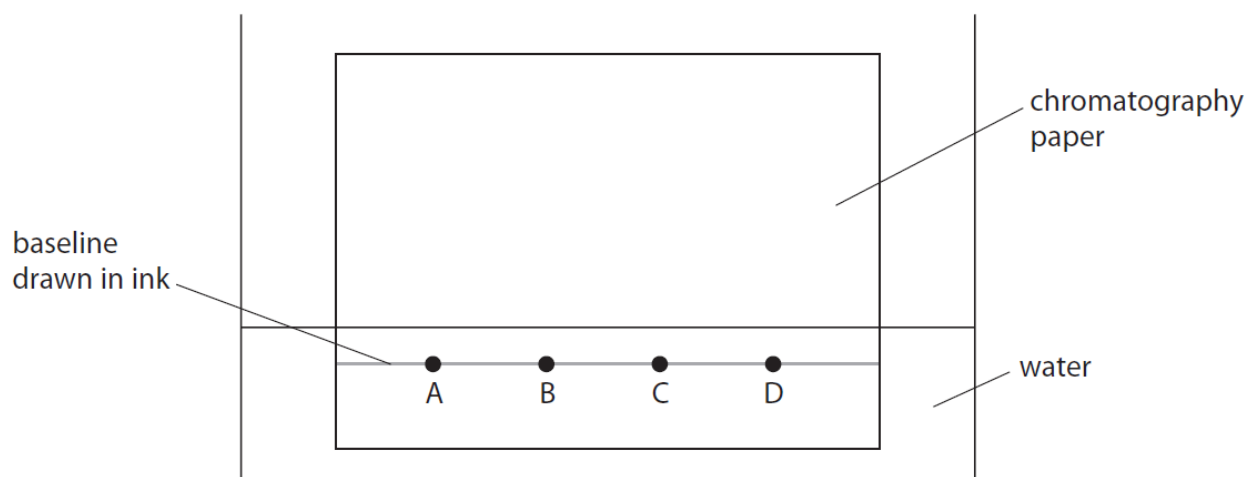


ACTIVITY 5a – AO3 in Exams

Paper 1C, Q4(a)

4 A student uses this apparatus to investigate the colours in four different inks, A, B, C and D.



(a) Explain two mistakes the student made when setting up his experiment.

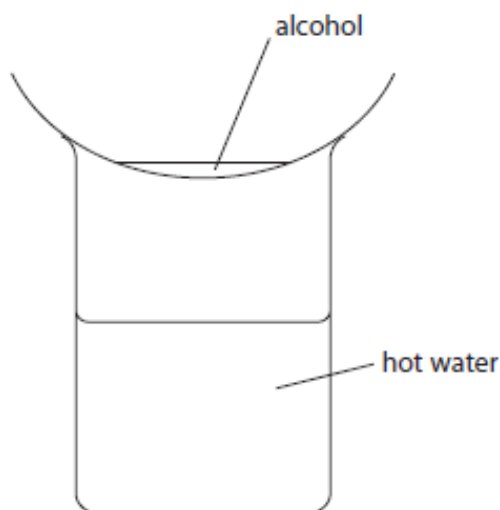
(4)

Question number	Answer	Notes	Marks
4 a	<p>Explanations that link together the following two pairs of points:</p> <p>M1 baseline has been drawn in ink</p> <p>M2 and therefore it will interfere with /contaminate the results</p> <p>M3 the water level is above the ink spots</p> <p>M4 and therefore the inks will mix with the water</p>	<p>ACCEPT not drawn in pencil</p> <p>ACCEPT will produce other colours/will move up the paper/will get mixed up with the ink samples</p> <p>ALLOW pencil will not interfere with the results/ pencil will not dissolve</p> <p>ACCEPT too high/above the baseline</p> <p>ACCEPT the spots are under water</p> <p>ACCEPT the inks will dissolve in the water / the inks will wash off the paper</p>	4

Paper 2C, Q3(c)(i), (ii) & (iii)

- 3 Methanol, ethanol, propanol and butanol are alcohols. They are all liquids that evaporate easily when warmed.

A student uses this apparatus to compare the time taken for the four liquids to evaporate.



She uses this method.

- pour some methanol into an evaporating basin
- place the evaporating basin on top of a beaker containing hot water
- measure the time taken for the methanol to evaporate completely
- repeat the experiment with each of the other alcohols, using the same apparatus

(c) The table shows the results of experiments done by four students, A, B, C and D.

Alcohol	Formula of alcohol	Time taken for liquid to evaporate in s				
		Student A	Student B	Student C	Student D	Mean time in s
methanol	CH ₃ OH	20	24	22	26	23
ethanol	C ₂ H ₅ OH	32	34	35	30	33
propanol	C ₃ H ₇ OH	45	47	50	48	48
butanol	C ₄ H ₉ OH	64	63	90	60	

- (i) Calculate the mean (average) time for butanol to evaporate.

(2)

- (ii) Explain how the results show which alcohol evaporates most easily.

(2)

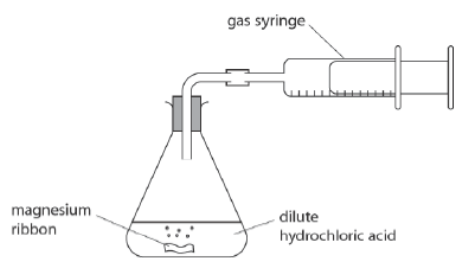
- (iii) State the relationship between the number of carbon atoms in the molecule and how easily the alcohol evaporates.

(2)

Question number	Answer	Additional guidance	Marks
3 (c)	(i) M1 $(64 + 63 + 60) \div 3$ M2 = 62	ALLOW 62.3 62/62.3 with no working scores 2 ALLOW 69/69.25/69.3 for 1 mark	2
	(ii) An explanation including the following two points: M1 methanol/ CH_3OH (evaporates most easily) M2 because the time taken is the shortest	ACCEPT because has lowest (mean) time	2
	(iii) M1 as the number of carbon atoms increases M2 the ease of evaporation decreases/the less easily the alcohol evaporates	ALLOW the less volatile the alcohol IGNORE the slower the alcohol evaporates IGNORE references to time taken ALLOW correct reverse argument	2

Paper 1C, Q13(a) & (b)

13 A student uses this apparatus to investigate the rate of reaction between magnesium and an excess of dilute hydrochloric acid.



She uses this method.

- use a graduated beaker to pour 50 cm^3 of dilute hydrochloric acid of concentration 2.00 mol/dm^3 into the conical flask
- add a piece of magnesium ribbon of mass 0.086 g to the acid and put the bung into the neck of the flask
- measure the total volume of gas collected every ten seconds until the reaction stops

The table shows the student's results.

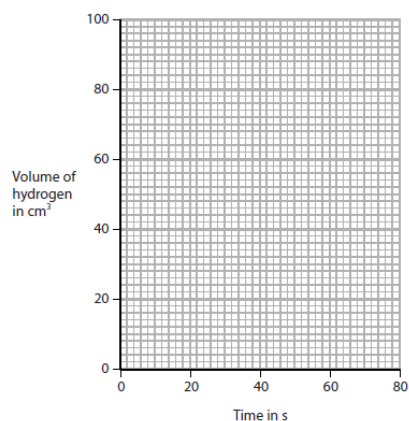
Time in s	Volume of hydrogen in cm^3
0	0
10	29
20	52
30	67
40	76
50	81
60	84
70	84
80	84

(a) (i) Plot the student's results on the grid.

(1)

(ii) Draw a curve of best fit.

(1)



(b) (i) The student repeats the experiment using

- 0.043 g of magnesium ribbon
- 50 cm^3 of 2.00 mol/dm^3 hydrochloric acid

Draw, on the grid in part (a), the curve you would expect in this experiment.

Label this curve Y.

(2)

(ii) The student repeats the experiment again, using

- 0.086 g of magnesium ribbon
- 50 cm^3 of 2.00 mol/dm^3 hydrochloric acid
- a slightly higher temperature than the first experiment

Draw, on the grid in part (a), the curve you would expect in this experiment.

Label this curve Z.

(2)

Question number	Answer	Notes	Marks
13 a (i)		all points plotted correctly to + or - half a square	1
(ii)		curve of best fit drawn for points plotted	1

Question number	Answer	Notes	Marks
13 b i	M1 curve Y starting at origin and below original curve M2 levelling off at 42 cm^3 to + or - half a square		2
ii	M1 curve Z starting at origin and above original curve M2 levelling off at 84 cm^3 to + or - half a square	ACCEPT curves unlabelled If curves labelled incorrectly then deduct 1 mark	2