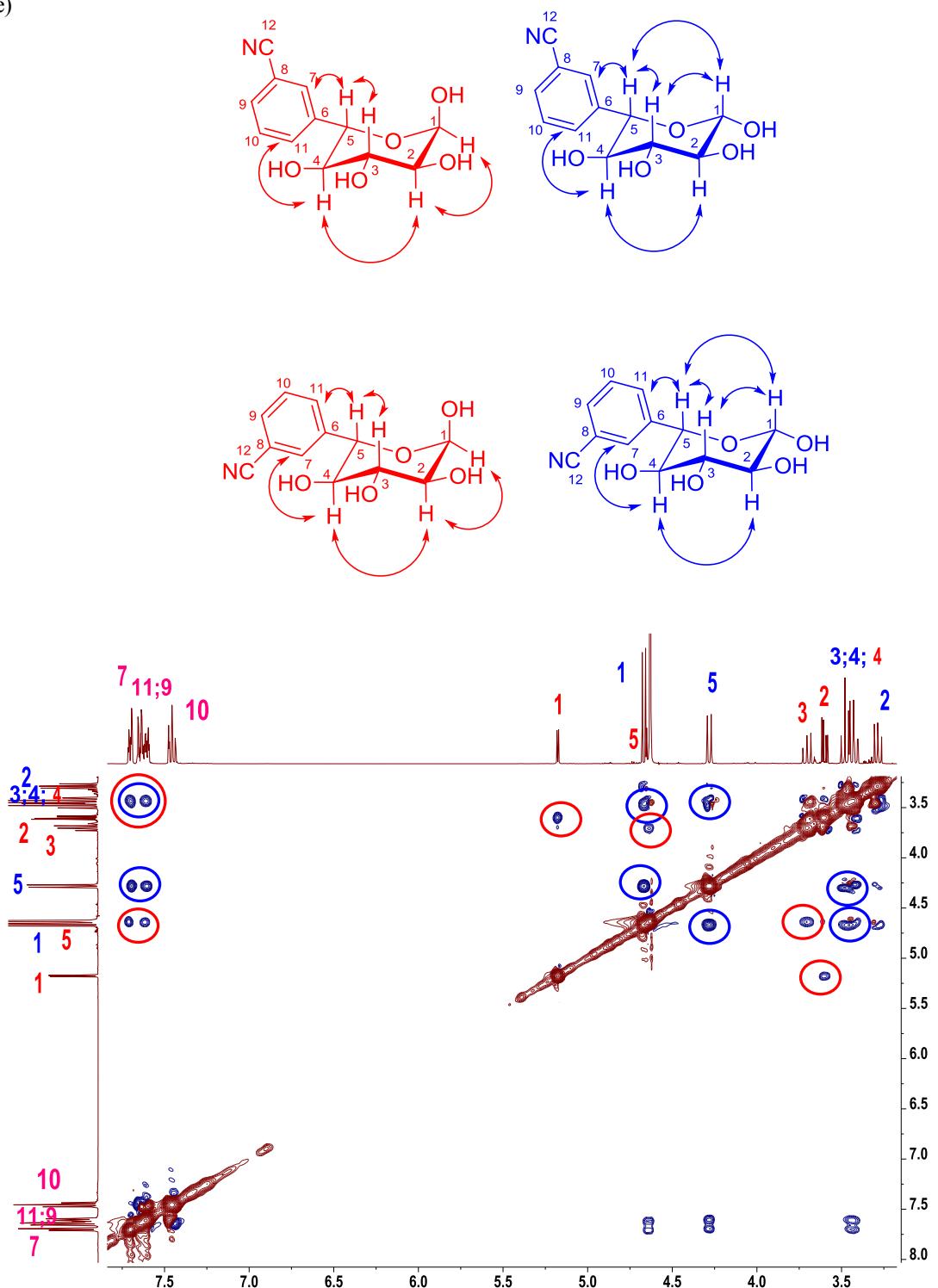
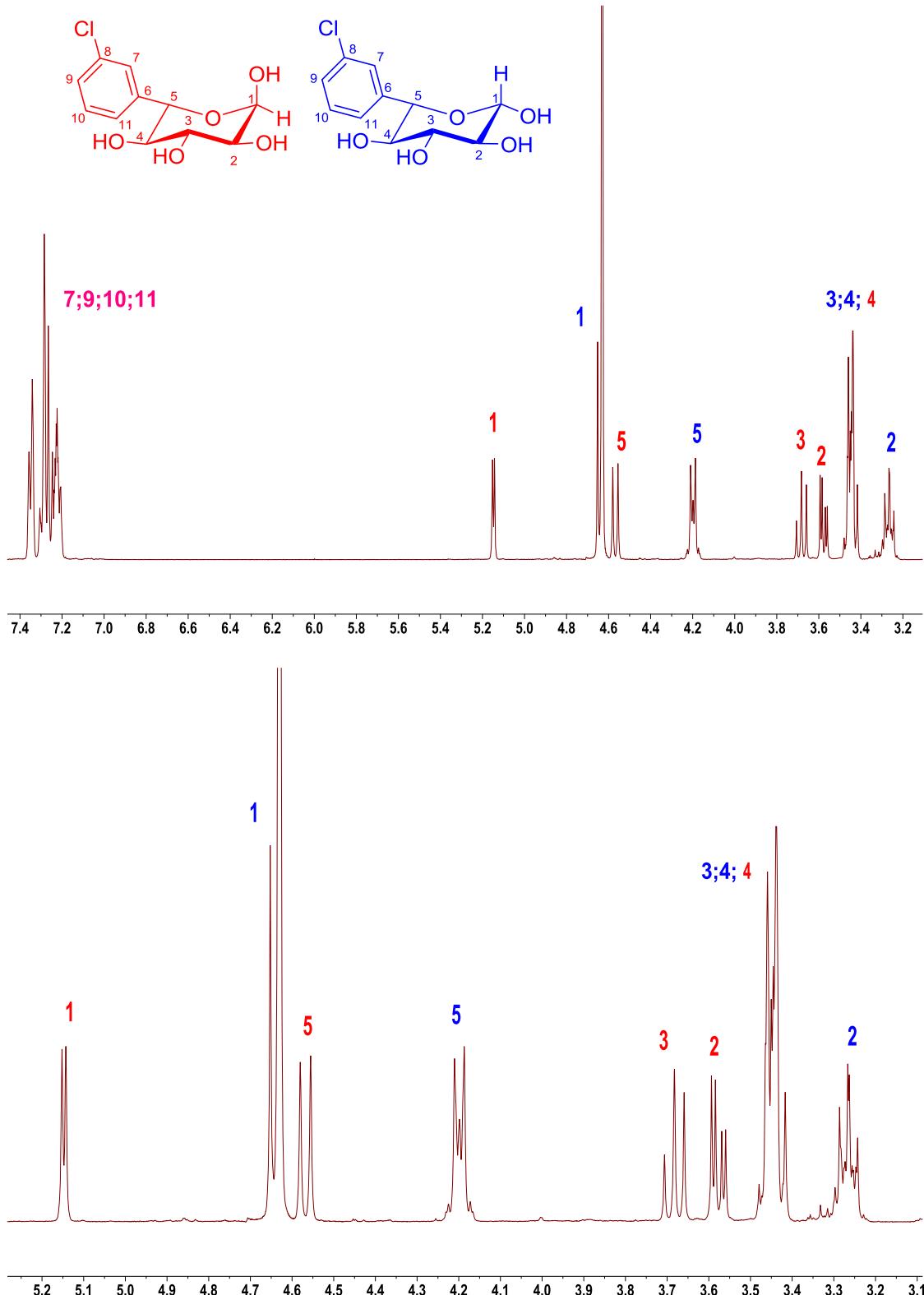
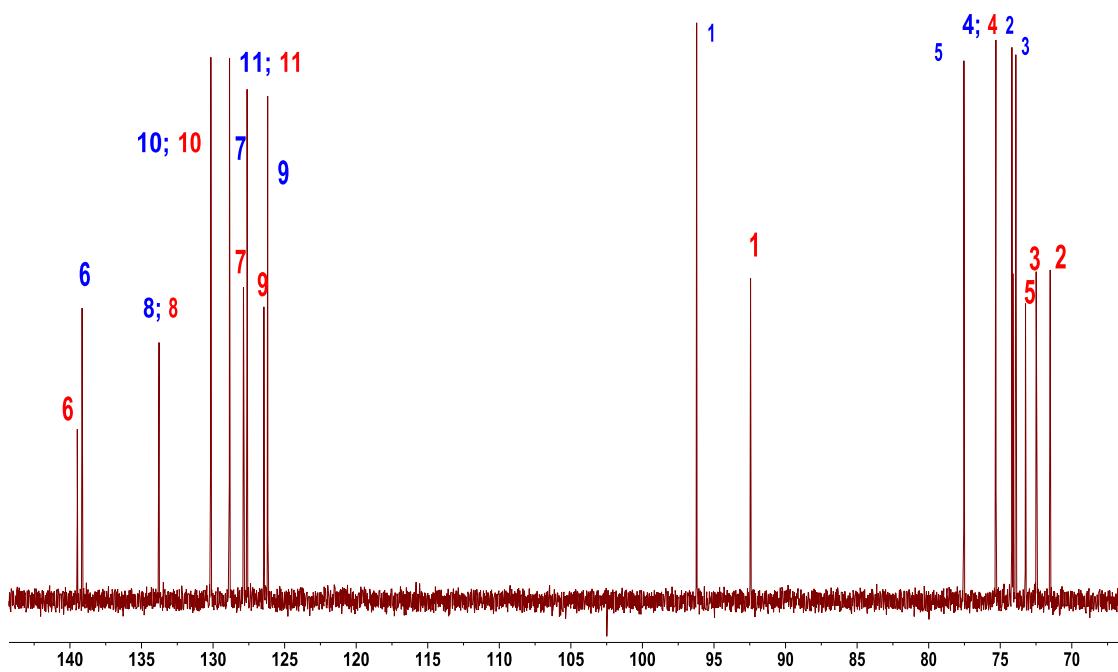


Figura21S(3.2) Espectros de RMN (D_2O) de **14k**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

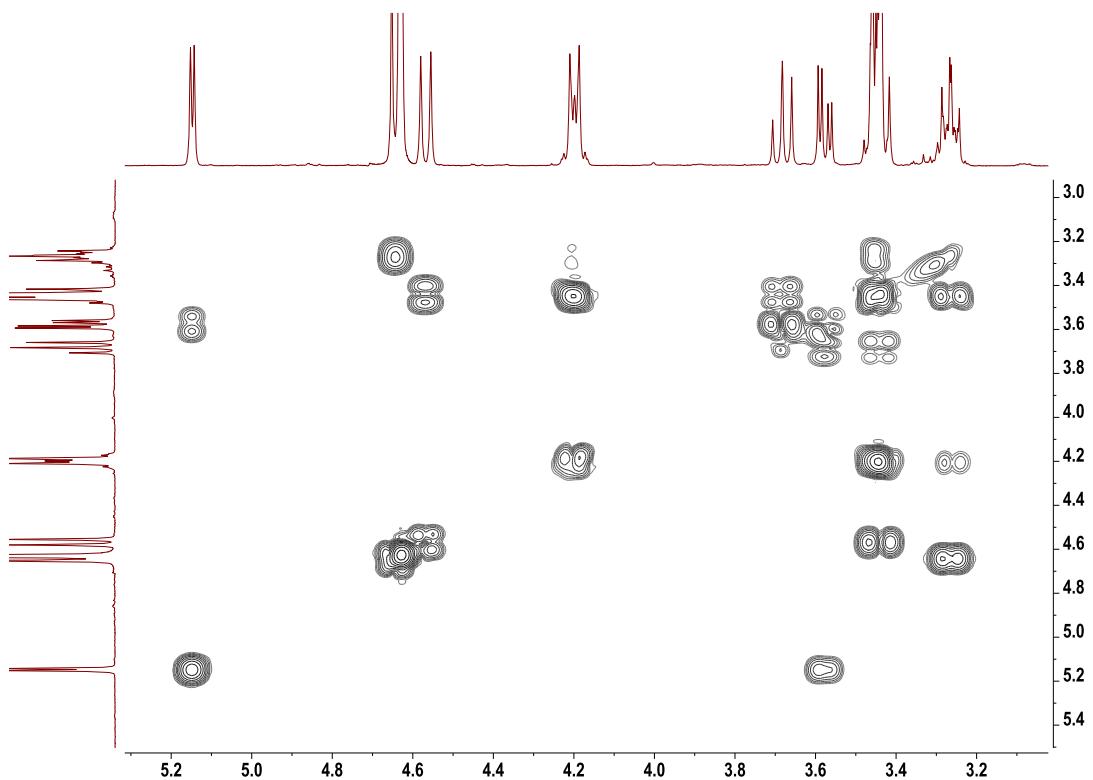
a)



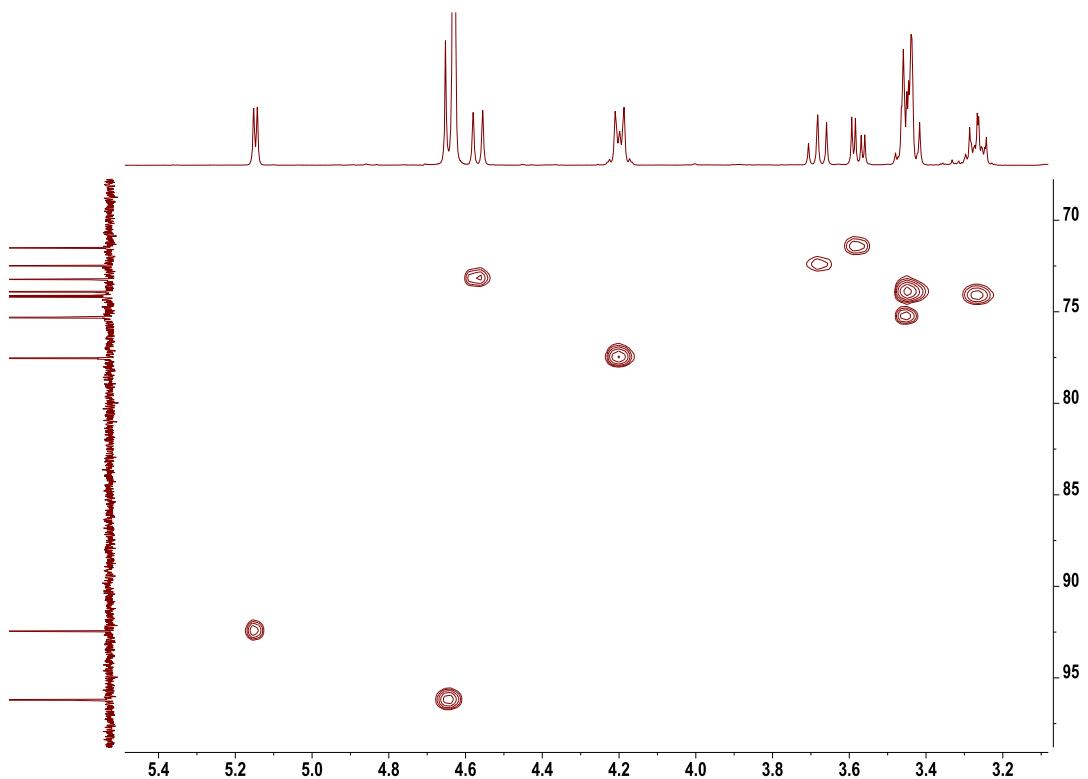
b)



c)



d)



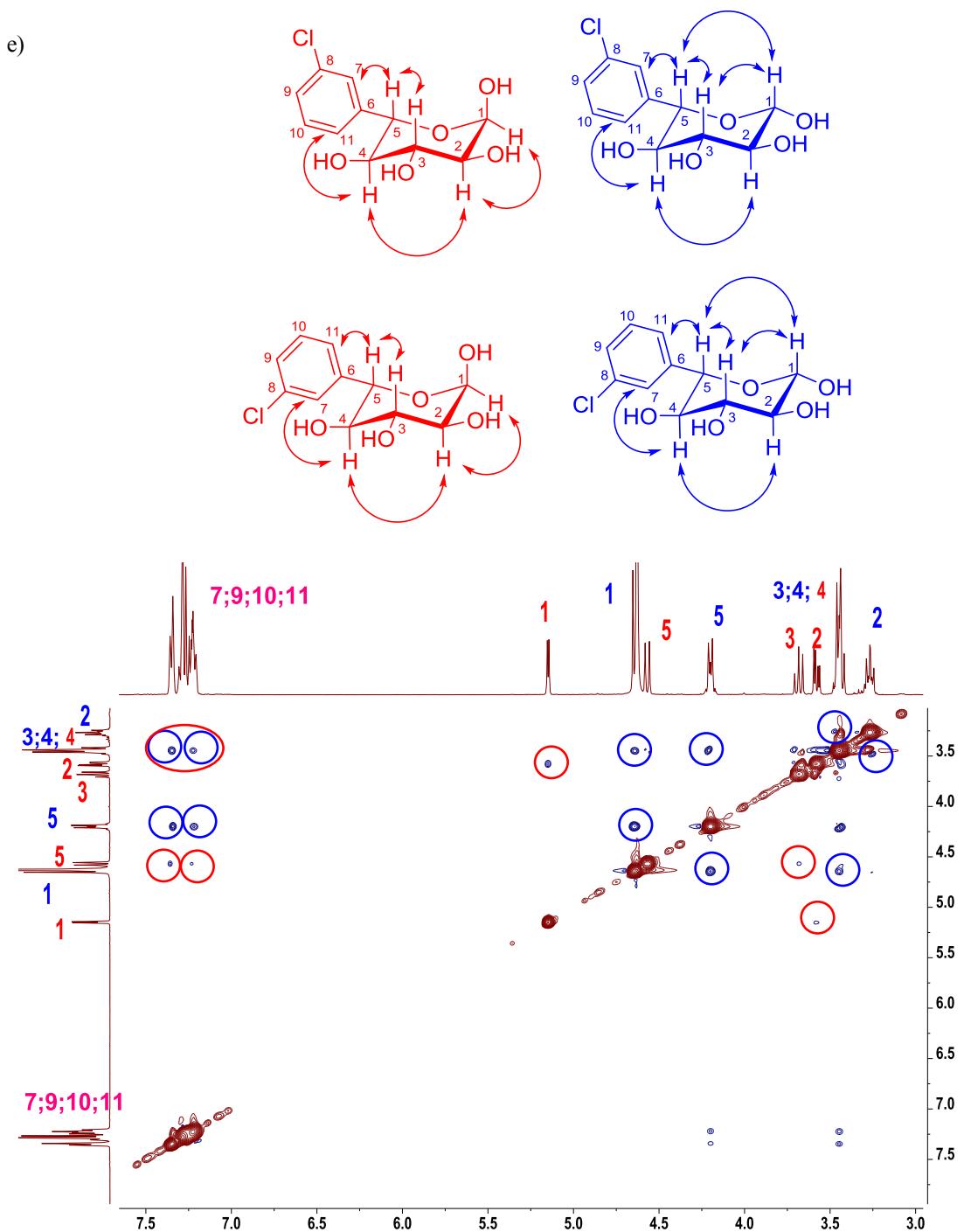
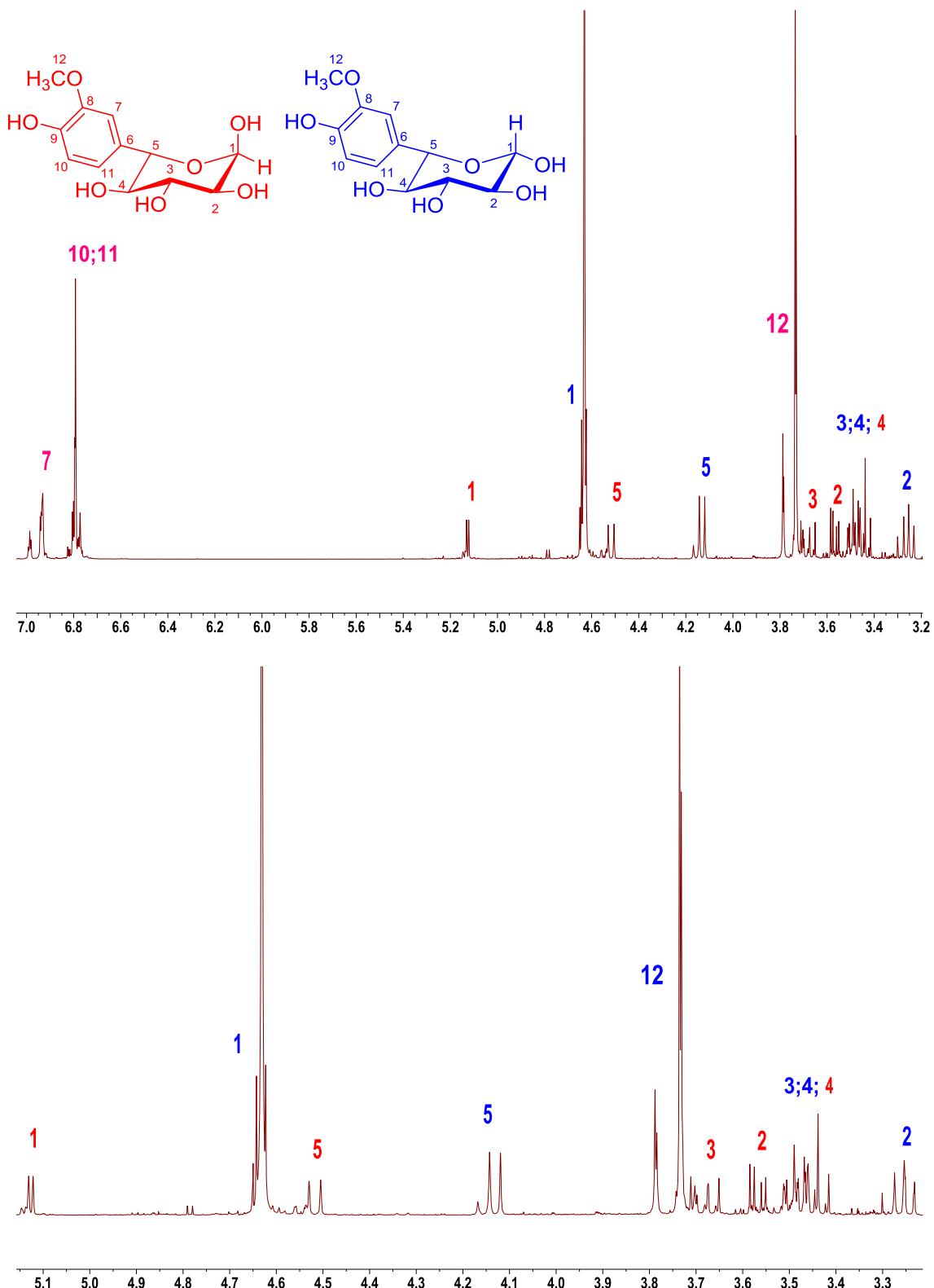
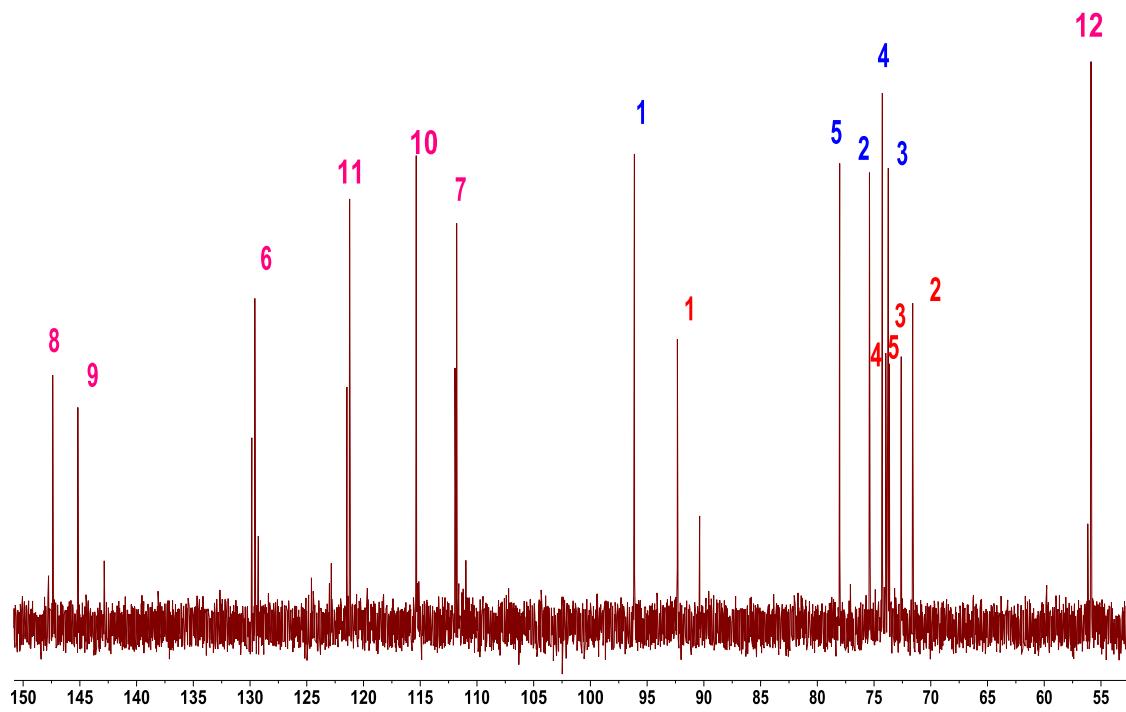


Figura 22S(3.2) Espectros de RMN(D_2O) de **14t**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

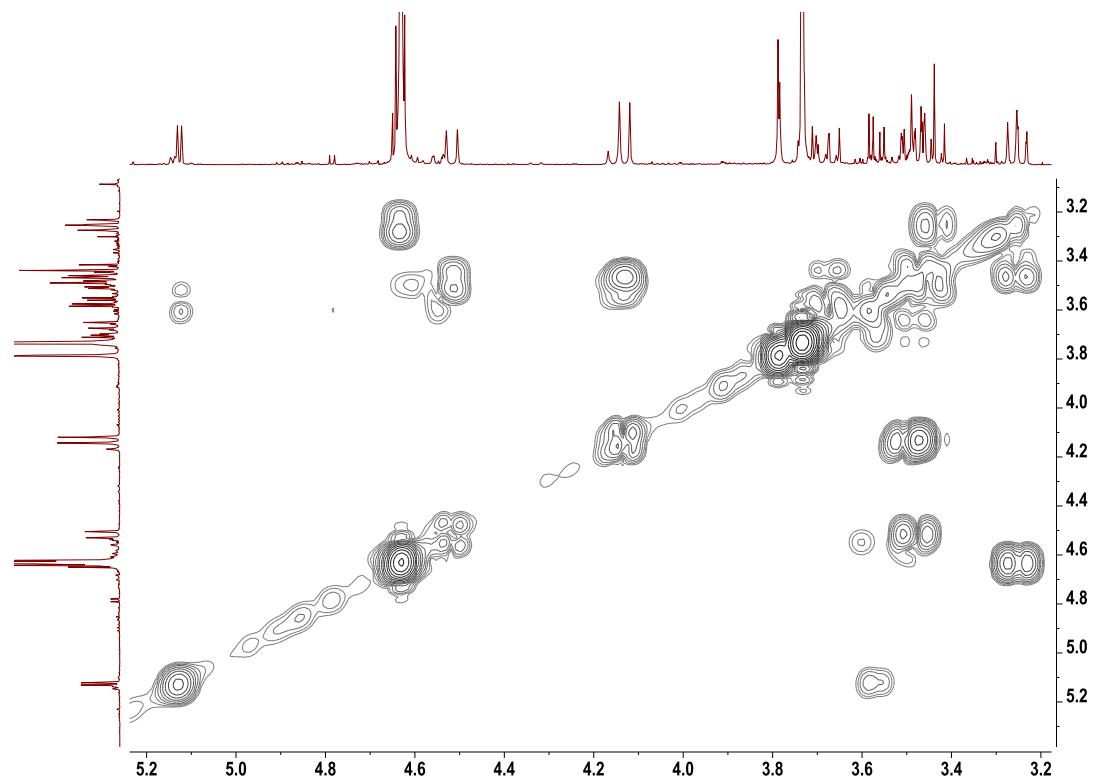
a)



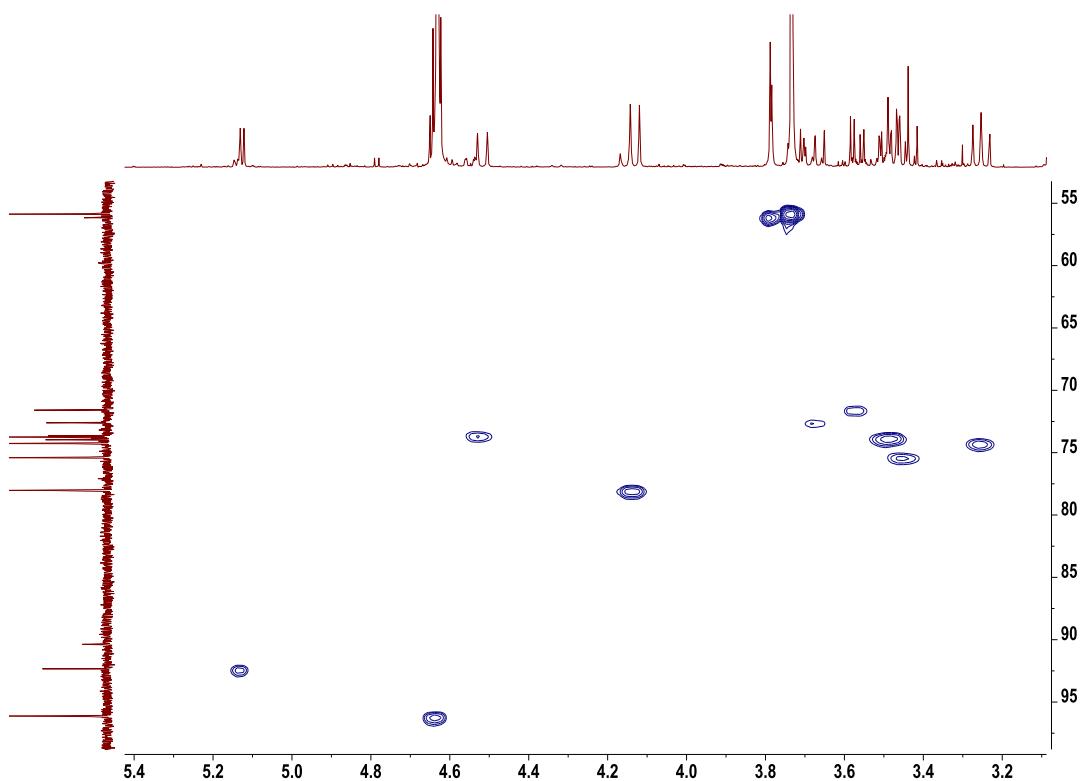
b)



c)



d)



e)

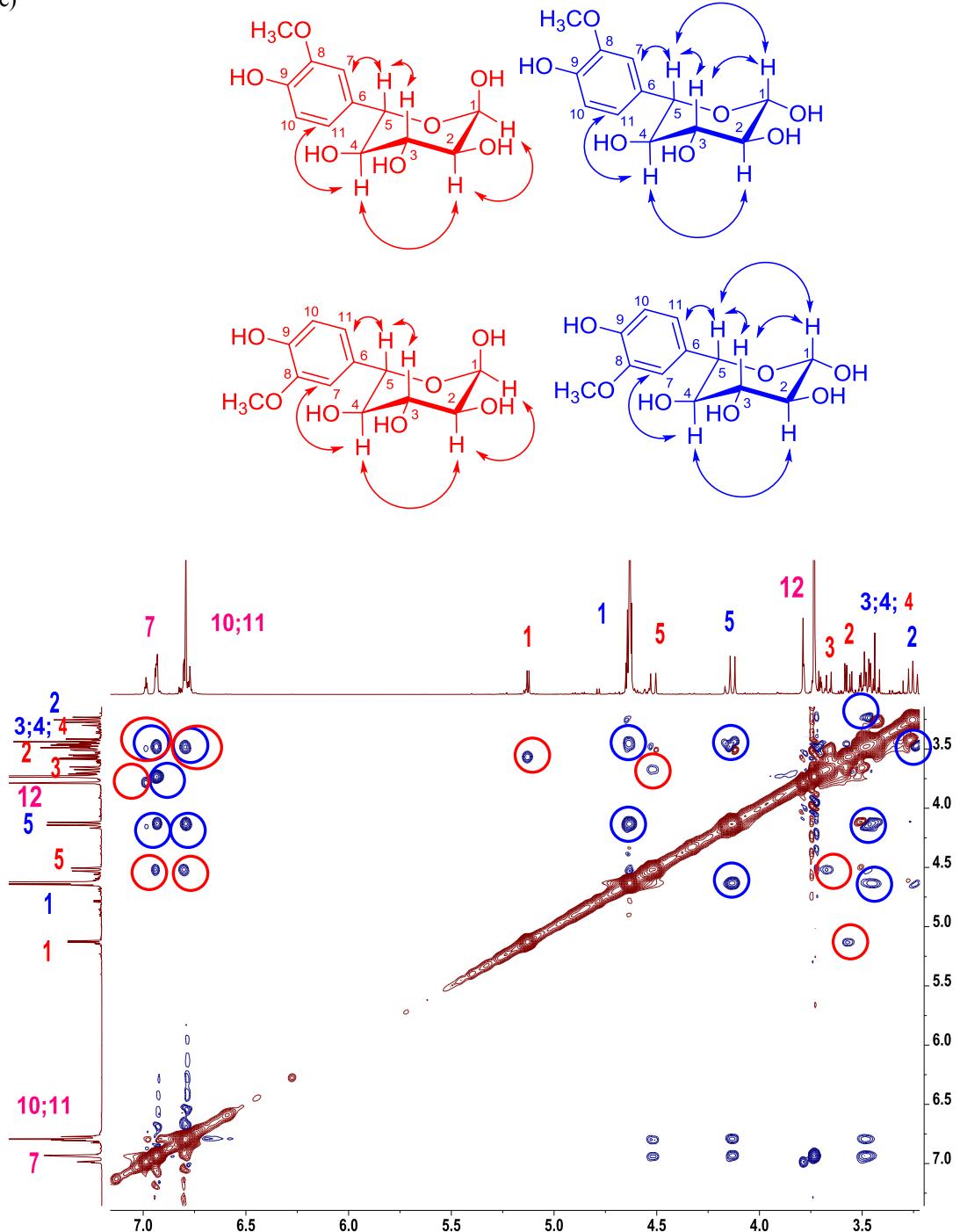
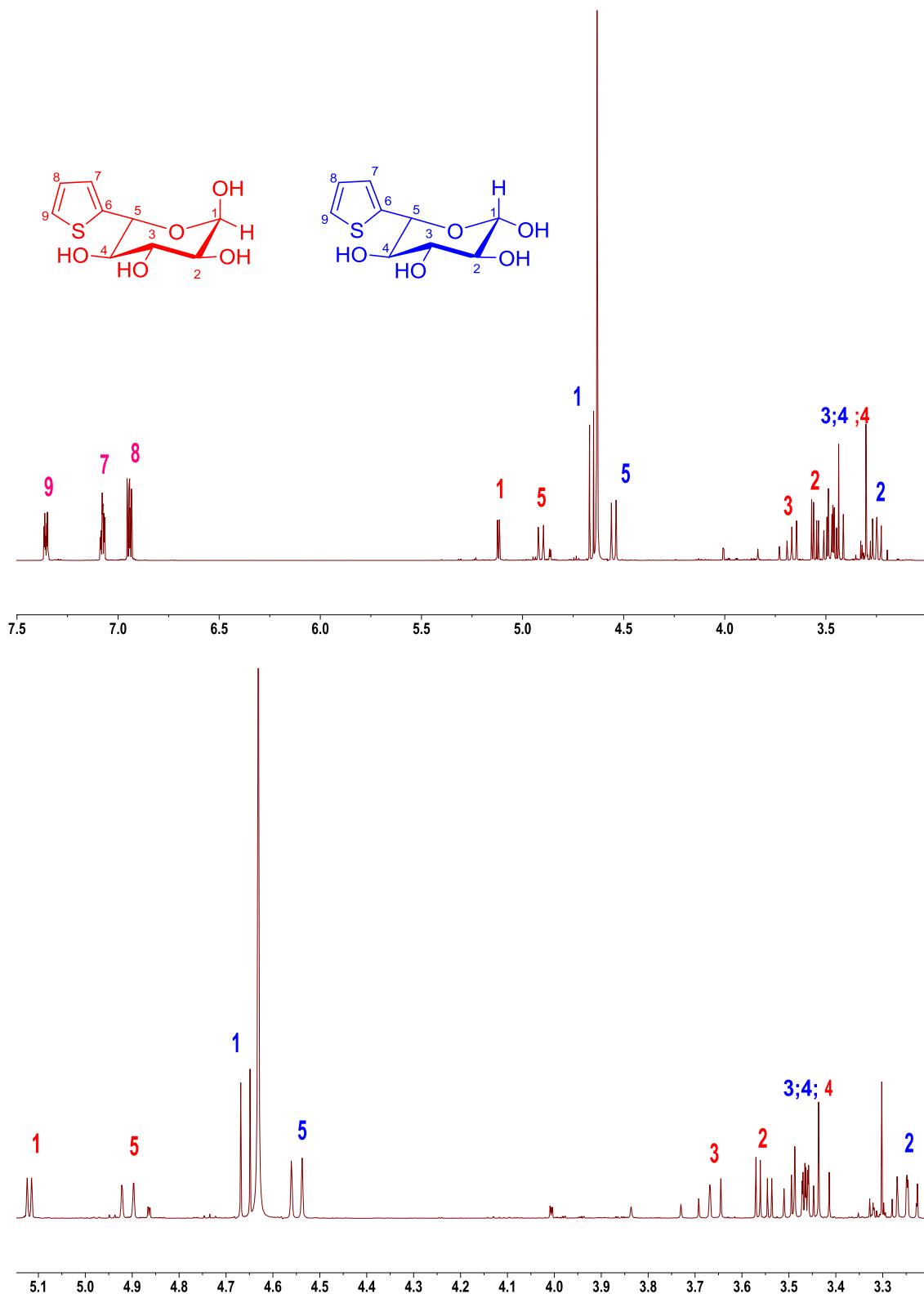
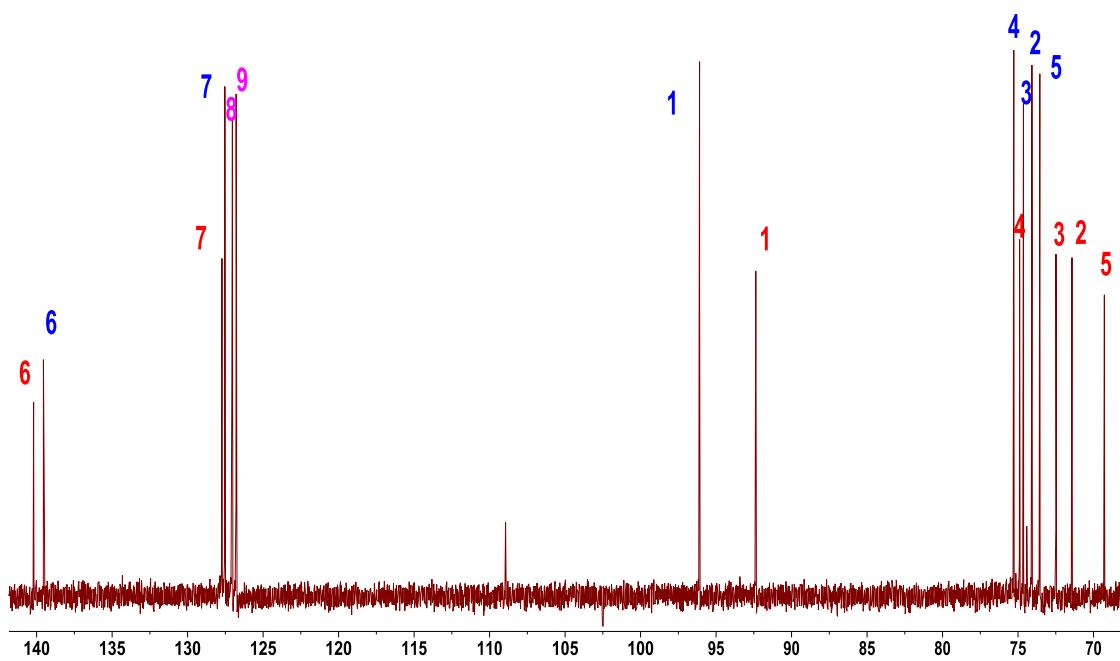


Figura 23S(3.2) Espectros de RMN (D_2O) de **14x**: a) 1H ; b) ^{13}C ; c) 2D 1H - 1H COSY; d) HSQC y e) NOESY.

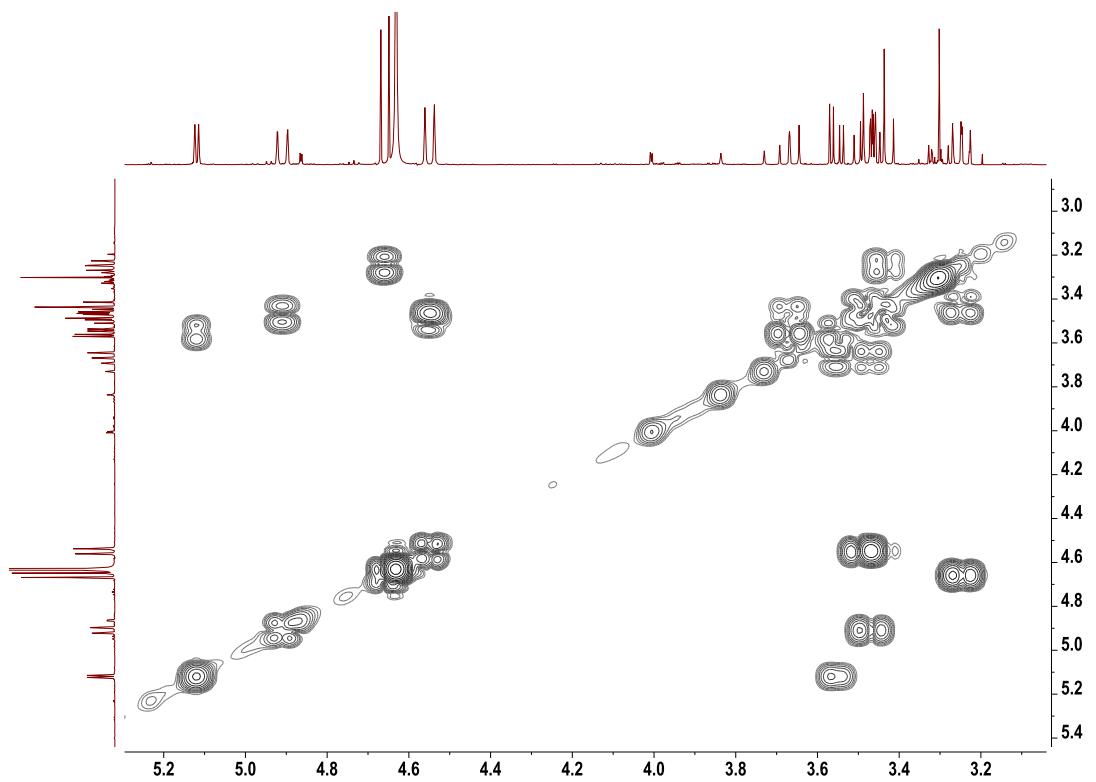
a)



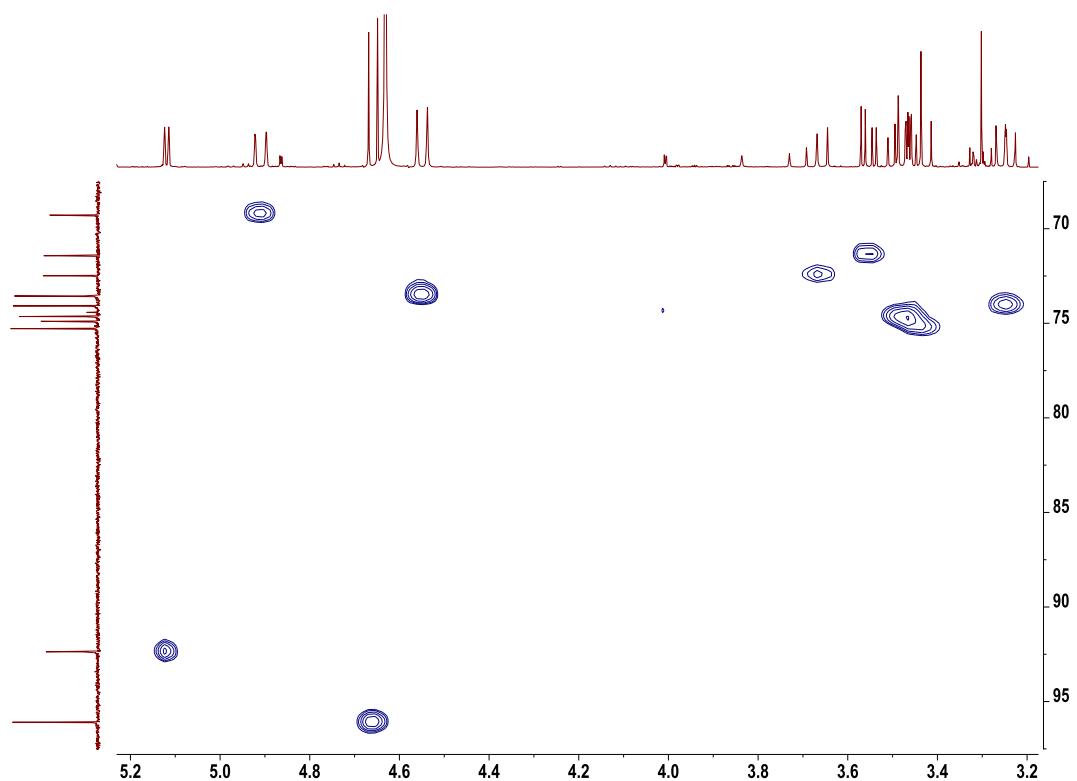
b)



c)



d)



e)

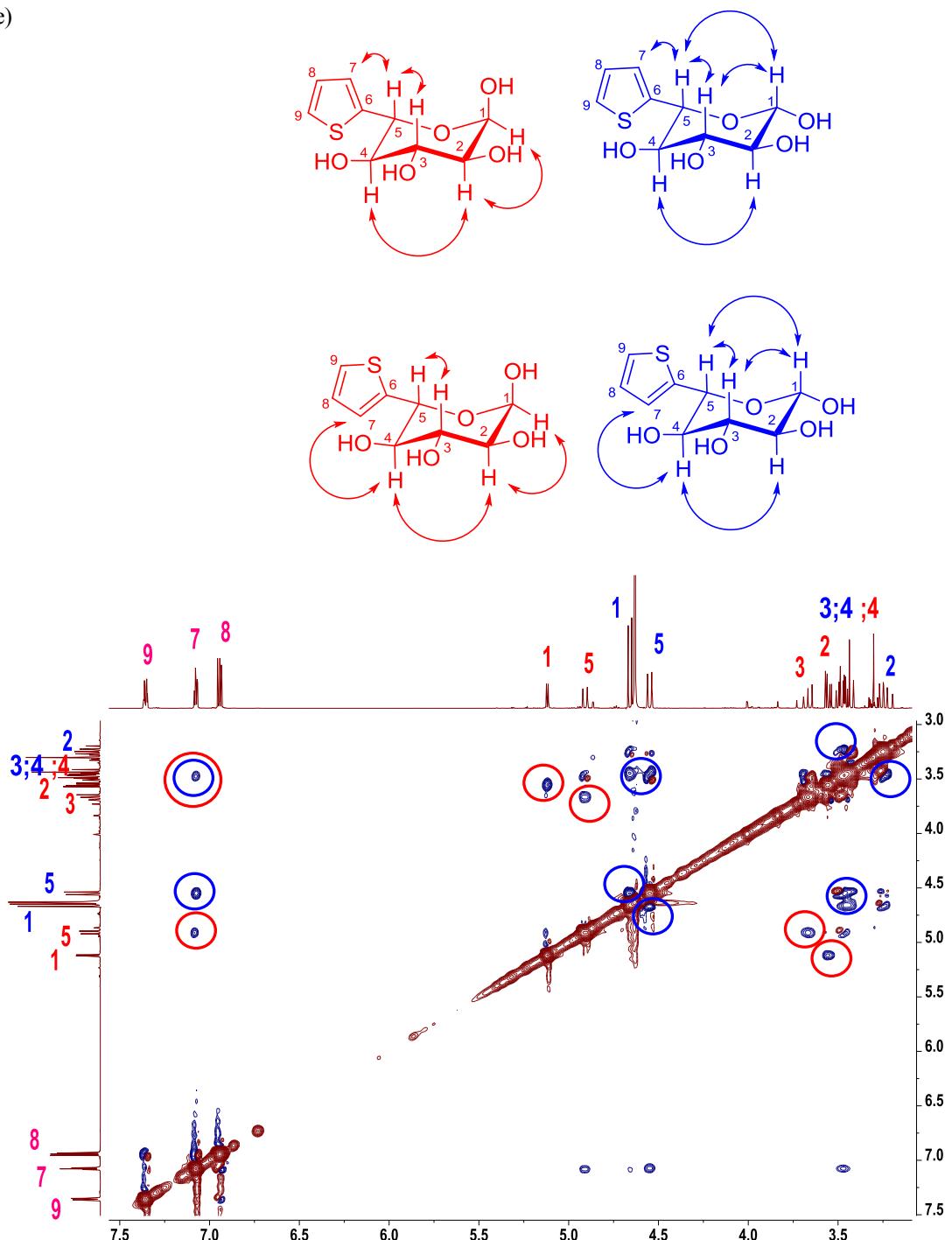
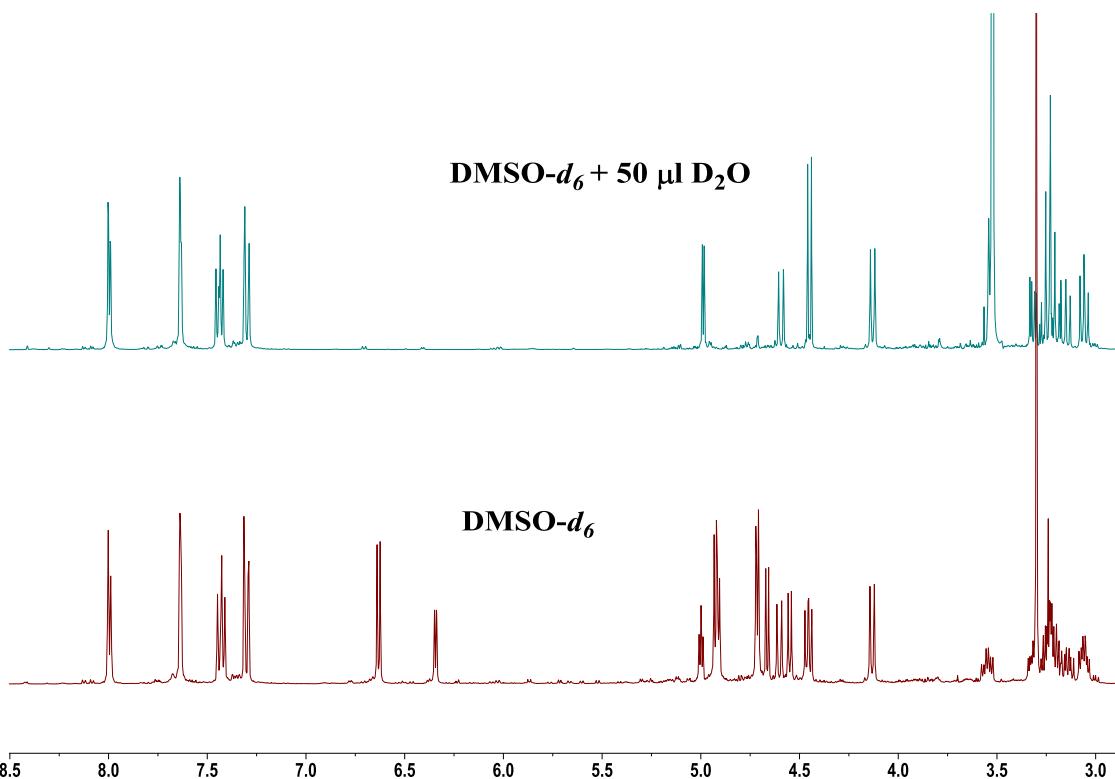
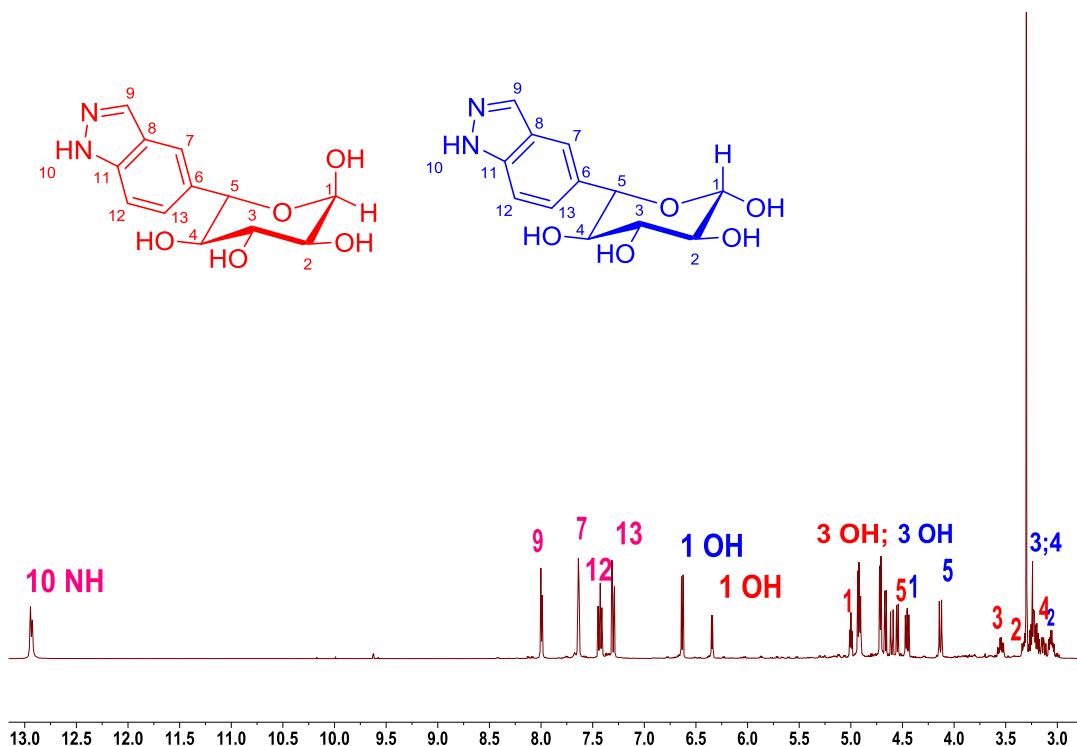
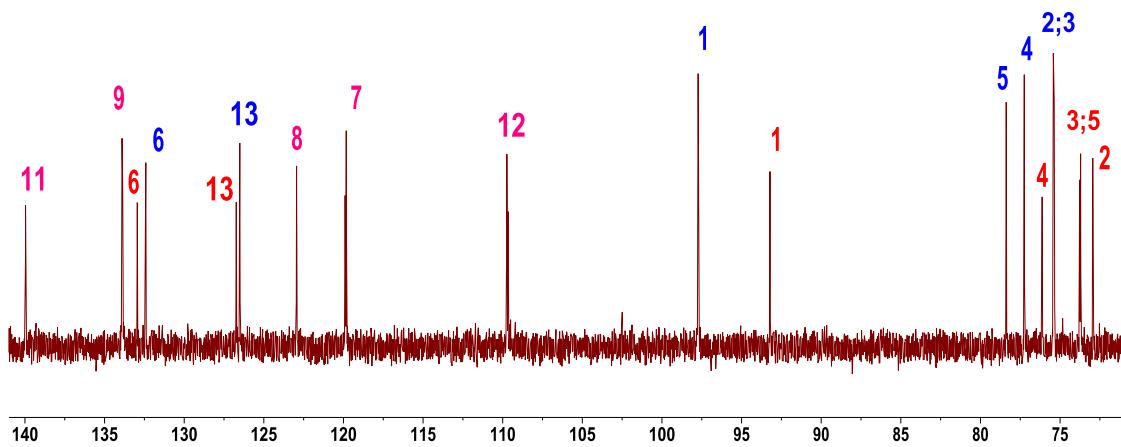


Figura 24S(3.2) Espectros de RMN (DMSO- d_6) de **14ad**: a) ^1H ; b) ^{13}C ; c) 2D ^1H - ^1H COSY; d) HSQC y e) NOESY.

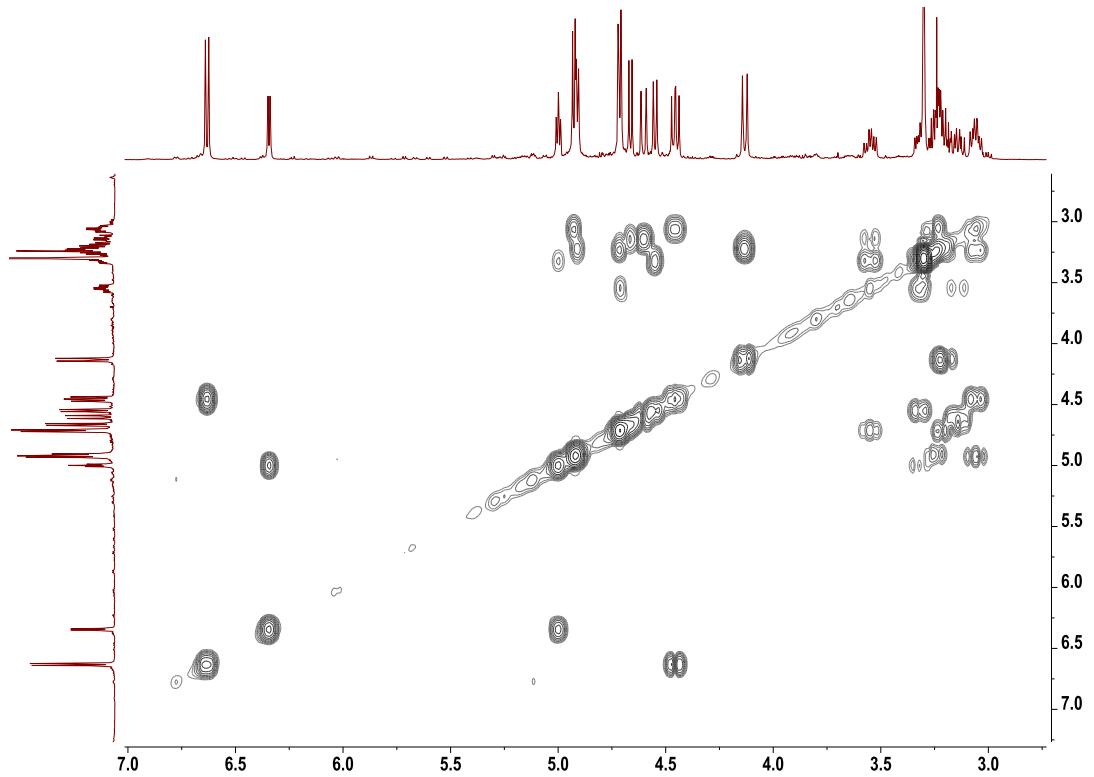
a)



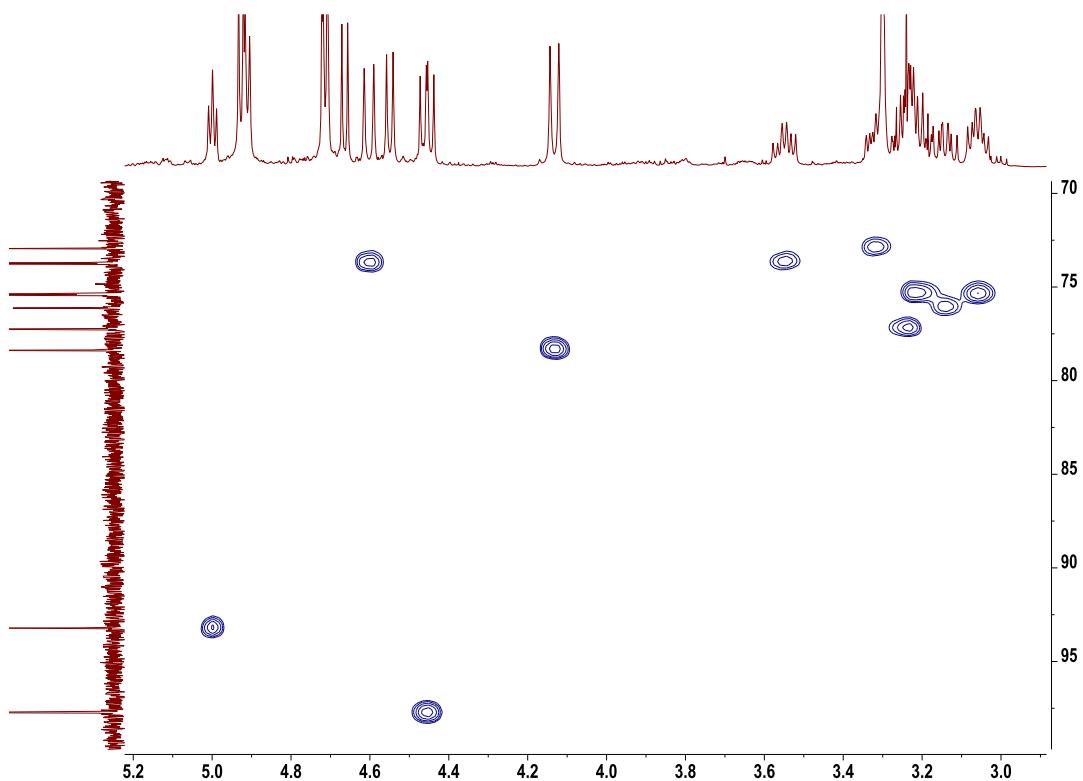
b)



c)



d)



e)

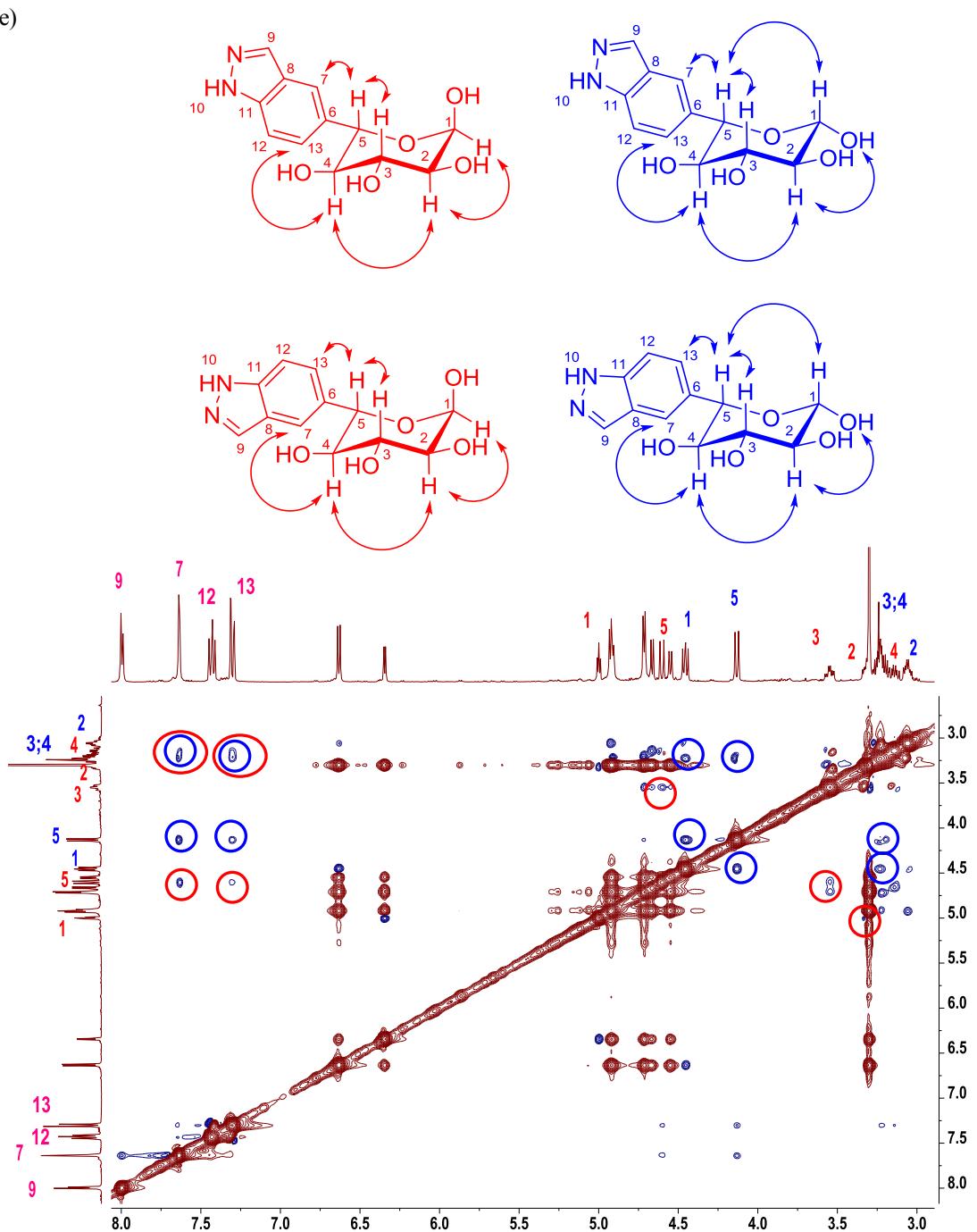
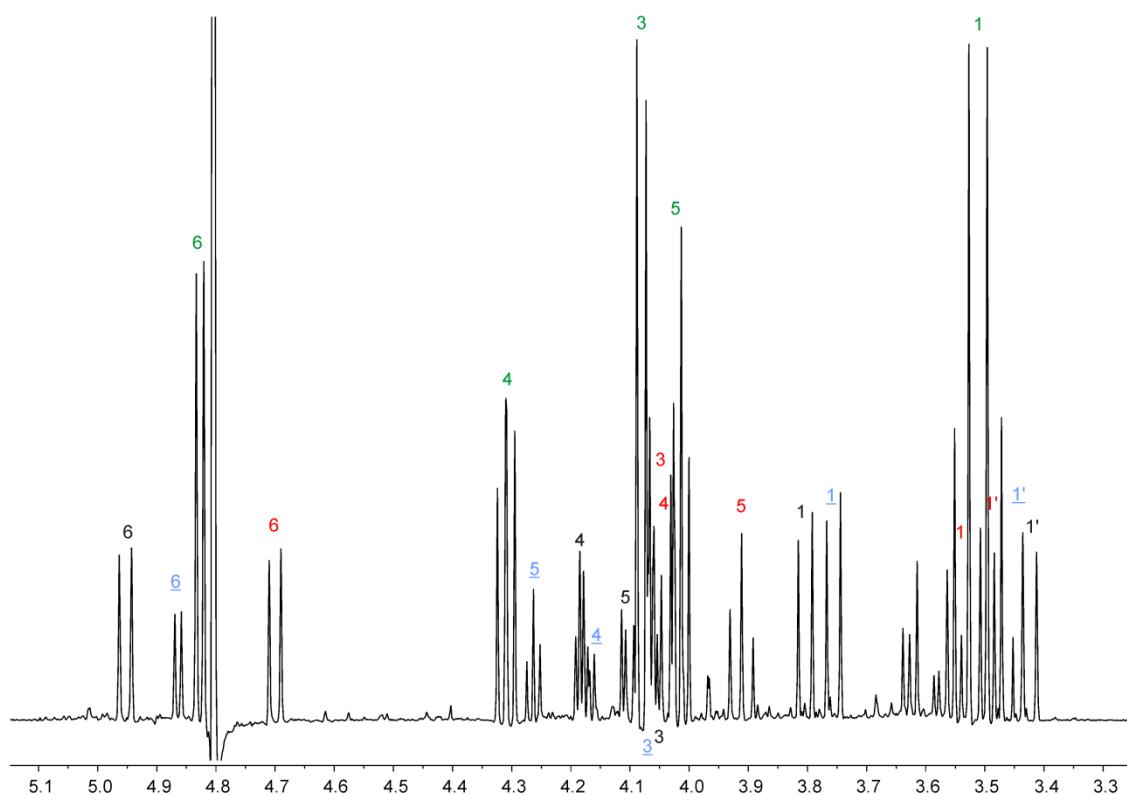
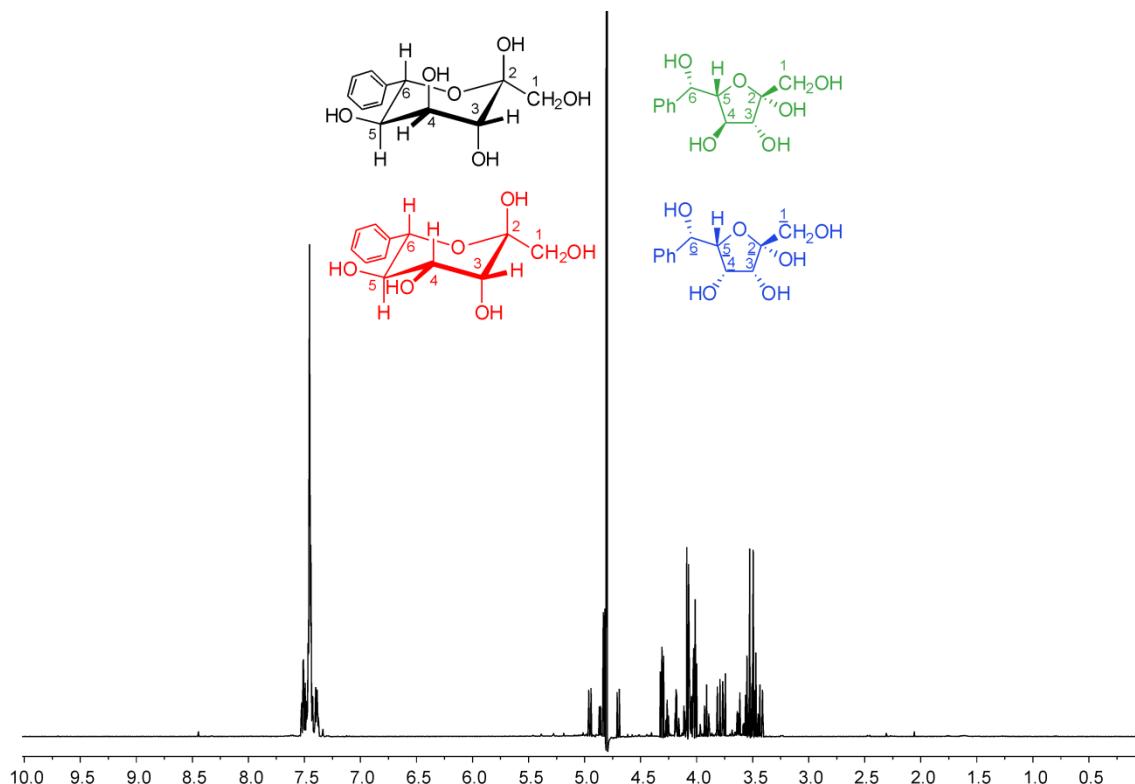
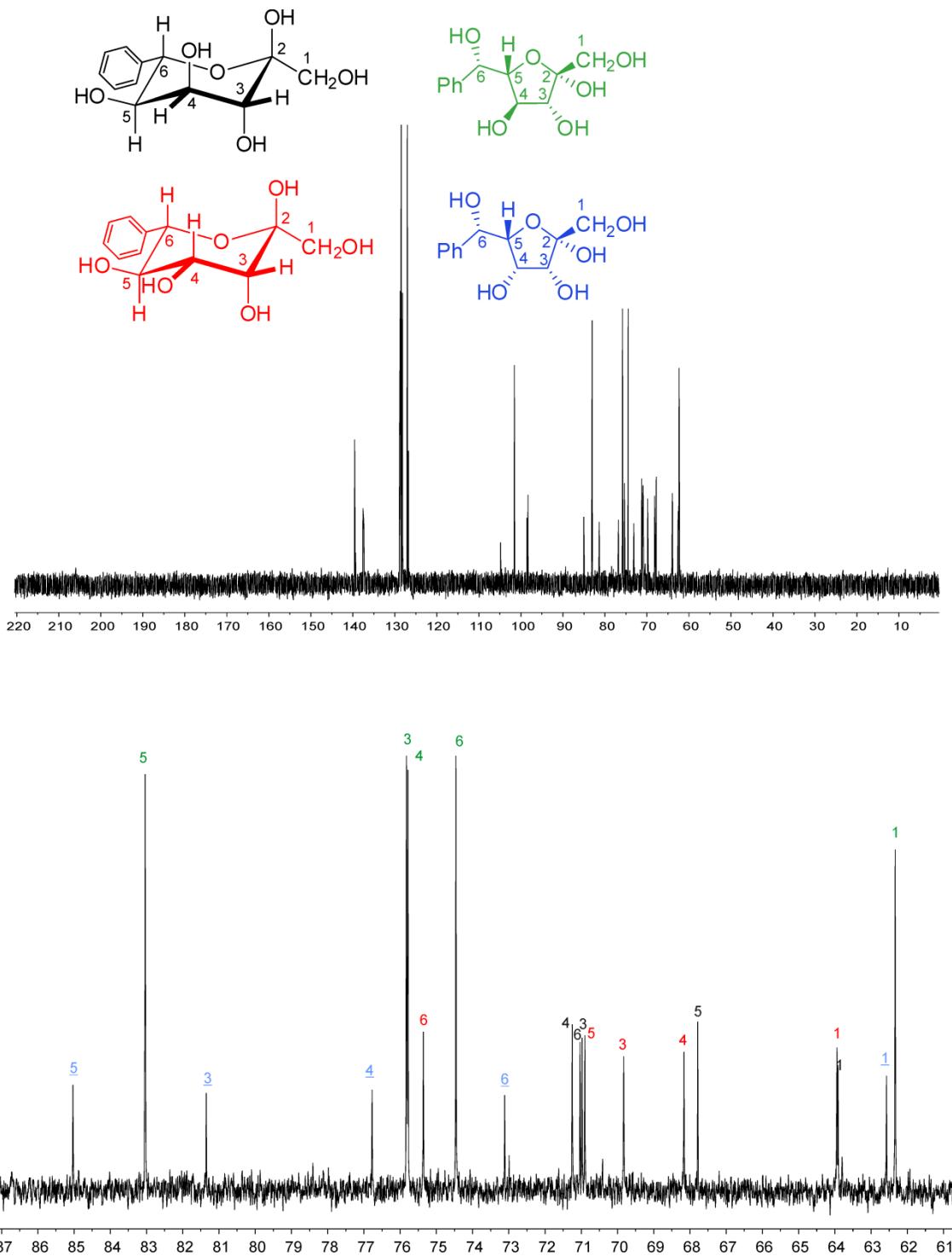


Figura 25S(3.2) Espectros de RMN (D_2O) de **15a** y **16a**: a) 1H ; b) ^{13}C ; c) COSY; d) HSQC y e) 1D NOESY selectivo.

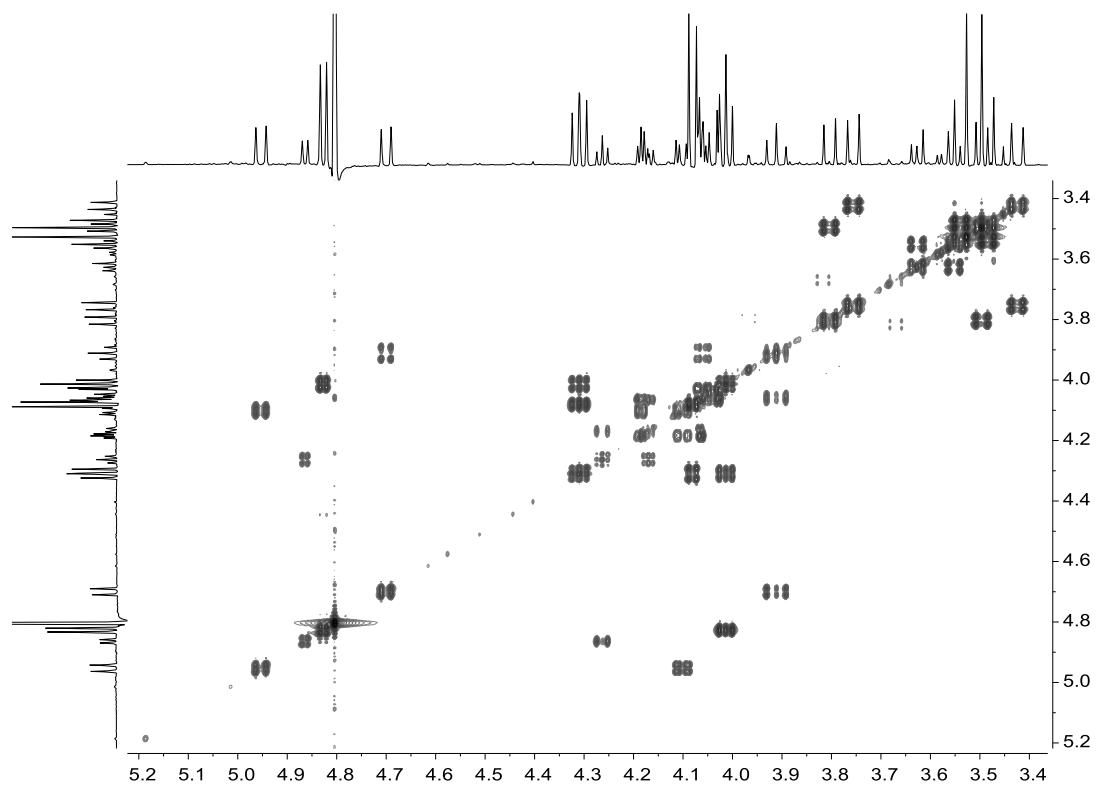
a)



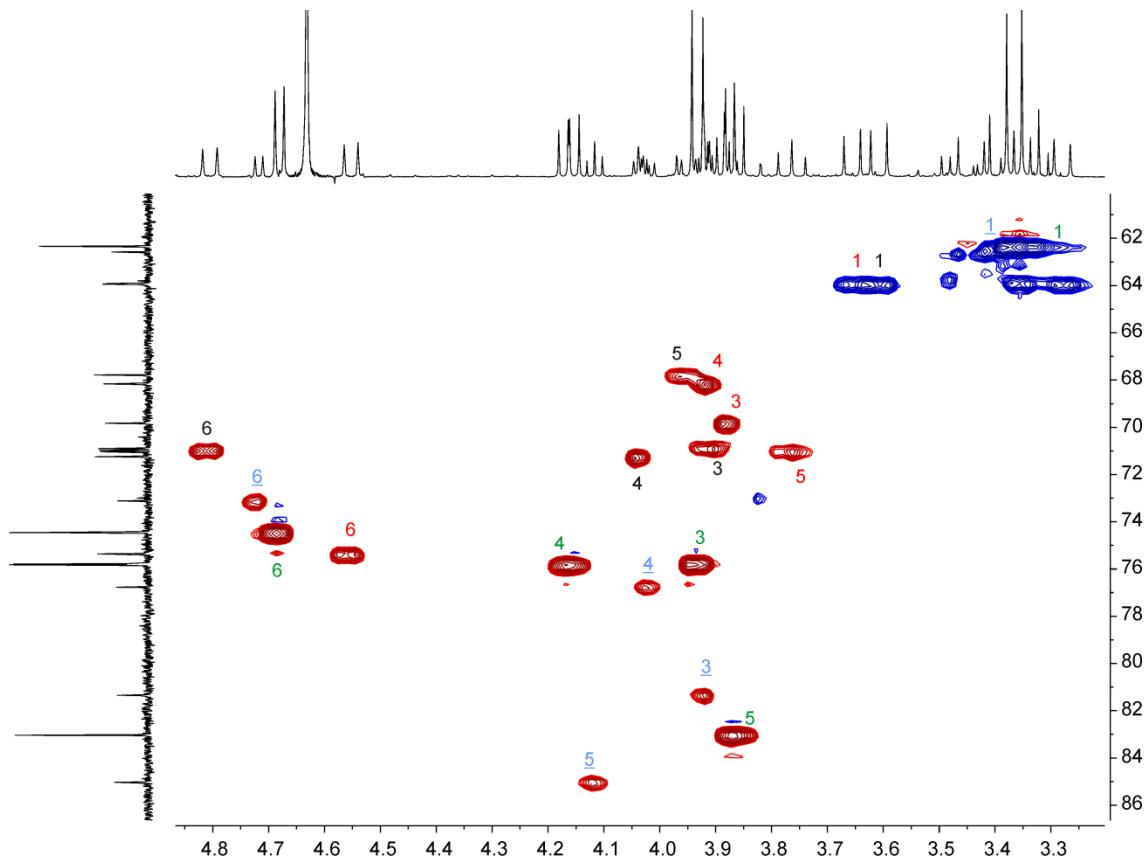
b)



c)



d)



e)

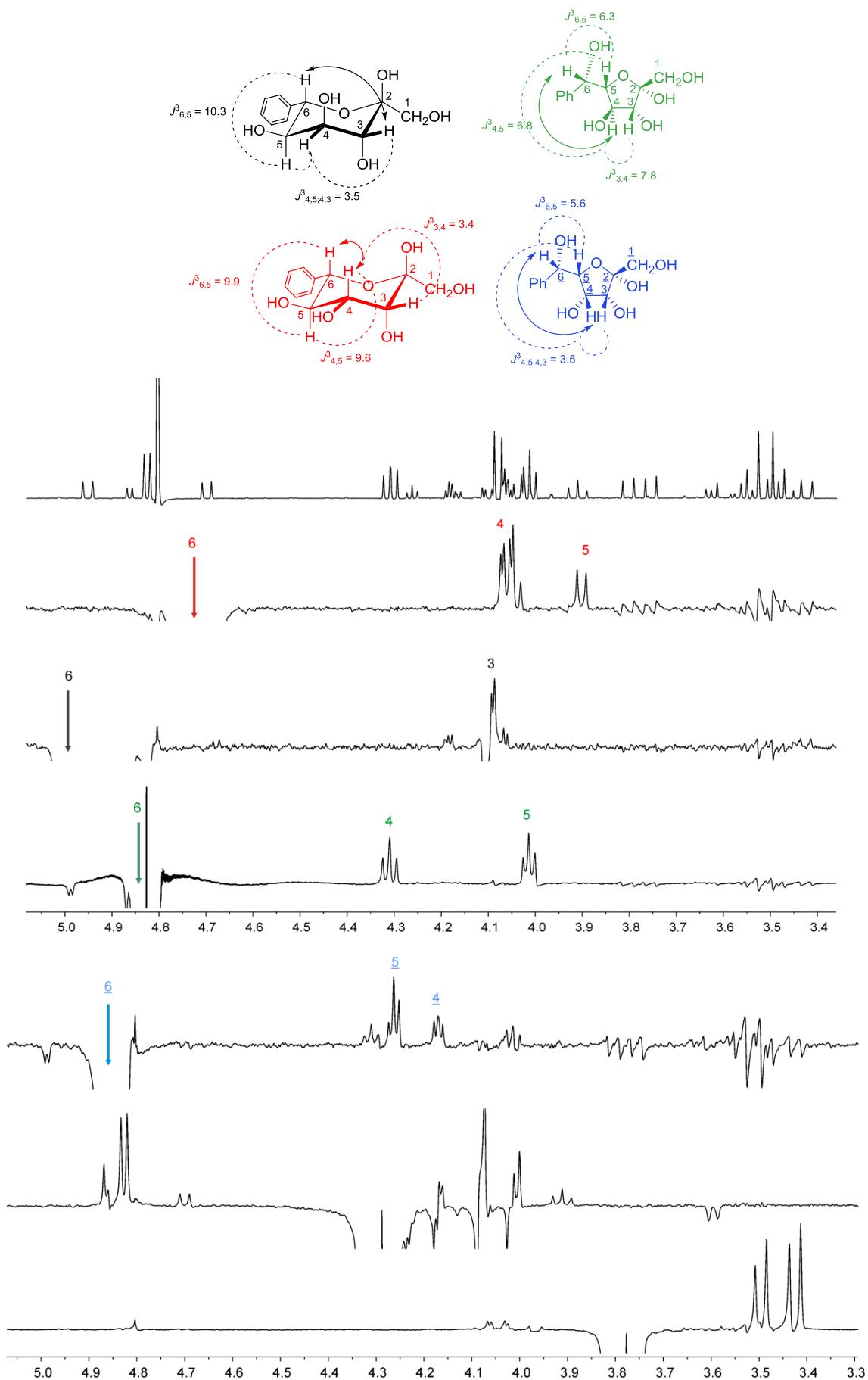
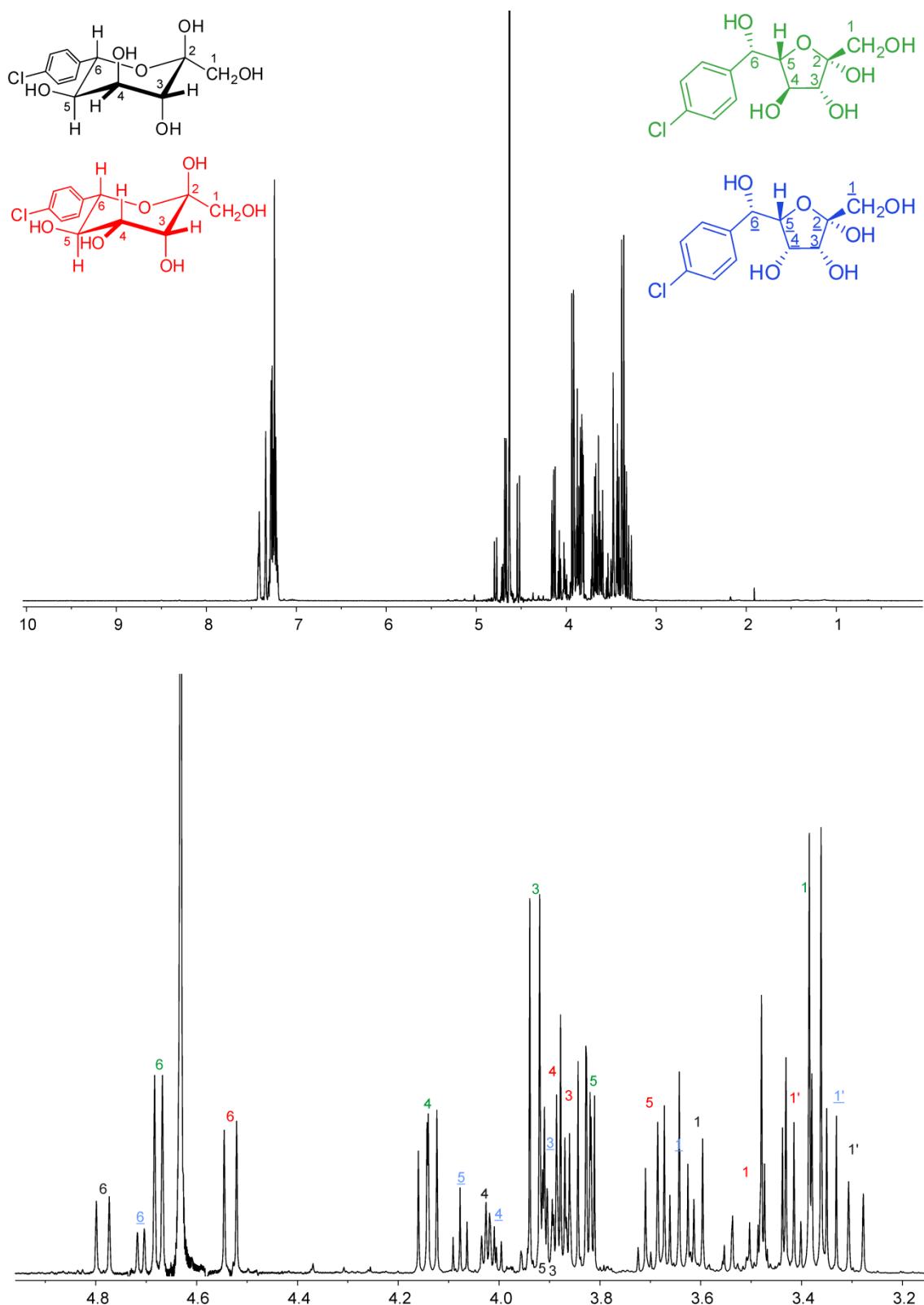
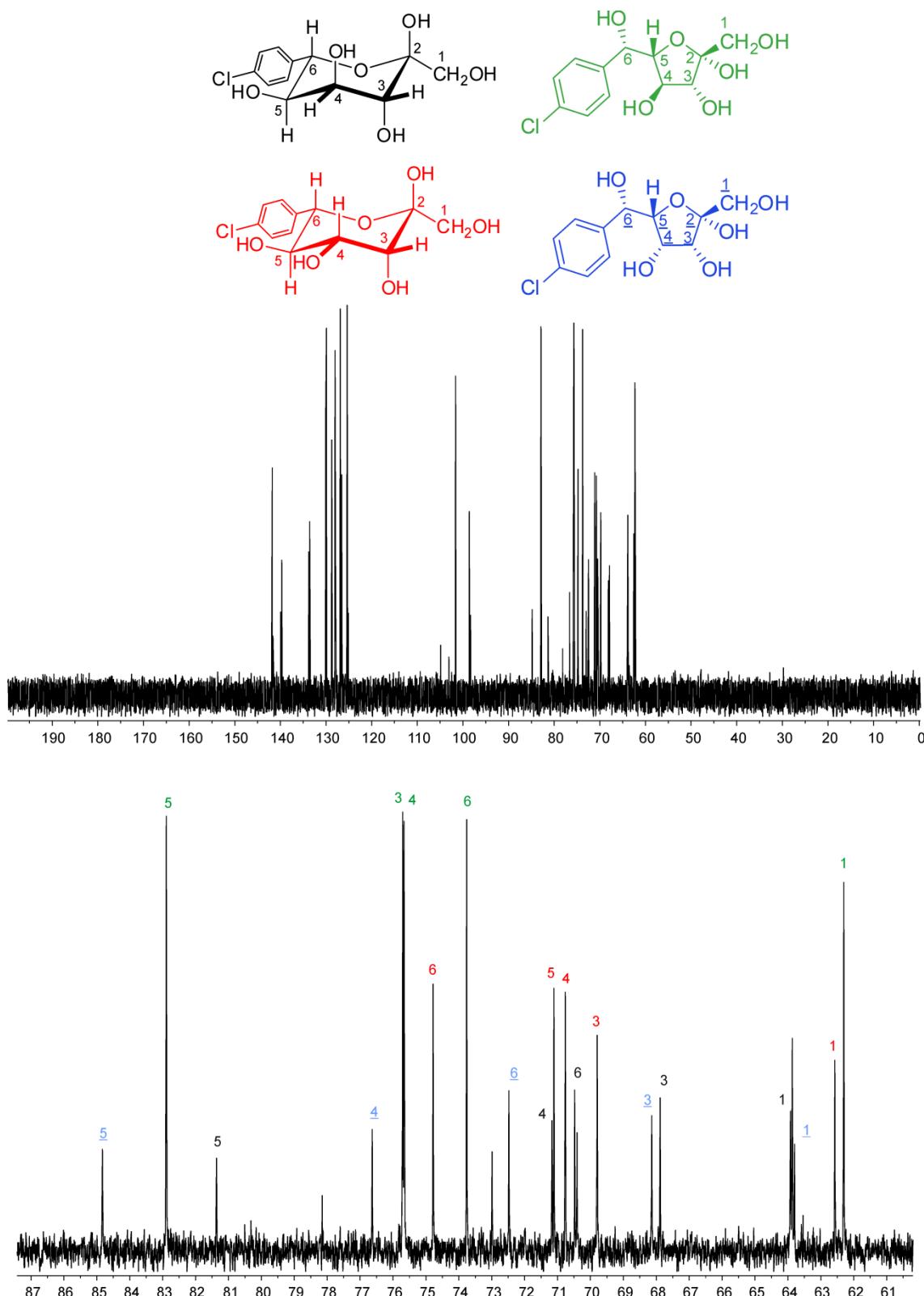


Figura26S(3.2) Espectros de RMN (D_2O) de **15k** y **16k**: a) 1H ; b) ^{13}C ; c) COSY; d) HSQC.

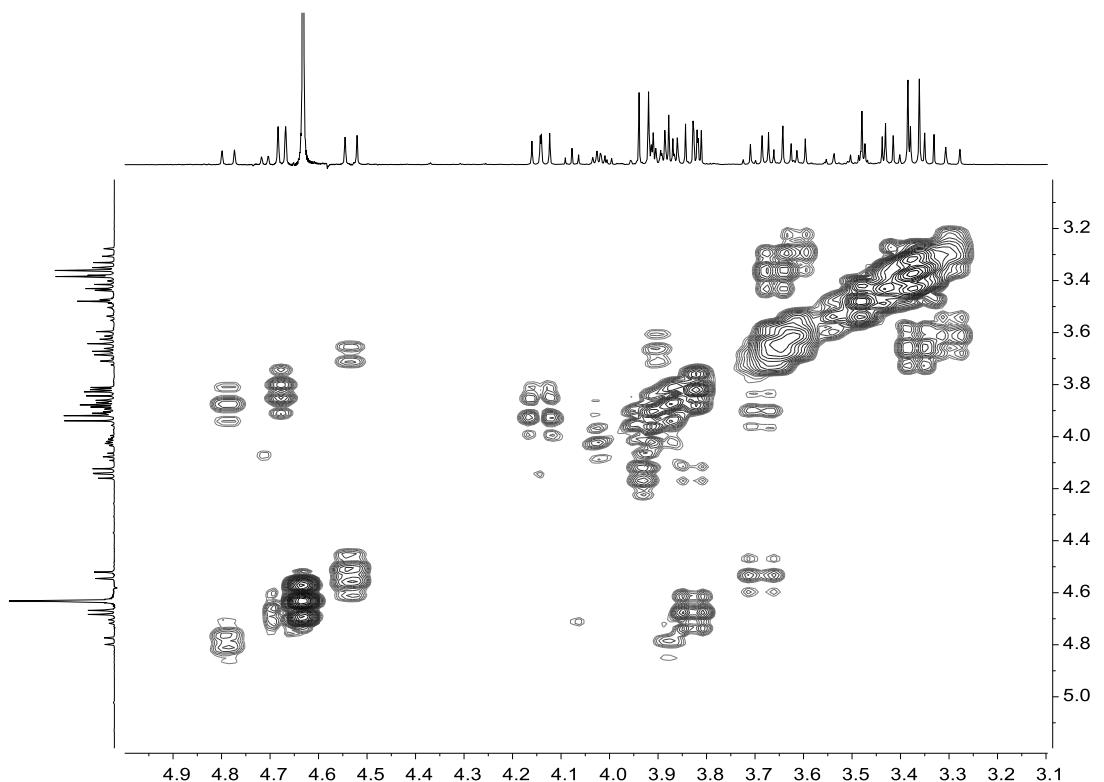
a)



b)



c)



d)

