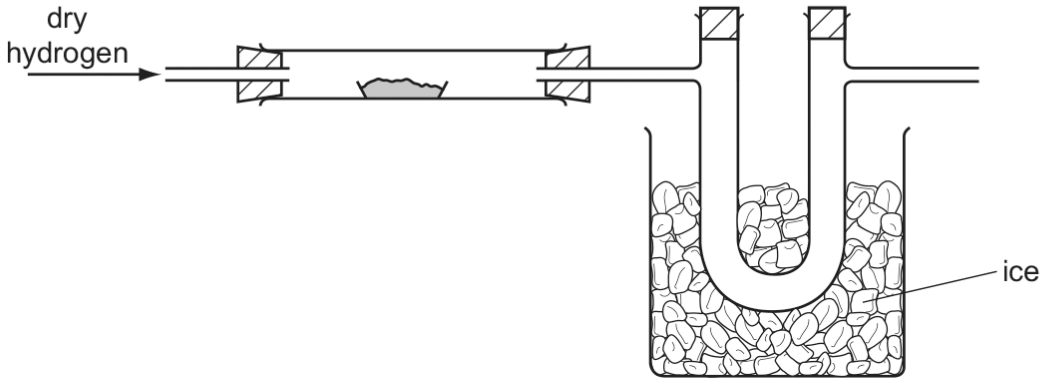
10.1 Water

01. 0620_s13_qp_63 Q: 1

A student passed dry hydrogen gas over heated copper(II) oxide using the apparatus below. He wanted to collect and measure the water formed in the reaction.



(a) Use labelled arrows to indicate where

(i) the heat is applied,

(ii) the water collects. [2]

(b) The colour of the copper(II) oxide changes from black to ..... [1]

(c) Suggest why the hydrogen gas that was used had to be dry.

..... [1]

(d) Describe a chemical test for water.

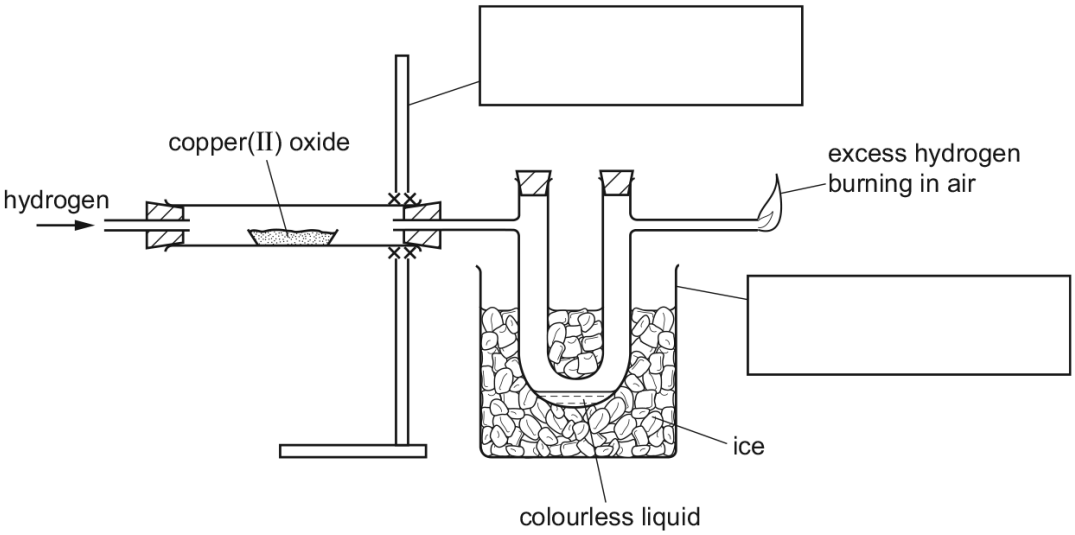
test .....

result ..... [2]

[Total: 6]

02. 0620_s16_qp_62 Q: 1

The diagram shows the apparatus used to reduce copper(II) oxide with hydrogen.



(a) Complete the boxes to name the apparatus. [2]

(b) Use an arrow to indicate where heat is applied. [1]

(c) The colour of the copper(II) oxide changes from ..... to ..... . [2]

(d) Suggest a reason why the U-tube is surrounded by ice.

..... [1]

(e) **(i)** Identify the colourless liquid formed.

..... [1]

(ii) Give a chemical test for this liquid.

test .....

result .....

[2]

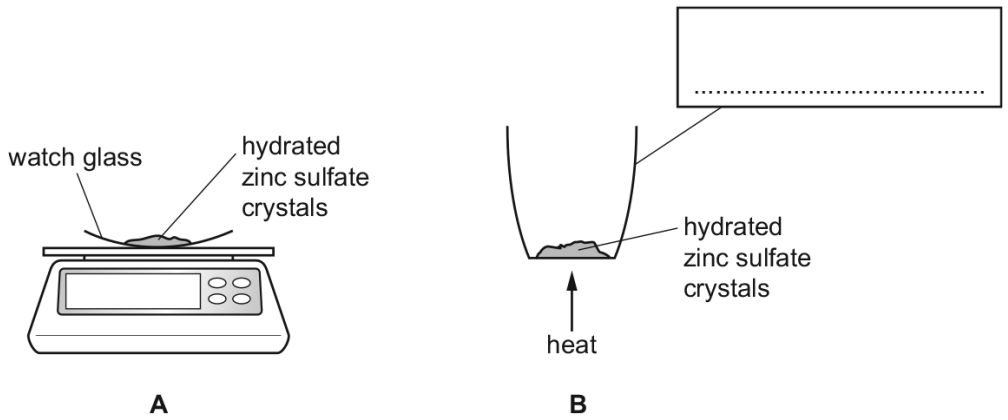
(iii) How could you show that this liquid is pure?

..... [1]

[Total: 10]

03. 0620_s18_qp_63 Q: 1

Zinc sulfate crystals are hydrated. They contain water of crystallisation. A student did an experiment to find the mass of water in hydrated zinc sulfate crystals.
The hydrated zinc sulfate crystals were weighed and then heated with a Bunsen burner to remove the water as shown.



(a) (i) Name the apparatus used to weigh the crystals in **A**.

..... [1]

(ii) Complete the box to name the apparatus. [1]

(b) What position should the air hole of the Bunsen burner be in when heating the hydrated zinc sulfate crystals in **B**?

..... [1]

(c) Describe how the student could find out if all of the water of crystallisation had been removed from the hydrated zinc sulfate crystals.

.....

.....

..... [2]

(d) Describe a **chemical** test for water.

test .....

result .....
[2]

[Total: 7]

04. 0620_w13_qp_61 Q: 6

Old documents

Some documents are stored in containers with packets of silica gel crystals. These crystals absorb water from air that enters the container. Water could damage the documents.
Anhydrous cobalt(II) chloride is added to the silica gel. As the crystals absorb water they change colour from blue to pink. Heating the silica gel in an oven removes the water from the crystals so that the crystals can be reused.

Plan an experiment to find the mass of water absorbed by a packet of silica gel crystals.

.....

.....

.....

.....

.....

.....

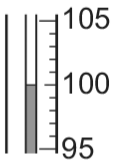
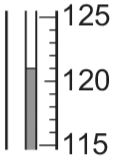
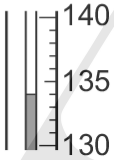
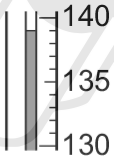
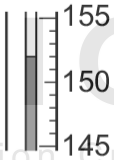
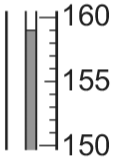
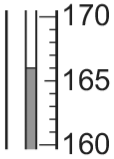
..... [6]

[Total: 6]

05. 0620_w13_qp_63 Q: 3

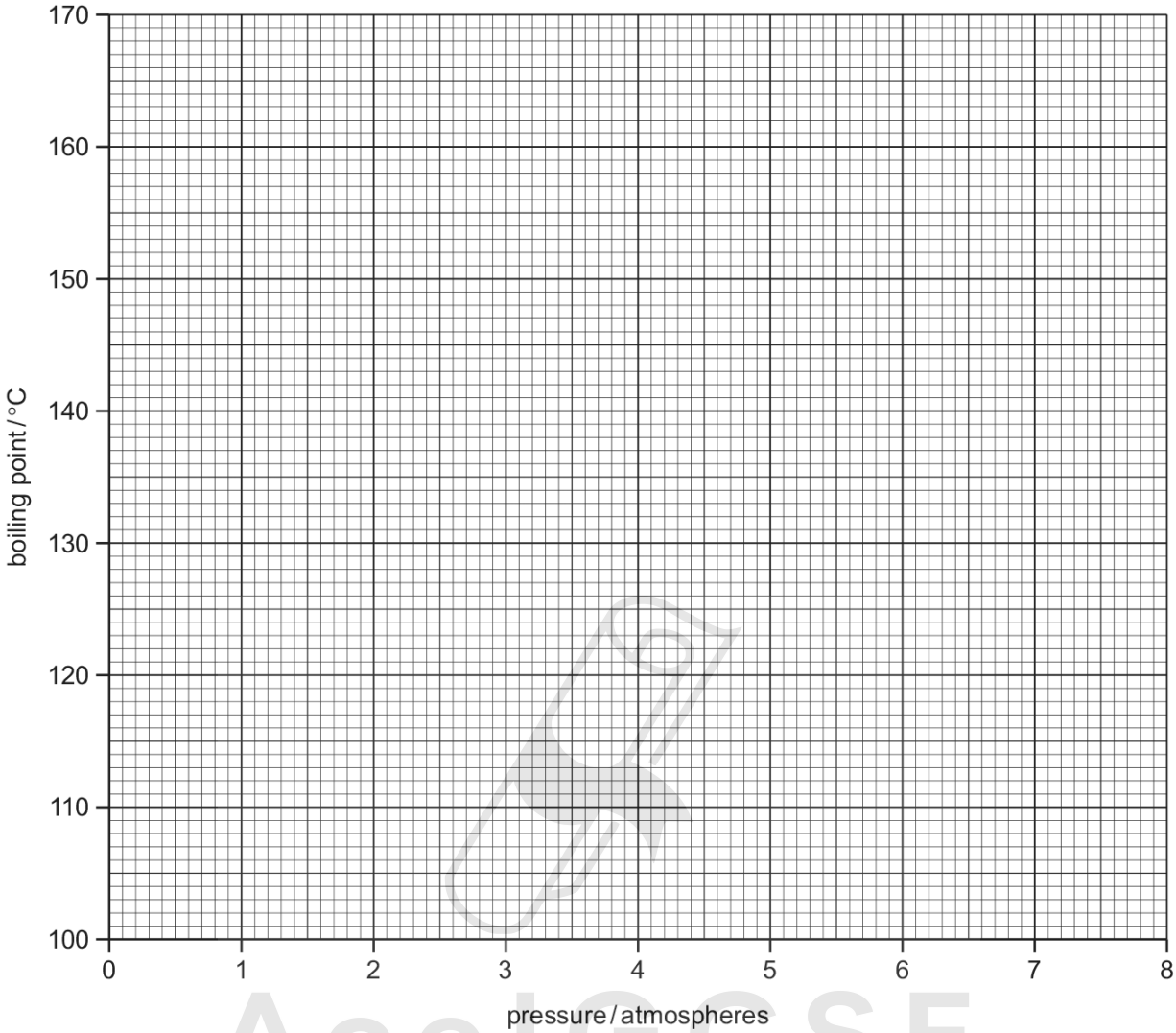
A scientist measured the boiling point of water at different pressures.

(a) Use the thermometer diagrams in the table to complete the boiling point temperatures.

pressure / atmospheres	thermometer diagram	boiling point / °C
1		
2		
3		
4		
5		
6		
7		

[3]

(b) Plot the points on the grid and draw a smooth line graph.



[4]

(c) State which point is inaccurate. Why have you chosen this point?

.....

..... [2]

(d) **Use your graph** to find the boiling point of water at a pressure of 7.5 atmospheres. Show clearly **on the grid** how you obtained your answer.

..... [3]

(e) State a chemical test for water.

test .....

result ..... [2]

[Total: 14]

01. 0620_s13_ms_63 Q: 1

(a) **(i)** arrow / label underneath solid in tube (1)

(ii) arrow / label in U-tube below level of ice (1) [2]

(b) red / brown (1) [1]

(c) water collected only from the reaction / owtte (1) [1]

(d) test anhydrous / white copper sulfate / cobalt chloride (paper) (1)

result turns blue / pink (1) **note:** do not allow physical tests [2]

---

02. 0620_s16_ms_62 Q: 1

(a)	stand; beaker;	**2** 1 1
(b)	arrow(s) underneath copper oxide;	**1**
(c)	black; to orange / red / brown / pink;	**2** 1 1
(d)	to condense (the water vapour);	**1**
(e)(i)	water;	**1**

(e)(ii)	test: anhydrous copper(II) sulfate;
	result: turns blue;
	OR
	test: cobalt(II) chloride (paper);
	result: turns pink;
		2
		1
		1
		
		1
		1

(e)(iii)	boiling / melting point determination;	**1**

03. 0620_s18_ms_63 Q: 1

(a)(i)	balance	1
(a)(ii)	crucible	1
(b)	open	1
(c)	weigh the solid	1
	heat to constant mass	1
(d)	anhydrous copper sulfate / cobalt chloride paper	1
	turns blue / turns pink	1

04. 0620_w13_ms_61 Q: 6

mass of silica gel (1)
heat in oven > 100 °C (1)
for specified realistic time / until turns blue (1)
reweigh (1) record (1)
heat in oven again to check constant mass / indication of colour change (1)
calculation (1) max [6]

---

05. 0620_w13_ms_63 Q: 3

(a) boiling points completed correctly (3),
–1 each incorrect
100, 121, 134, 139, 152, 159, 166 [3]

(b) points plotted correctly (3)
smooth curve through all points except anomalous point (1) [4]

(c) point at 4 atmos / 139°C / 4th point (1)
off curve / outlier / anomalous (1) [2]

(d) extrapolation (1)
value from graph (1)
168–170
unit °C (1) [3]

(e) test (1)
anhydrous copper sulfate or cobalt chloride(paper) (1)
result (1)
turns blue or pink (1) [2]
ignore: original colour
