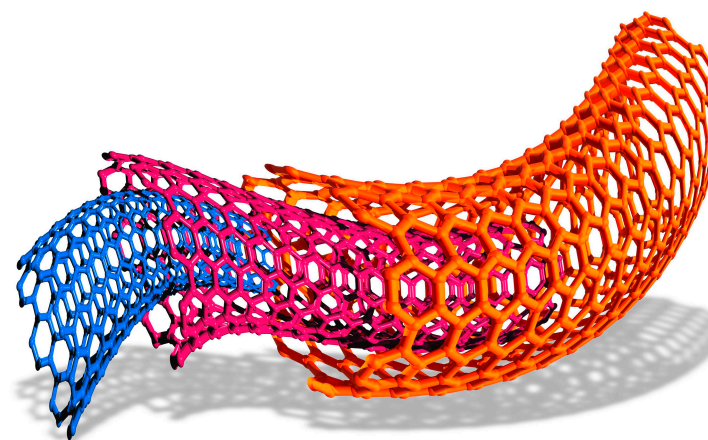


# Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 2

Cambridge IGCSE™  
Chemistry 0620



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- 2 A bicycle maker wants to choose a suitable material to make bicycle frames. The table shows the properties of some materials that could be used.

material	relative strength	density in g/cm <sup>3</sup>	resistance to corrosion	cost per tonne in \$/tonne
aluminium	8	2.7	very good	1500
iron	21	7.9	poor	450
stainless steel	24	7.9	very good	600
titanium	27	4.5	very good	15000
zinc	14	7.1	good	1300

- (a) Which material is the most suitable for making the bicycle frame?

Explain your answer using information from the table.

Stainless steel because it is strong, resistant to corrosion, and very cheap.

[3]

- (b) Aluminium is extracted from aluminium oxide by electrolysis.

- (i) State the name of the main ore of aluminium.

Bauxite [1]

- (ii) Suggest why aluminium is extracted by electrolysis and **not** by reduction with carbon.

It's easier to do large amounts of it [1]

- (iii) Molten aluminium oxide is electrolysed using graphite electrodes.

Predict the products of this electrolysis at

the positive electrode (anode), Oxygen

the negative electrode (cathode), Aluminium [2]

Select page

Your Mark

2(a)

2(b)(i)

2(b)(ii)

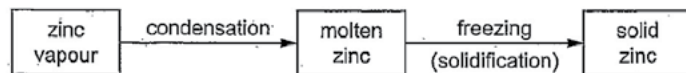
2(b)(iii)

2(c)

## Q2 Mark scheme

(a)	<p>stainless steel; any 2 from: (very) strong; (good) resistance to corrosion; cheap;</p> <p><b>OR</b></p> <p>iron; strong; cheap;</p> <p><b>OR</b></p> <p>aluminium; low density; (good) resistance to corrosion;</p>	<p><b>OR</b></p> <p>titanium; any 2 from: strong; (good) resistance to corrosion; low density;</p> <p><b>OR</b></p> <p>zinc; (good) resistance to corrosion;</p>
(b)(i)	bauxite;	
(b)(ii)	aluminium is too reactive/aluminium is high in the electrochemical series/aluminium is very reactive;	
(b)(iii)	anode: oxygen/O <sub>2</sub> ; cathode: aluminium/Al;	

(c) The diagram shows the changes of state when zinc vapour is cooled slowly to room temperature.



Explain what happens during these changes in terms of

- the distance between the particles,
- the type of motion shown by the particles.

During condensation, the particles get closer together and move slower, but still are moving.

During freezing, particles get very close together and barely move at all.

[4]

[Total: 11]

Your  
Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)

## Q2 Mark scheme

(c)

any 4 from:

- atoms in gas far apart/all over the place;
- atoms in gas moving (very) fast/move freely/bouncing around/move randomly;
- atoms slow down during condensation/move less than before;
- atoms get closer together in condensation;
- atoms in liquid are close together/touching;
- atoms in liquid slide over each other/atoms in liquids move slowly/restricted movement;
- atoms slow down (further) during freezing/atoms in liquid move more than in solid;
- atoms in solid only vibrate;
- atoms in solid are/touching/close to each other/closely packed/tightly packed;

- 2 A bicycle maker wants to choose a suitable material to make bicycle frames. The table shows the properties of some materials that could be used.

material	relative strength	density in g/cm <sup>3</sup>	resistance to corrosion	cost per tonne in \$/tonne
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stainless steel	24	7.9	very good	600
titanium	27	4.5	very good	15000
zinc	14	7.1	good	1300

- (a) Which material is the most suitable for making the bicycle frame?

Explain your answer using information from the table.

Stainless steel because it is very strong, it is very dense and has good resistance to corrosion. But And it is not as ex is not too expensive [3]

- (b) Aluminium is extracted from aluminium oxide by electrolysis.

- (i) State the name of the main ore of aluminium.

bauxite [1]

- (ii) Suggest why aluminium is extracted by electrolysis and **not** by reduction with carbon.

because it is not too reactive [1]  
not reactive a good conductor of electricity

- (iii) Molten aluminium oxide is electrolysed using graphite electrodes.

Predict the products of this electrolysis at

the positive electrode (anode), graphite [2]

the negative electrode (cathode), Aluminium oxide

Your  
Mark

2(a)

2(b)(i)

2(b)(ii)

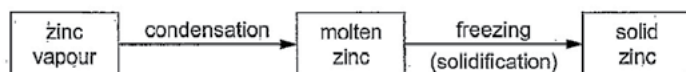
2(b)(iii)

2(c)

## Q2 Mark scheme

(a)	<p>stainless steel; any 2 from: (very) strong; (good) resistance to corrosion; cheap;</p> <p><b>OR</b></p> <p>iron; strong; cheap;</p> <p><b>OR</b></p> <p>aluminium; low density; (good) resistance to corrosion;</p>	<p><b>OR</b></p> <p>titanium; any 2 from: strong; (good) resistance to corrosion; low density;</p> <p><b>OR</b></p> <p>zinc; (good) resistance to corrosion;</p>
(b)(i)	bauxite;	
(b)(ii)	aluminium is too reactive/aluminium is high in the electrochemical series/aluminium is very reactive;	
(b)(iii)	anode: oxygen/O <sub>2</sub> ; cathode: aluminium/Al;	

(c) The diagram shows the changes of state when zinc vapour is cooled slowly to room temperature.



Explain what happens during these changes in terms of

- the distance between the particles,
- the type of motion shown by the particles.

Firstly, the particles slowly start to move closer and closer until they are aligned and fixed at solid zinc. Secondly, the particles tend to move less and less.

[4]

[Total: 11]

Your  
Mark

2(a)

2(b)(i)

2(b)(ii)

2(b)(iii)

2(c)

## Q2 Mark scheme

(c)

any 4 from:

- atoms in gas far apart/all over the place;
- atoms in gas moving (very) fast/move freely/bouncing around/move randomly;
- atoms slow down during condensation/move less than before;
- atoms get closer together in condensation;
- atoms in liquid are close together/touching;
- atoms in liquid slide over each other/atoms in liquids move slowly/restricted movement;
- atoms slow down (further) during freezing/atoms in liquid move more than in solid;
- atoms in solid only vibrate;
- atoms in solid are/touching/close to each other/closely packed/tightly packed;

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