

Question Number	Acceptable Answers	Reject	Mark
1 (a)	<p>(IR spectrum of X)</p> <p>peak at 3400 (cm⁻¹) (1)</p> <p><i>MAY BE ANNOTATED ON SPECTRUM</i></p> <p><i>ALLOW</i> anything in the Data Booklet range which is 3200 to 3750 (cm⁻¹)</p> <p>X has an O-H (group) OR X is an alcohol (1)</p> <p>(From the chemical information)</p> <p>X is primary or secondary (alcohol) OR X is not tertiary (alcohol) OR X is any two from:</p> <p>butan-1-ol, butan-2-ol, (2)-methylpropan-1-ol (1)</p> <p>Y is an aldehyde or a ketone <i>ALLOW</i> “ Y is a carbonyl” (1)</p> <p><i>NOTE RE THIRD/FOURTH SCORING POINTS:</i></p> <p>If just state that X is butan-1-ol with no justification (0) but then go on to state Y is butanal, give (1) CQ mark</p> <p>OR</p> <p>If just state that X is butan-2-ol with no justification (0) but then go on to state Y is butanone, give (1) CQ mark</p> <p>OR</p> <p>If just state that X is (2)-methylpropan-1-ol with no justification (0) but then go on to state Y is (2)-methylpropanal, give CQ mark (1)</p> <p>NOTE: These Part (a) marks may be awarded from answers to either Part (a) or Part (b)</p>	X is a phenol (0)	4

1 (b)
QWC

First two marks:

X is $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$ (1)

Y is $\text{CH}_3\text{COCH}_2\text{CH}_3$ (1)

These marks are stand alone

NOTE: Two correct names, but no structural formulae for both scores (1) out of (2)

If X identified as $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
and
and Y identified as $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$

award (1) unless previously credited in (a)

(NMR spectrum of X)

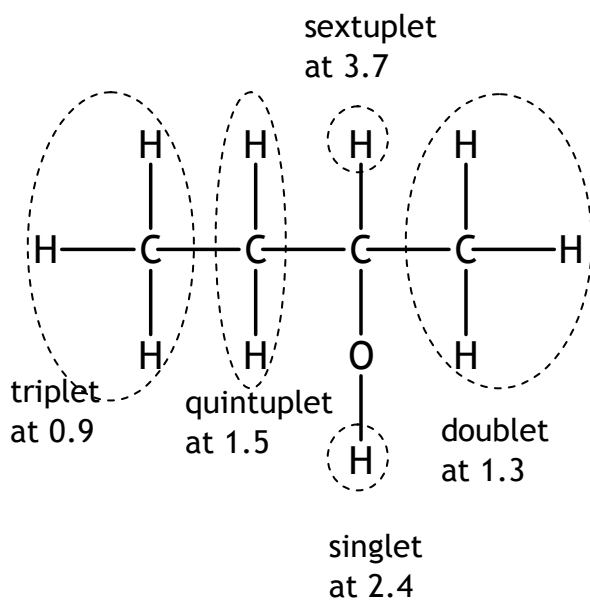
Third mark:-
hydrogen OR H in five (different) environments

(*IGNORE* reference to butan-1-ol here)

OR

(so must be butan-1-ol or butan-2-ol and) **not**
2-methylpropan-1-ol which has four
peaks/hydrogen environments (1)

NOTE: Candidates may annotate a structural or displayed formula to show that there are five environments. (For this mark, no details of splitting or chemical shifts are needed.)



splitting pattern (2,6,1,5,3) consistent with
butan-2-ol

OR

splitting pattern inconsistent with butan-1-ol
(which is 3,6,5,3,1) (1)

Fourth mark:-

splitting pattern (2,6,1,5,3) consistent with butan-2-ol

OR

splitting pattern inconsistent with butan-1-ol (which is 3,6,5,3,1)

OR

assign peaks correctly quoting chemical shifts from the spectrum

(1)

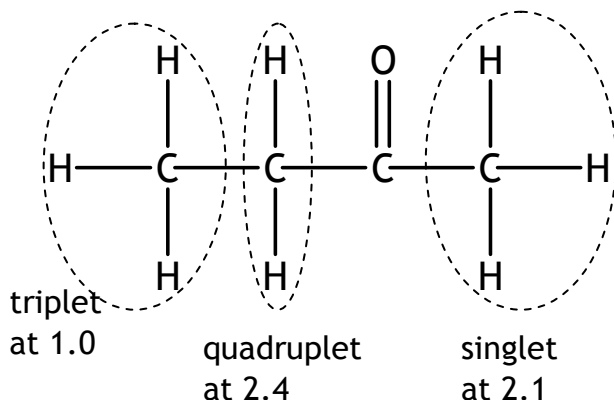
(NMR spectrum of Y)

Fifth mark:-

hydrogen OR H in three (different) environments

(1)

NOTE: Candidates may annotate a structural or displayed formula to show that there are three environments. (For this mark, no details of splitting or chemical shifts are needed.)



Sixth mark:-

splitting pattern (1,4,3) is consistent with butanone

OR

splitting pattern is inconsistent with butanal (which is 3,6,4,3)

OR

splitting pattern inconsistent with 2-methylpropanal (which is 2,8,2)

OR

assign peaks correctly quoting chemical shifts from the spectrum

(1)

