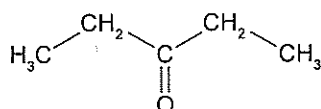


4. The following three sets of chemical shifts are produced by pentanal, pentan-2-one and pentan-3-one.

i.	13.8	22.4	24.3	43.6	201.3
ii.	13.5	17.5	29.3	45.2	206.6
iii.	8.0	35.5	210.9		

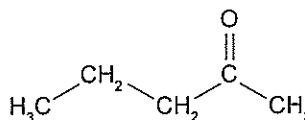
Use your knowledge to evaluate which set of shifts goes with which compound. Justify your answer.

a. pentan-3-one



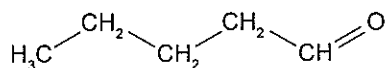
iii. 8.0, 35.5, 210.9

b. pentan-2-one



ii. 13.5, 17.5, 29.3, 45.2, 206.6

c. pentanal



i. 13.8, 22.4, 24.3, 43.6, 201.3

Explanation:

Pentan-3-one is symmetric and therefore has three chemical environments. This means it is the set iii. In addition to the C=O (180-220), pentan-2-one will have two deshielded peaks (CH₂ and CH₃ attached to C=O), one CH₂ and one CH₃. Conversely pentanal will have one deshielded peak, aside from C=O, two CH₂'s and one CH₃. In addition to a C=O signal, set ii has two peaks with high chemical shift and two with low chemical shift whereas set i has one high chemical shift two mediums and a low chemical shift. Therefore set ii fits pentan-2-one and set i fits pentanal.
