

Solutions

Original marking guidance: M1 method, A1 accuracy, B1 explanation.

2.1 $2(12.0000) + 6(1.0078) + 15.9949 = 46.0417$.

2.2 Two in propanone, three in propanal; propanone has equivalent methyl carbons whereas propanal does not.

2.3 $R_f = 4.2/7.0 = 0.60$, no units. Same solvent/stationary-phase conditions.

3.1 Ethyl ethanoate $\text{CH}_3\text{COOCH}_2\text{CH}_3$. Acyl CH_3 singlet; OCH_2 quartet; terminal CH_3 triplet. Integration gives relative H counts, not unique connectivity; shifts/splitting/formula are also needed.

3.2 Different compounds can share retention time; co-eluting components can form one peak. Mass/fragment evidence supplies an additional structural constraint. Matched standards/blanks and sample provenance/contamination controls test the reliability of attribution.