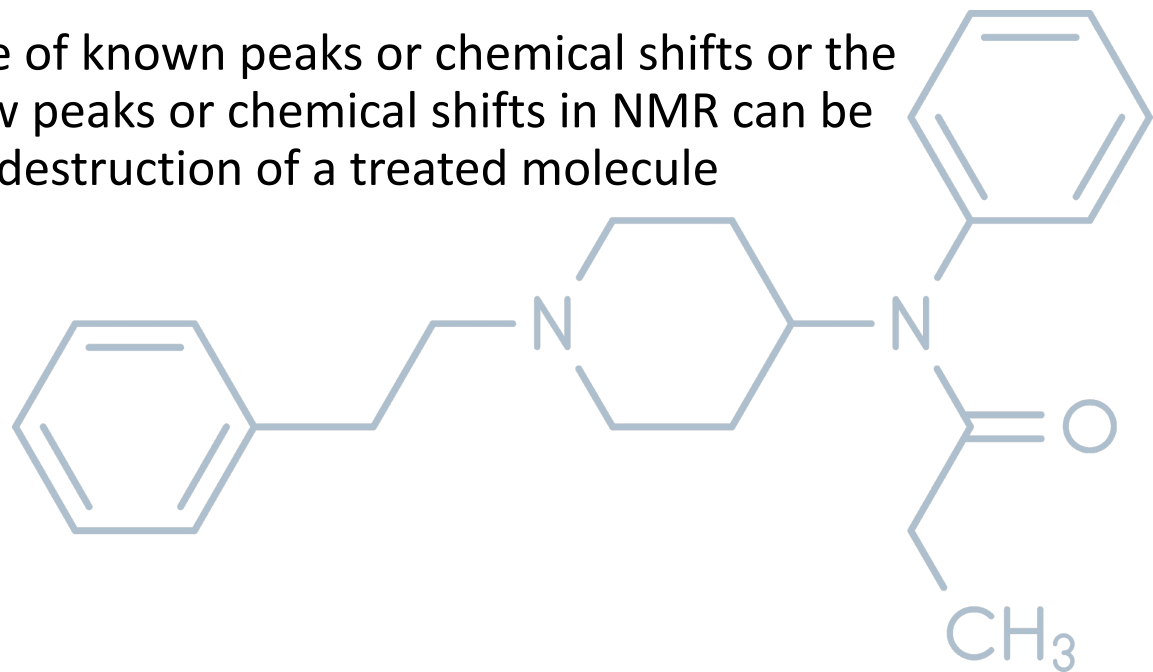
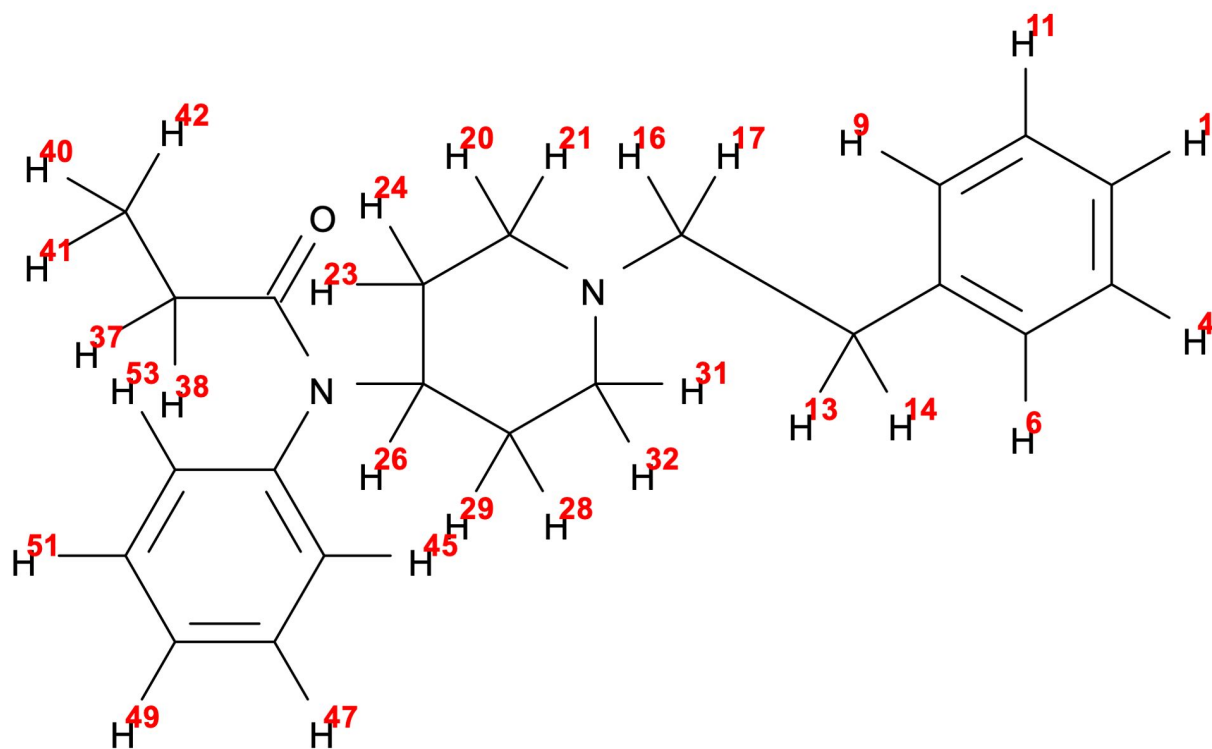


# Analysis of fentanyl and heroin treated with SoRite<sup>®</sup>

- Fentanyl ( $C_{22}H_{28}N_2O$ ) and heroin ( $C_{21}H_{23}NO_5$ ) were treated with SoRite and then analyzed using  $^1H$  NMR in the solvent  $D_2O$
- By analyzing the different chemical shifts of hydrogen that occur in  $^1H$  NMR, each hydrogen group in a molecule can be identified
- The disappearance of known peaks or chemical shifts or the appearance of new peaks or chemical shifts in NMR can be used to verify the destruction of a treated molecule

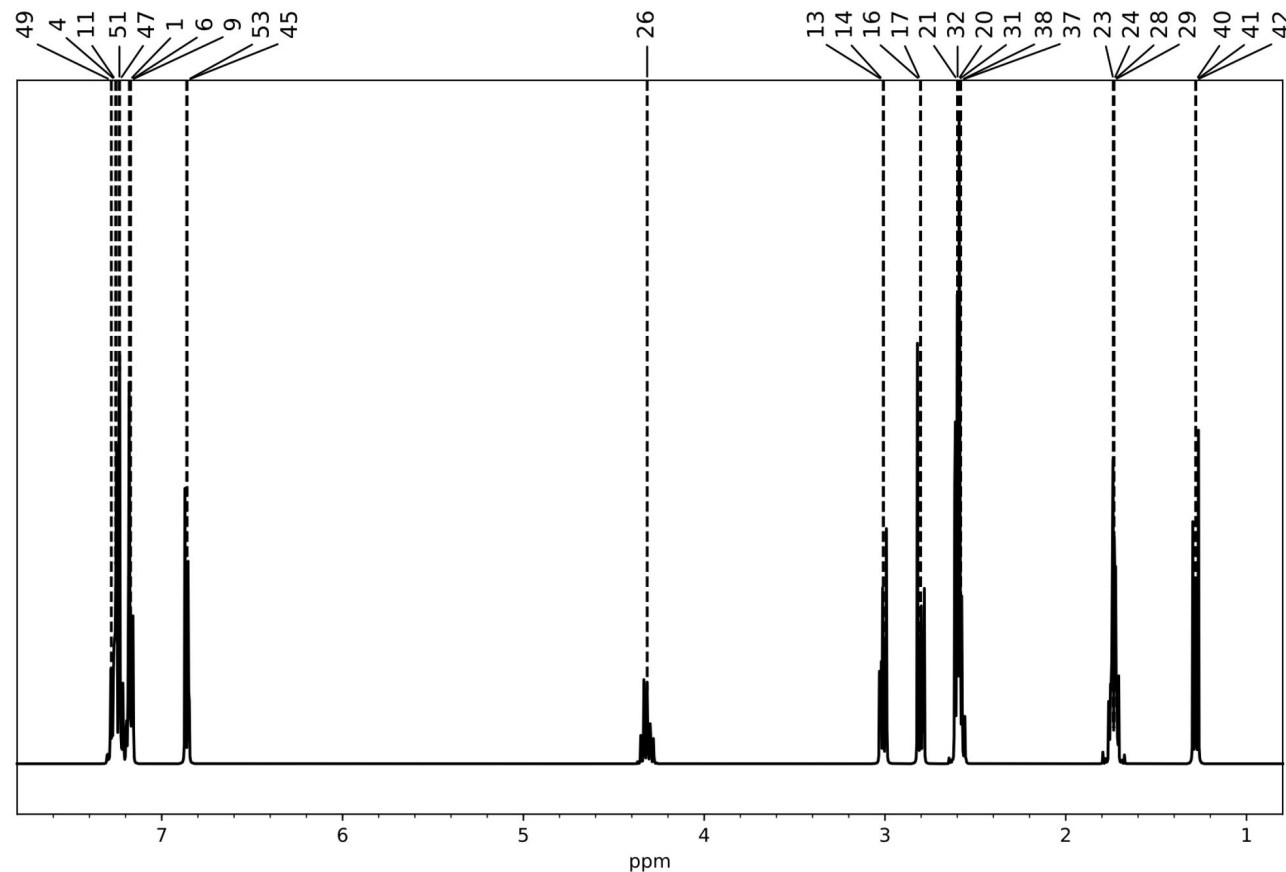


# Chemical shifts of the hydrogen groups in fentanyl (C<sub>23</sub>H<sub>27</sub>N<sub>2</sub>O) dissolved in D<sub>2</sub>O



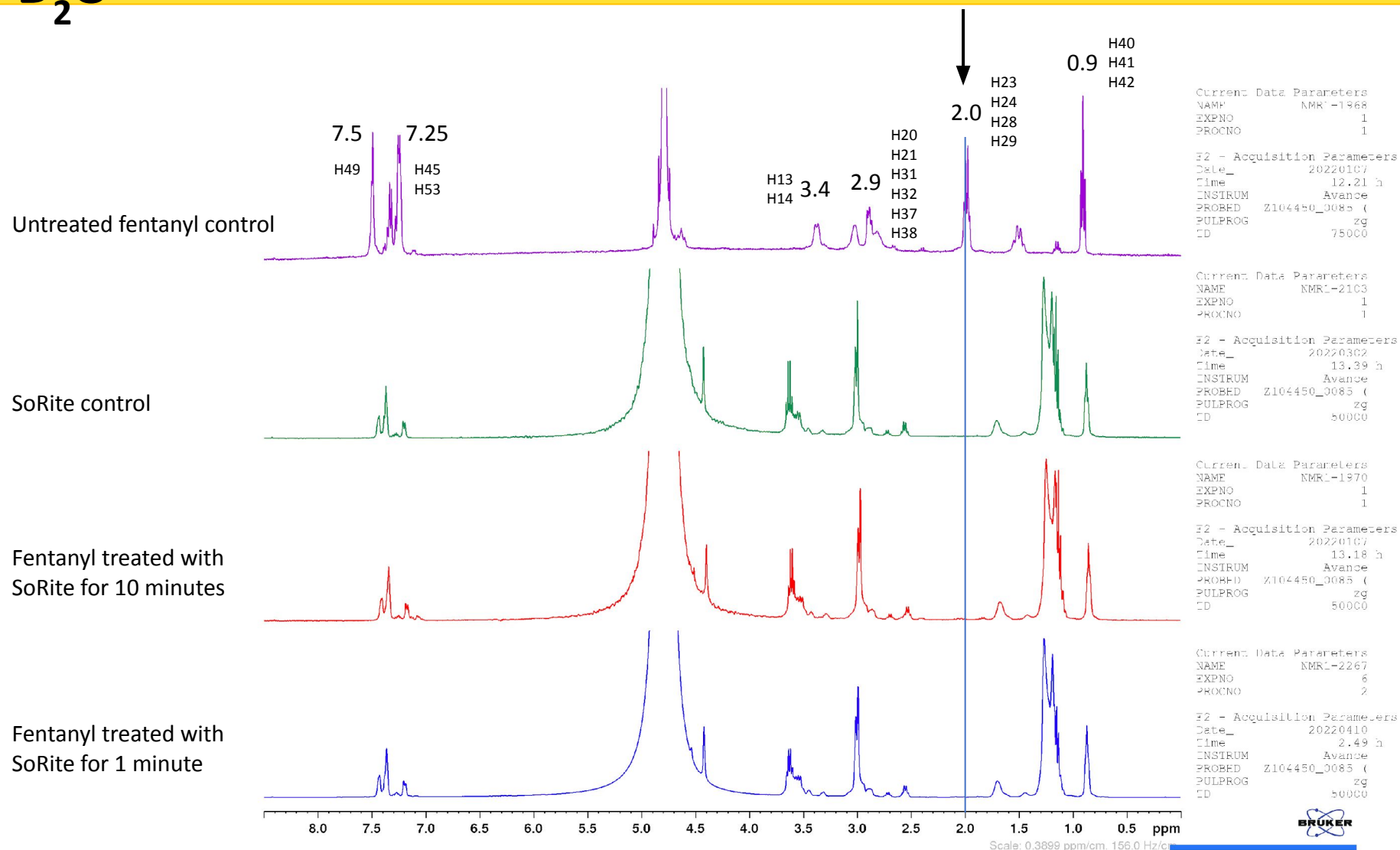
H1, 7.179	H28, 4.735
H4, 7.254	H29, 1.735
H6, 7.173	H31, 2.598
H9, 7.173	H32, 2.598
H11, 7.254	H37, 2.582
H13, 3.009	H48, 2.582
H14, 3.009	H40, 1.281
H16, 2.803	H41, 1.281
H17, 2.803	H42, 1.281
H20, 2.598	H45, 6.861
H21, 2.598	H47, 7.234
H23, 1.735	H49, 7.279
H24, 1.735	H51, 7.234
H26, 4.315	H53, 6.861

# Chemical shifts of the hydrogen groups in fentanyl ( $\text{C}_{22}\text{H}_{28}\text{N}_2\text{O}$ ) dissolved in $\text{D}_2\text{O}$



R.J. Abraham RJ, Mobli M. 2008. Modelling  $^1\text{H}$  NMR Spectra of Organic Compounds: Theory, Applications and NMR Prediction Software. Wiley, Chichester, 2008.

# Analysis of fentanyl treated with SoRite<sup>®</sup> in the solvent D<sub>2</sub>O

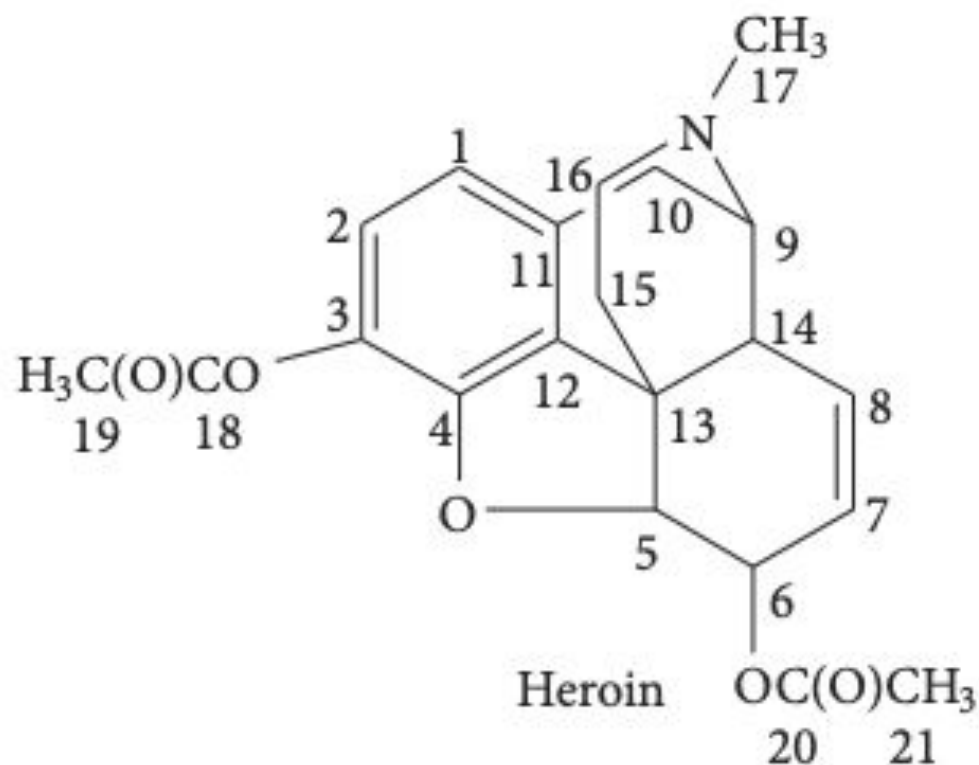


# Analysis of fentanyl treated with SoRite<sup>®</sup>

The loss of H23, H24, H28  
and H29 indicates that  
fentanyl is destroyed by  
the oxidation of  
one or both of the  
nitrogen groups

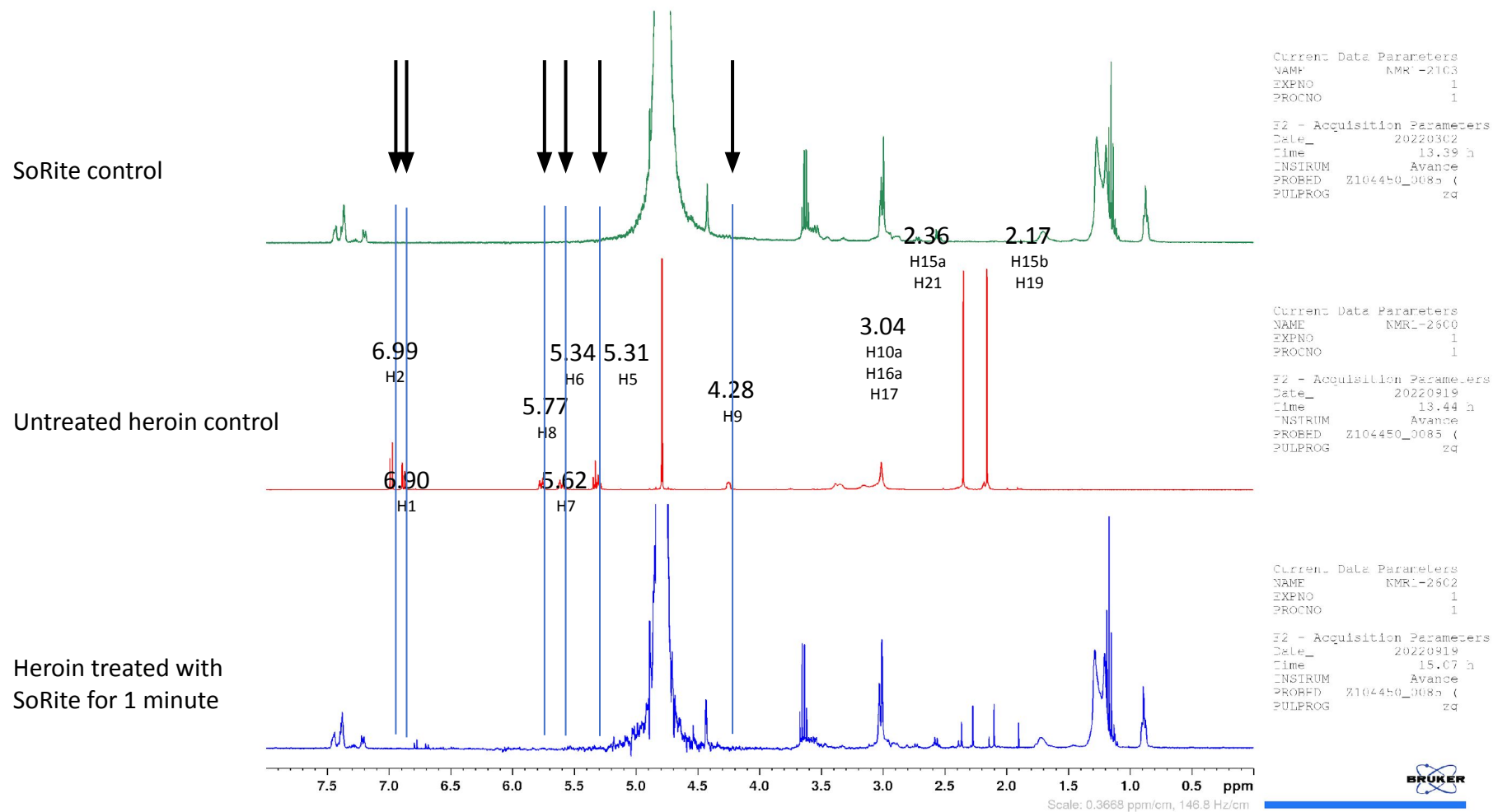


# Chemical shifts of the hydrogen groups in heroin ( $C_{21}H_{23}NO_5$ ) dissolved in $D_2O$



H1, 6.90	2.17, H15b, H19
H2, 6.99	2.36, H15a, H21
H5, 5.31	3.04, H10a, H16a, H17
H6, 5.34	3.18, H14
H7, 5.62	3.39, H10b, H16b
H8, 5.77	4.28, H9
H9, 4.28	5.31, H5
H10a, 3.04	5.34, H6
H10b, 3.39	5.62, H7
H14, 3.18	5.77, H8
H15a, 2.36	6.90, H1
H15b, 2.17	6.99, H2
H16a, 3.04	
H16b, 3.39	
H17, 3.04	
H19, 2.17	
H21, 2.36	

# Analysis of heroin treated with SoRite<sup>®</sup> in the solvent D<sub>2</sub>O



# Analysis of heroin treated with SoRite<sup>®</sup>

•The loss of H1, H2, H5, H6, H7, H8 and H9 indicates that heroin is destroyed by the oxidation of the ring-bound oxygen group

