

M1.(a) percentage of oxygen is 58.33 1

correct calculation of ratios (C 3.125, H 4.17, O 3.645) 1

clearly relates ratios to formula eg
simplifies ratios (C 1, H 1.29, O 1.17) or for H then $3.125 \times 8 / 6 = 4.17\%$ etc 1

Notes

* correct percentage of oxygen can be stated or shown clearly in a calculation

* to score final mark must **clearly** show how ratios relate to $C_6H_8O_7$

* allow full credit to candidate who correctly finds

percentage of oxygen

calculates M_r

shows percentage of H is 8 divided by M_r

(b) carbon dioxide / CO_2 1

(c) (i) suitable reaction vessel
eg sealed flask or test-tube with side arm or
eg tube in bung 1

suitable collection method
eg gas syringe / over water in measuring
eg cylinder 1

Notes

* collection vessel must allow measurement of gas

* if apparatus would leak lose second mark

* ignore heating

* can draw tubing as single line

* accept 2D or 3D diagrams

* do not need labels, and ignore mis-labelling

(ii) (1) mass on x -axis 1

Notes

* If axes unlabelled use data to decide that mass

is on the x-axis

sensible scales

1

Notes

* lose this mark if the **plotted points** do not cover at least half of the paper

* lose this mark if the graph plot goes off the squared paper

plots points correctly \pm one square

1

- (2) draws appropriate straight line of best fit, omitting point at 1.17g / 86 cm³

Notes

* lose this mark if the line deviates towards the point at 1.17g / 86 cm³

* candidates does not have to extrapolate the line to the origin to score this mark

* when checking for best fit, candidate's line **must** go through the origin \pm one square. Extend candidate's line if necessary

1

- (3) 129 \pm 1 cm³

Notes

* accept this answer **only**

1

- (d) CO₂ / gas formed distends stomach / produces wind / increases pressure in stomach

1

- (e) molecular formula has to be a simple multiple of the empirical formula

1

so approximate M_r value will distinguish between the options or equivalent wording

1

(f) gas escapes before bung inserted any 2 × 1 for

syringe sticks

carbon dioxide soluble in water

Notes

* *do not accept 'operator error' / 'inaccurate equipment' / 'equipment leaks'*

2

(g) volume depends on pressure and temperature

Notes

* *do not accept 'to get a more accurate result' or equivalent wording without qualification*

1

(h) Tablets could vary between samples or equivalent wording

Notes

* *do not accept 'to get a more accurate / reliable result' or 'to make a fair test' without qualification*

1

(i) (i) NaHCO₃ **least** soluble

1

(ii) exhaust gases passed into mixture of NaCl and NH₃

1

(j) $2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$

Notes

* *accept multiples*

1

(k) 106.0 divided by 217.1 × 100 = 48.8%

Notes

* *ignore precision of answer*

1

