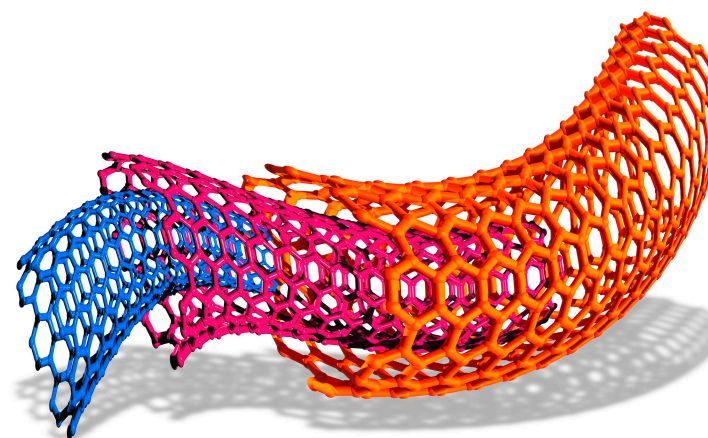




Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 3

Cambridge IGCSE™
Chemistry 0620



In order to help us develop the highest quality resources, we are undertaking a continuous programme of review; not only to measure the success of our resources but also to highlight areas for improvement and to identify new development needs.

We invite you to complete our survey by visiting the website below. Your comments on the quality and relevance of our resources are very important to us.

www.surveymonkey.co.uk/r/GL6ZNJB

Would you like to become a Cambridge International consultant and help us develop support materials?

Please follow the link below to register your interest.

www.cambridgeinternational.org/cambridge-for/teachers/teacherconsultants/

Copyright © UCLES 2017

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

UCLES retains the copyright on all its publications. Registered Centres are permitted to copy material from this booklet for their own internal use. However, we cannot give permission to Centres to photocopy any material that is acknowledged to a third party, even for internal use within a Centre.

3 The table shows some properties of the Group I metals.

metal	density in g/cm ³	melting point /°C	boiling point /°C
lithium	0.53	181	1342
sodium		98	883
potassium	0.86	63	760
rubidium	1.53	39	686
caesium		29	669

(a) (i) Describe the trend in boiling points of the Group I metals.

The decreases as it goes down. [1]

(ii) Predict the density of caesium.

2.5 [1]

(iii) Deduce the state of caesium at 20 °C.

Explain your answer.

Solid because it ~~boils~~ melts at 29°C. [2]

(b) Complete the word equation for the reaction of rubidium with water.

rubidium + water → rubidium oxide + Hydrogen [2]

Rb

Select
page

Your
Mark

3(a)(i)

3(a)(ii)

3(a)(iii)

3(b)

3(c)

3(d)(i)

3(d)(ii)

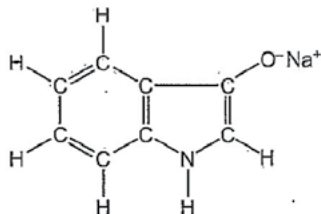
3(d)(iii)

3(d)(iv)

Q3 Mark scheme

(a)(i)	decreases down the Group I/increases up the Group I;
(a)(ii)	1.88 (1.60–2.50) (g/cm ³);
(a)(iii)	solid; 20 °C is below the melting point/the melting point is above 20 °C;
(b)	rubidium hydroxide; hydrogen;
(c)	155; (1 mark for hydrogen = (6 × 1) = 6/sodium = (1 × 23) = 23)
(d)(i)	pencil will not smear/pencil line will not move/ink will smear/ink will undergo chromatography/ink would spread/ink would travel upwards/pencil mark would not spread;
(d)(ii)	K;
(d)(iii)	J;
(d)(iv)	J;

- (c) The dye, indigotin, is formed when compound F is exposed to air. The structure of compound F is shown below.



Complete the table and calculate the relative molecular mass of compound F.

type of atom	number of atoms	atomic mass	molecular mass
carbon	8	12	$8 \times 12 = 96$
hydrogen	6	1	$6 \times 1 = 6$ $6 \times 1 = 6$
nitrogen	1	14	$1 \times 14 = 14$
oxygen	1	16	$1 \times 16 = 16$
sodium	1	23	$23 \times 1 = 23$ $1 \times 23 = 23$

relative molecular mass = 155 [2]

Your
Mark

3(a)(i)

3(a)(ii)

3(a)(iii)

3(b)

3(c)

3(d)(i)

3(d)(ii)

3(d)(iii)

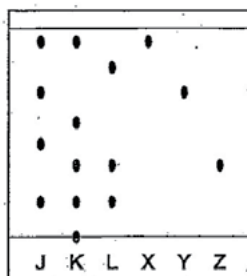
3(d)(iv)

Q3 Mark scheme

(a)(i)	decreases down the Group I/increases up the Group I;
(a)(ii)	1.88 (1.60–2.50) (g/cm ³);
(a)(iii)	solid; 20 °C is below the melting point/the melting point is above 20 °C;
(b)	rubidium hydroxide; hydrogen;
(c)	155; (1 mark for hydrogen = (6 × 1) = 6/sodium = (1 × 23) = 23)
(d)(i)	pencil will not smear/pencil line will not move/ink will smear/ink will undergo chromatography/ink would spread/ink would travel upwards/pencil mark would not spread;
(d)(ii)	K;
(d)(iii)	J;
(d)(iv)	J;

- (d) Three dye mixtures, J, K and L, were spotted onto a piece of chromatography paper. Three pure dyes, X, Y and Z, were also spotted onto the same piece of paper.

The diagram shows the results of this chromatography.



- (i) Suggest why the base line was drawn in pencil and **not** in ink.

because pencil is insoluble; ~~ink is soluble~~ [1]
~~ink is soluble~~, Ink is Soluble

- (ii) Which dye mixture, J, K or L, contains a dye which did **not** move during this chromatography?

J K [1]

- (iii) Which dye mixture, J, K or L, contains both dye X and dye Y?

J [1]

- (iv) Which dye mixture, J, K or L, does **not** contain dye Z?

J [1]

[Total: 12]

Your
Mark

3(a)(i)

3(a)(ii)

3(a)(iii)

3(b)

3(c)

3(d)(i)

3(d)(ii)

3(d)(iii)

3(d)(iv)

Q3	Mark scheme
(a)(i)	decreases down the Group I/increases up the Group I;
(a)(ii)	1.88 (1.60–2.50) (g/cm ³);
(a)(iii)	solid; 20 °C is below the melting point/the melting point is above 20 °C;
(b)	rubidium hydroxide; hydrogen;
(c)	155; (1 mark for hydrogen = (6 × 1) = 6/sodium = (1 × 23) = 23)
(d)(i)	pencil will not smear/pencil line will not move/ink will smear/ink will undergo chromatography/ink would spread/ink would travel upwards/pencil mark would not spread;
(d)(ii)	K;
(d)(iii)	J;
(d)(iv)	J;

3 The table shows some properties of the Group I metals.

metal	density in g/cm ³	melting point /°C	boiling point /°C
lithium	0.53	181	1342
sodium		98	883
potassium	0.86	63	760
rubidium	1.53	39	686
caesium		29	669

(a) (i) Describe the trend in boiling points of the Group I metals.

temperatures decrease. [1]

(ii) Predict the density of caesium.

2.02 g/cm³ [1]

(iii) Deduce the state of caesium at 20°C.

Explain your answer.

Molten liquid at 20°C caesium would be a solid
at 20°C in a fixed position [2]

(b) Complete the word equation for the reaction of rubidium with water.

rubidium + water → rubidium oxide + Hydrogen [2]

Select
page

Your
Mark

3(a)(i)

3(a)(ii)

3(a)(iii)

3(b)

3(c)

3(d)(i)

3(d)(ii)

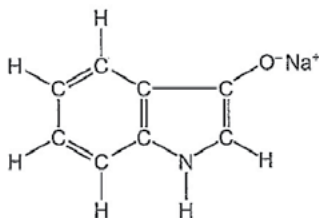
3(d)(iii)

3(d)(iv)

Q3 Mark scheme

(a)(i)	decreases down the Group I/increases up the Group I;
(a)(ii)	1.88 (1.60–2.50) (g/cm ³);
(a)(iii)	solid; 20 °C is below the melting point/the melting point is above 20 °C;
(b)	rubidium hydroxide; hydrogen;
(c)	155; (1 mark for hydrogen = (6 × 1) = 6/sodium = (1 × 23) = 23)
(d)(i)	pencil will not smear/pencil line will not move/ink will smear/ink will undergo chromatography/ink would spread/ink would travel upwards/pencil mark would not spread;
(d)(ii)	K;
(d)(iii)	J;
(d)(iv)	J;

- (c) The dye, indigotin, is formed when compound **F** is exposed to air. The structure of compound **F** is shown below.



Complete the table and calculate the relative molecular mass of compound **F**.

type of atom	number of atoms	atomic mass	
carbon	8	12	$8 \times 12 = 96$
hydrogen	6	1	$6 \times 1 = 6$
nitrogen	1	14	$1 \times 14 = 14$
oxygen	1	16	$1 \times 16 = 16$
sodium	1	23	$1 \times 23 = 23$

relative molecular mass = 164 [2]

Select
page

Your
Mark

3(a)(i)

3(a)(ii)

3(a)(iii)

3(b)

3(c)

3(d)(i)

3(d)(ii)

3(d)(iii)

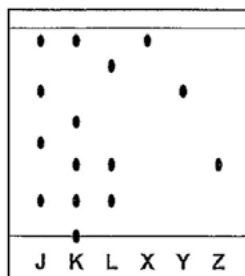
3(d)(iv)

Q3 Mark scheme

(a)(i)	decreases down the Group I/increases up the Group I;
(a)(ii)	1.88 (1.60–2.50) (g/cm ³);
(a)(iii)	solid; 20 °C is below the melting point/the melting point is above 20 °C;
(b)	rubidium hydroxide; hydrogen;
(c)	155; (1 mark for hydrogen = (6 × 1) = 6/sodium = (1 × 23) = 23)
(d)(i)	pencil will not smear/pencil line will not move/ink will smear/ink will undergo chromatography/ink would spread/ink would travel upwards/pencil mark would not spread;
(d)(ii)	K;
(d)(iii)	J;
(d)(iv)	J;

- (d) Three dye mixtures, J, K and L, were spotted onto a piece of chromatography paper. Three pure dyes, X, Y and Z, were also spotted onto the same piece of paper.

The diagram shows the results of this chromatography.



- (i) Suggest why the base line was drawn in pencil and **not** in ink.
 To not ruin the ink from spreading on to the paper..... [1]
- (ii) Which dye mixture, J, K or L, contains a dye which did **not** move during this chromatography?
 K..... [1]
- (iii) Which dye mixture, J, K or L, contains both dye X and dye Y?
 J..... [1]
- (iv) Which dye mixture, J, K or L, does **not** contain dye Z?
 J..... [1]

[Total: 12]

Your
Mark

3(a)(i)

3(a)(ii)

3(a)(iii)

3(b)

3(c)

3(d)(i)

3(d)(ii)

3(d)(iii)

3(d)(iv)

Q3	Mark scheme
(a)(i)	decreases down the Group I/increases up the Group I;
(a)(ii)	1.88 (1.60–2.50) (g/cm ³);
(a)(iii)	solid; 20 °C is below the melting point/the melting point is above 20 °C;
(b)	rubidium hydroxide; hydrogen;
(c)	155; (1 mark for hydrogen = (6 × 1) = 6/sodium = (1 × 23) = 23)
(d)(i)	pencil will not smear/pencil line will not move/ink will smear/ink will undergo chromatography/ink would spread/ink would travel upwards/pencil mark would not spread;
(d)(ii)	K;
(d)(iii)	J;
(d)(iv)	J;

Cambridge Assessment International Education
The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA, United Kingdom
t: +44 1223 553554
e: info@cambridgeinternational.org www.cambridgeinternational.org

Copyright © UCLES September 2017