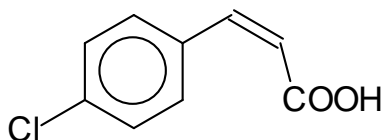


MARK ONE ANSWER FOR EACH QUESTION ON BOTH THE EXAM AND YOUR SCANTRON!

1. What happens to the energy difference between the parallel and antiparallel spin states of protons in an external magnetic field as the field strength doubles?

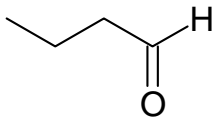
- A. It stays the same
- B. It doubles as well
- C. It decreases to $\frac{1}{2}$ of its former value
- D. It quadruples
- E. It increases, but the extent of the increase can only be determined experimentally

2. How many non-equivalent types of protons (protons distinguishable by NMR) does the compound below have?



- A. 2 B. 3 C. 4 D. 5 E. more than 5

3. Butanal, shown below, generates a characteristic cation radical resulting from McLafferty rearrangement. What m/z value would you expect this cation radical to have? (Hint: it might help if you sketch out the rearrangement of this aldehyde. Assume the atomic masses of C, H, and O are 12, 1, and 16, respectively)



- A. 28 B. 35 C. 39 D. 44 E. 71

4. This is version B. Please circle 4 B on your scantron!

Key qu232-01_1_101

1. B
2. D
3. D