



Student Book Unit 4 Test 2 Mark scheme (Chapters 1.6 to 1.7)

- 1 a Object and mirror-image are non-superimposable / contains a carbon atom with four different groups (1) (1)
 accept asymmetric molecule
 not asymmetric carbon atom or rotates the plane of polarised light
- b (i) Rotates (plane of polarisation of) plane-polarised (monochromatic) light or has a non-superimposable mirror image (1)
 not bends/twists light
 if they say 'contains chiral carbon' this must be explained or indicated on the diagram for (1)
- (ii)
- $$\begin{array}{c} \text{CH}_2\text{CH}_3 \\ | \\ \text{C} \cdots \cdots \text{Br} \\ / \quad \backslash \\ \text{CH}_3 \quad \text{H} \end{array}$$

\vdots

$$\begin{array}{c} \text{CH}_2\text{CH}_3 \\ | \\ \text{Br} \cdots \cdots \text{C} \\ / \quad \backslash \\ \text{H} \quad \text{CH}_3 \end{array}$$
- Structure (1); correct mirror image (1) (3)
 must be 3D drawing for (2) – if it is drawn flat only (1)
 if a correct mirror image of an incorrect but chiral compound then (1) – the chiral compound must be feasible to get this mark
- c (i) A species with a lone pair of electrons to donate (1)
 not 'seeks protons in nucleus' or 'nucleus loving' or 'has a negative charge'
- (ii) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$ (1)
 consequential alcohol on answer to part b (ii)
 the structure must be sufficiently clear to show butan-2-ol
- $$\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ | & | & | & | \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ | & | & | & | \\ \text{H} & \text{H} & \text{OH} & \text{H} \end{array}$$

is OK
- (iii) Add PCl_5 (1); (steamy) (acid) fumes / white gas (1) (4)
 if $\text{PCl}_5(\text{aq})$ then (0)
 any other suitable test and result acceptable e.g.
 sodium (1); bubbles (1)
 potassium dichromate(VI) (1); green (1)
 potassium manganate(VII) (1); brown/colourless (1)
 add carboxylic acid and conc. sulfuric acid (1); sweet smell (1)
 I_2/NaOH or KI/NaClO (1); yellow ppt. (1)
 consequential on answer given to part c (iii)
- d (i) hydrolysis / saponification (1)
 not substitution
- (ii) Yield falls; reaction with acid is an equilibrium (1) (2)
- e (i) Ethanoic acid (1)
- (ii) CH_3COOH / CH_3COO^- (1)
- (iii) $\text{HCl}/\text{H}_3\text{O}^+$ is a stronger acid (1) than ethanoic acid (1) (4)
 or CH_3COO^- strong base (1) whereas Cl^- weaker base (1)

(Total 14 marks)



Student Book Unit 4 Test 2 Mark scheme (cont.)

2 a **A – F – G – C – D – E – B (2)** (2)

(1) if one letter out of sequence but rest correct; (0) if two or more letters out of sequence
if adjacent pair inverted this is one error.

b **Little** – to produce a saturated solution / to prevent loss of solid /
because all solid will not crystallise / to prevent loss of yield. (1)

Small – (if large volume used) solid would be lost/dissolved (1)

(2)

(Total 4 marks)

3 a Reasoning/identification of peaks:

3 types of H ratio 6 : 1 : 1 or some correct reference to height of peaks (1)

this related to structure of propan-2-ol in shift data (1)

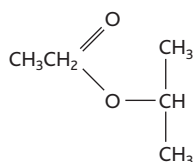
(2)

b Yellow ppt. (1); hospital smell (1)

(2)

c (1)

(1)



d Propene (1); dehydration/elimination (1)

(2)

(Total 7 marks)

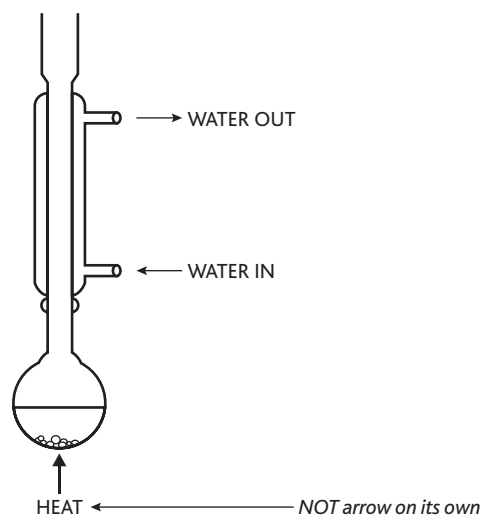
4 a (Wear) gloves / add slowly / cool while adding (1)

(1)

if multiple answers correct and incorrect (0)

not lab. coat / be careful not to spill on hands / do in a fume cupboard

b (i)



Flask (round or pear shaped only) + heat (1)

Vertical condenser (double surface and water inlet and outlet) (1)

(2)

not sealed, no gaps, joint shown between flask and condenser safe
not distillation, if water in/out labelled they must be correct



Student Book Unit 4 Test 2 Mark scheme (cont.)

(ii) (Fractionally) distil (1)

Collect fraction that distils over at about 56 °C / stated range 55–57 °C

or 54–58 °C (1)

(2)

a temperature value / range must be quoted

not 'collect fraction above 56 °C'

mark independently

c PCl₅ / SOCl₂ (1); no steamy fumes / no gas which turns blue litmus red (1) (2)

or K₂Cr₂O₇ + H₂SO₄ (1); no colour change / stays orange (1)

or KMnO₄ + H₂SO₄ (1); no colour change / stays purple (1)

or Na (1); no bubbles / no effervescence (1)

name or formula can be given

ignore oxidation numbers unless they are incorrect

results may be given as negative tests – or as 'if propan-2-ol was present there would be steamy fumes'

result mark is dependent on correct reagent but may have result mark if minor error in reagent

must be a chemical test – e.g. not 'check that boiling point is 56 °C exactly'

(Total 7 marks)