

1. **Nov/2021/Paper_11/No.7**

Why does a balloon full of helium gas become smaller as the temperature changes from 30 °C to 10 °C?

- A The gas condenses to a liquid and so takes up less space.
- B The gas particles become smaller at lower temperatures.
- C The gas particles diffuse through the balloon and escape.
- D The gas particles move more slowly so reducing the pressure.

2. **Nov/2021/Paper_11/No.25**

The Haber process is used to make ammonia.

Which catalyst is used in the Haber process?

- A iron
- B nickel
- C platinum
- D vanadium(V) oxide

3. **Nov/2021/Paper_11/No.26**

Some compounds containing nitrogen are used as fertilisers.

The table shows some nitrogen-containing compounds, whether they are used as a fertiliser or not and a reason for this.

Which row is correct?

	compound	used as a fertiliser	reason
A	aqueous ammonia, $\text{NH}_3(\text{aq})$	yes	lowers the pH of the soil
B	ammonium carbonate, $(\text{NH}_4)_2\text{CO}_3$	no	is insoluble in water
C	ammonium chloride, NH_4Cl	yes	is made from the products of the Haber process and the Contact process
D	ammonium nitrate, NH_4NO_3	yes	is soluble in water

4. Nov/2021/Paper_11/No.32

Carbon dioxide, methane and oxygen are gases involved in the carbon cycle.

Which of these gases may contribute to global warming?

- A carbon dioxide only
- B carbon dioxide and methane
- C carbon dioxide and oxygen
- D methane only

5. Nov/2021/Paper_11/No.33

Two statements about the water in lakes are given.

statement 1 Fish are unable to live in some lakes because there is insufficient oxygen in the water.

statement 2 Fertilisers can be washed into lakes where they cause eutrophication.

What is correct?

- A Both statements are correct and statement 2 explains statement 1.
- B Both statements are correct but statement 2 does not explain statement 1.
- C Statement 1 is correct but statement 2 is incorrect.
- D Statement 2 is correct but statement 1 is incorrect.

6. Nov/2021/Paper_12/No.26

The table contains some facts about sulfur dioxide and sulfuric acid and comments on these facts.

Which row is correct?

	fact	comment
A	In the manufacture of sulfuric acid, sulfur reacts with oxygen to make sulfur trioxide.	The equation for this reaction is $2S(s) + 3O_2(g) \rightleftharpoons 2SO_3(g)$.
B	Nickel is used as the catalyst in the Contact process.	Catalysts speed up a reaction by lowering the activation energy, E_a .
C	Sulfuric acid is used in car batteries.	This increases the efficiency of the petrol engine.
D	The use of low sulfur petrol is beneficial because it minimises the formation of acid rain.	Sulfur dioxide is acidic because it is the oxide of a non-metal.

7. Nov/2021/Paper_12/No.32

Gas X is present in dry air and may contribute to global warming.

What is X?

- A carbon monoxide
- B methane
- C nitrogen oxide
- D sulfur dioxide

8. Nov/2021/Paper_12/No.33

Four processes are used during the purification of water.

- use of carbon
- desalination
- chlorination
- filtration

The purposes, W, X, Y and Z, for these processes are listed.

- W disinfection
- X removal of solids
- Y removal of dissolved salts
- Z removal of tastes and odours

What is the purpose for each process?

	use of carbon	desalination	chlorination	filtration
A	Y	Z	W	X
B	Z	Y	W	X
C	Z	Y	X	W
D	Y	Z	X	W

9. Nov/2021/Paper_2S2/No.4a

Water from natural sources contains dissolved substances which are not pollutants, such as mineral salts.

(a) Name another substance found naturally in water which is **not** a mineral salt or a pollutant.

..... [1]

10. Jun/2020/Paper_11/No.20

Nitrogenous fertilisers promote plant growth and crop yield.

Which compound contains the greatest mass of nitrogen in 100 g of fertiliser?

- A KNO_3 B NH_4NO_3 C $(\text{NH}_4)_2\text{SO}_4$ D $(\text{NH}_4)_2\text{HPO}_4$

11. Jun/2020/Paper_11/No.22

Which statement about sulfuric acid is correct?

- A It is manufactured by heating hydrogen, oxygen and sulfur together.
B It is used as a battery acid.
C It is used as a detergent.
D It is used to neutralise alkaline soils.

12. Jun/2020/Paper_11/No.31

Which row correctly compares carbon dioxide and methane?

	both contain carbon	both are described as a greenhouse gas	both lower the pH of water when they dissolve in it
A	✓	x	✓
B	✓	✓	x
C	x	✓	✓
D	x	✓	x

13. Jun/2020/Paper_11/No.32

Sea water is not safe to drink. It can be converted into drinkable water by desalination.

What does desalination involve?

- A adding chlorine to kill bacteria
B boiling the water to sterilise it
C removing the salt by filtration
D separating the water by distillation

14. Jun/2020/Paper_12/No.22

Two fertilisers are made by mixing chemical compounds.

Fertiliser X contains 500 g of NH_4NO_3 and 500 g of $(\text{NH}_4)_2\text{SO}_4$ per kilogram.

Fertiliser Y contains 700 g of NH_4NO_3 and 300 g of CaSO_4 per kilogram.

Which fertiliser contains the higher percentage of nitrogen by mass and which contains the higher percentage of sulfur by mass?

[M_r : NH_4NO_3 , 80; $(\text{NH}_4)_2\text{SO}_4$, 132; CaSO_4 , 136]

	fertiliser with higher percentage N	fertiliser with higher percentage S
A	X	X
B	X	Y
C	Y	X
D	Y	Y

15. Jun/2020/Paper_12/No.23

Which processes occur in the manufacture of sulfuric acid?

- 1 burning sulfur in air
- 2 dissolving sulfur dioxide in sulfuric acid
- 3 dissolving sulfur dioxide in water
- 4 reacting sulfur dioxide with air

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

16. Jun/2020/Paper_12/No.31

Which row correctly compares carbon dioxide and methane?

	both contain carbon	both are described as a greenhouse gas	both lower the pH of water when they dissolve in it
A	✓	x	✓
B	✓	✓	x
C	x	✓	✓
D	x	✓	x

17. Jun/2020/Paper_12/No.32

Sea water has to be purified in order to obtain drinking water from it.

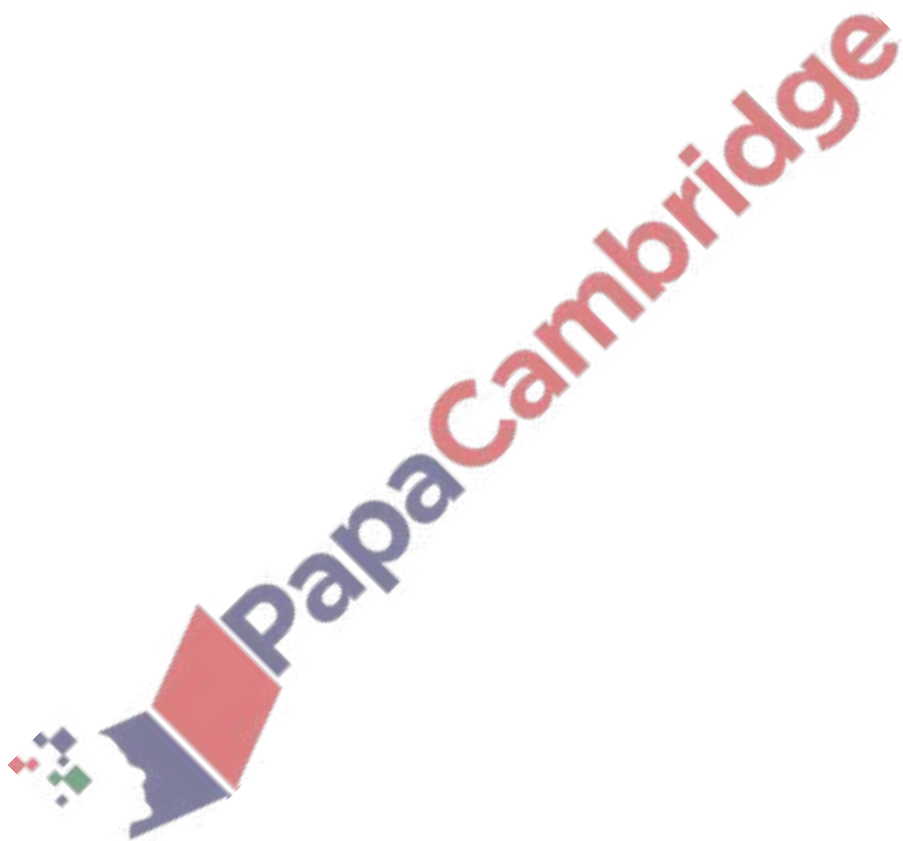
Which processes are used to purify the sea water?

	fractional distillation	desalination
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = used

x = not used



Carbon dioxide is a colourless gas found in air.

(a) The percentage of carbon dioxide in the air is increasing.

State one environmental problem caused by this increase.

..... [1]

(b) Carbon dioxide is a product of the complete combustion of octane, C_8H_{18} .

Construct the equation for this reaction.

..... [2]

(c) Fermentation of glucose produces carbon dioxide.

(i) Give the equation for the fermentation of glucose.

..... [1]

(ii) State **two** essential conditions needed for fermentation.

.....
..... [2]

(d) When warmed, solid carbon dioxide changes directly into a gas. It does **not** become a liquid.

Use the kinetic particle theory to describe the changes in **movement** and **arrangement** of the particles during this change of state.

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.....
.....
..... [3]

(e) Explain why solid carbon dioxide does not conduct electricity.

.....
..... [1]

[Total: 10]

Sulfur dioxide is a colourless gas which can be found in air.

(a) State one environmental problem caused by the presence of sulfur dioxide in air.

..... [1]

(b) When heated in air iron pyrite, FeS_2 , reacts with oxygen.

Sulfur dioxide and iron(III) oxide, Fe_2O_3 , are the products of this reaction.

Construct the equation for this reaction.

..... [2]

(c) Give one use for sulfur dioxide.

..... [1]

(d) Liquid sulfur dioxide is stored in cylinders.

When the cylinder is opened the liquid quickly changes into a gas.

Use the kinetic particle theory to describe the changes in **movement** and **arrangement** of the particles when liquid sulfur dioxide becomes a gas.

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.....
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..... [2]

(e) Sulfur dioxide has a low melting point.

Suggest, in terms of structure and bonding, why sulfur dioxide has a low melting point.

.....
.....
.....
..... [2]

Describe the chemical test for sulfur dioxide.

test

observation

[2]

[Total: 10]

