1 Water was added to separate samples of anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate.

Which row describes the colour changes that take place in these reactions?

	cobalt(II) chloride	copper(II) sulfate
A	blue to pink	blue to white
B	blue to pink	white to blue
C	pink to blue	blue to white
D	pink to blue	white to blue

2 In which reaction is the colour change from blue to white?

A heating hydrated cobalt(II) chloride

B heating hydrated copper(II) sulfate

C adding water to anhydrous cobalt(II) chloride

D adding water to anhydrous copper(II) sulfate

3 Which of the following are tests for water?

1 It turns anhydrous copper(II) sulfate blue.

2 It boils at 100 °C.

3 It turns anhydrous cobalt(II) chloride paper blue.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

4 Equations for the effect of water on anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate are shown.

$$CoCl_2(s) + 6H_2O(l) \rightarrow CoCl_2.6H_2O(s)$$

$$CuSO_4(s) + 5H_2O(l) \rightarrow CuSO_4.5H_2O(s)$$

Which statement is **not** correct?

A Both reactions can be reversed by changing the conditions.

B Both reactions can be used as a test for water.

C The colour change observed when hydrated copper(II) sulfate is heated is from blue to white.

D The colour change observed when water is added to anhydrous cobalt(II) chloride is from pink to blue.

5 Some crystals of hydrated cobalt(II) chloride are heated in a test-tube until no further change is observed.

The test-tube is allowed to cool and a few drops of water are then added to the contents.

Which colours are observed?

	before heating	after heating	after adding water
A	blue	pink	blue
B	blue	white	blue
C	pink	blue	pink
D	white	blue	white

6 Which statements about water are correct?

1 Household water may contain salts in solution.

2 Water for household use is filtered to remove soluble impurities.

3 Water is treated with chlorine to kill bacteria.

4 Water is used in industry for cooling.

A 1, 2

B 1, 2 a

C 1, 3 a

D 2, 3 a

7 If anhydrous copper(II) sulfate is added to water, which colour change is observed?

A blue to pink

B blue to white

C pink to blue

D white to blue

8 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.

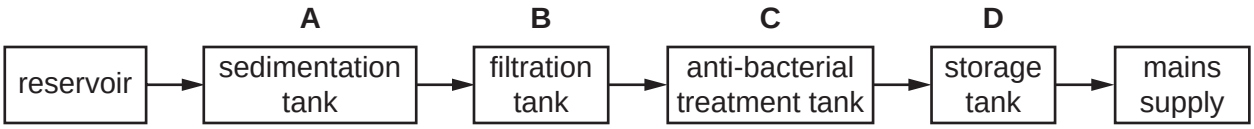
$$CoCl_2.6H_2O \rightleftharpoons CoCl_2 + 6H_2O$$

What happens when water is added to the blue solid?

	colour	tempe
A	changes to pink	decreases
B	changes to pink	increases
C	remains blue	decreases
D	remains blue	increases

9 The diagram shows stages in producing drinking water.

In which tank is chlorine added to the water?



10 Hydrated cobalt(II) chloride decomposes on heating.

The equation for the reaction is

$$CoCl_2.6H_2O \rightleftharpoons CoCl_2 + 6H_2O$$

The reaction is reversed by adding water.

Which row describes the colour change and the type of reaction for the **reverse** reaction?

	colour change	type of reaction
A	blue to pink	endothermic
B	blue to pink	exothermic
C	pink to blue	endothermic
D	pink to blue	exothermic

11 The table describes three types of water.

water type	source of water	appearance before treatment	treatment	appearance after treatment
P	rive	muddy	none	muddy
Q	river	muddy	filtration and chlorination	clear
R	wel	clear	chlorination only	clear

Which statement is correct?

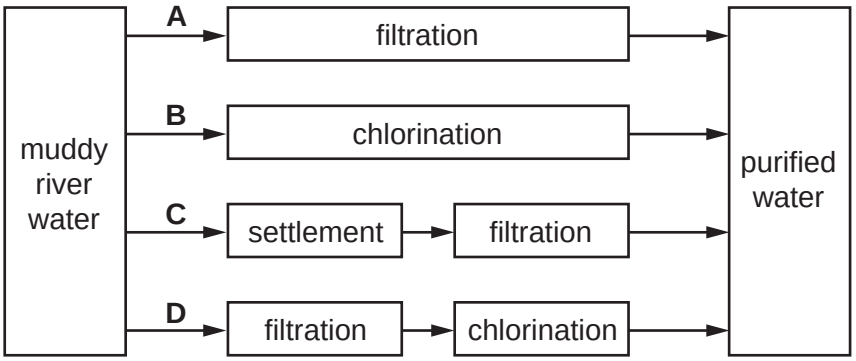
A Only Q and R are suitable for drinking, while P could be used for irrigation.

B Only Q and R are suitable for drinking, while P is unsuitable for any purpose.

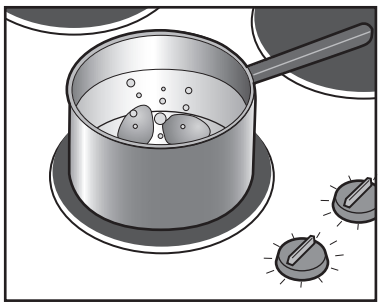
C Only Q is suitable for drinking. R could be used for washing cars and P for irrigation.

D P, Q and R are suitable for irrigation and washing cars, but are not suitable for drinking.

12 Which method of purification would produce water **most** suitable for drinking?



13 The diagram shows some uses of water in the home.



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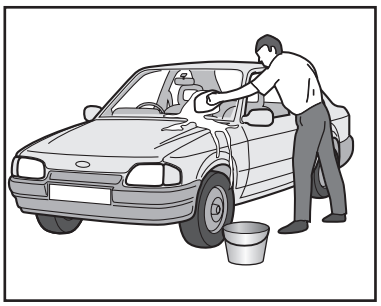


2

3

For which uses is it important for the water to have been treated?

A 1 only **B** 2 only **C** 3 only **D** 1, 2 and 3

14 In many countries river water is used for the washing of clothes.

The same water is not considered to be safe for drinking.

Why is it **not** safe for drinking?

A because river water contains dissolved salts

B because river water may contain harmful bacteria

C because river water may contain small particles of sand

D because river water may contain soap from washing clothes

15 Water is treated at a water works to make it fit to drink.

What is present in the water when it leaves the waterworks?

A bacteria only

B bacteria and insoluble substances

C chlorine only

D chlorine and soluble substances

16 Water has been contaminated with sea-water.

Which substances can be removed by chlorination and filtration?

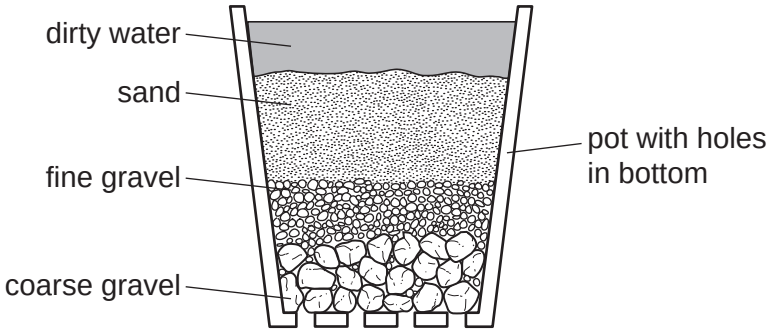
A bacteria, sand and sodium chloride

B bacteria and sand only

C bacteria and sodium chloride only

D sand and sodium chloride only

17 The diagram shows a stage in the purification of dirty water.



Which process does this apparatus show?

A chlorination

B condensation

C distillation

D filtration

18 Separate samples of anhydrous and hydrated copper(II) sulfate are heated.

Which shows the correct colour changes?

	anhydrous copper(II) sulfate	hydrated copper(II) sulfate
A	blue to white	white to blue
B	no change	blue to white
C	white to blue	blue to white
D	white to blue	no change

19 Which processes are used in the treatment of water?

A filtration and chlorination

B filtration and reduction

C neutralisation and chlorination

D neutralisation and reduction

20 Solid copper(II) sulfate can exist in two different forms, anhydrous and hydrated.

One of these forms is blue and the other is white.

The change between these two forms is reversible.

$$\text{blue form} \rightleftharpoons \text{white form}$$

Which is the blue form and how is the change from the blue form to the white form brought about?

	blue form	change to white form
A	anhydrous	add water
B	anhydrous	heat
C	hydrated	add water
D	hydrated	heat

21 Untreated water can spread diseases such as cholera.

What can be added to drinking water to reduce the spread of such diseases?

A carbon monoxide

B chlorine

C nitrogen monoxide

D sulfur

22 Some uses of water are listed.

1 for drinking

2 in chemical reactions

3 in swimming pools

4 in washing

For which uses is it necessary to chlorinate the water?

A 1 an **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

23 Water for human use is treated by filtration then chlorination.

Which uses do **not** need water of this quality?

1 water for cooling in industry

2 water for flushing toilets in the home

3 water for drinking

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

24 Water from a reservoir flows to the water works where purification processes 1 takes place followed by process 2.

What are purification processes 1 and 2?

	purification process 1	purification process 2
A	chlorination	filtration
B	filtration	chlorination
C	fractional distillation	filtration
D	filtration	fractional distillation

25 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.

$$CoCl_2.6H_2O \rightleftharpoons CoCl_2 + 6H_2O$$

What happens when water is added to the blue solid?

	colour	tempe
A	changes to pink	decreases
B	changes to pink	increases
C	remains blue	decreases
D	remains blue	increases

26 Why is chlorination used in water treatment?

A to kill bacteria in the water

B to make the water neutral

C to make the water taste better

D to remove any salt in the water

27 Which pollutant, found in car exhaust fumes, does **not** come from the fuel?

A carbon monoxide

B hydrocarbons

C lead compounds

D nitrogen oxides

28 Which statements about water are correct?

1 Water is treated with chlorine to kill bacteria.

2 Household water may contain salts in solution.

3 Water is used in industry for cooling.

4 Water for household use is filtered to remove soluble impurities.

A 1, 2 and 3 **B** 1 and 4 **C** 2, 3 and 4 **D** 1, 2, 3 and 4

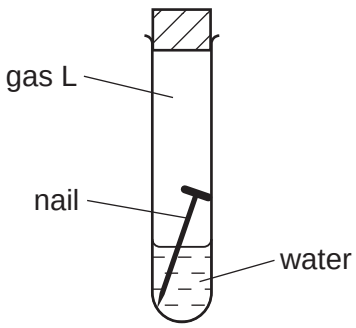
29 Water must be purified before it is suitable for use in the home.

Which processes are used to remove solid impurities and bacteria?

	to remove solid impurities	to remove bacteria
A	chlorination	chlorination
B	chlorination	filtration
C	filtration	chlorination
D	filtration	filtration

30 An iron nail is placed in a closed test-tube, containing gas L.

The nail rusts.



What is gas L?

A carbon dioxide

B hydrogen

C nitrogen

D oxygen