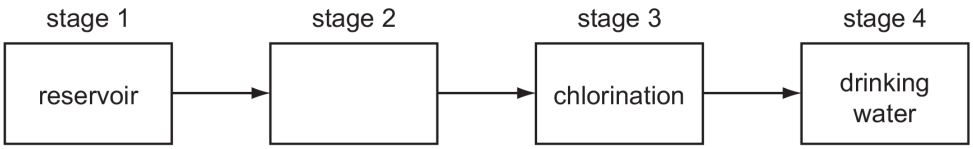
01. 0620_m16_qp_22 Q: 29

The diagram shows how water is treated to make it suitable for drinking.



What happens in stage 2?

A condensation

B distillation

C evaporation

D filtration

11.2 Air

02. 0620_m21_qp_22 Q: 29

Petrol burns in a car engine to produce waste gases which leave through the car exhaust.

One of these waste gases is an oxide of nitrogen.

Which statement describes how this oxide of nitrogen is formed?

A Carbon dioxide reacts with nitrogen in the catalytic converter.

B Nitrogen reacts with oxygen in the car engine.

C Nitrogen reacts with oxygen in the catalytic converter.

D Petrol combines with nitrogen in the car engine.

---

03. 0620_s21_qp_23 Q: 24

Which statement explains why galvanising prevents iron from rusting?

A Zinc is more reactive than iron and corrodes in preference to iron.

B Zinc is more reactive than iron and loses electrons less easily than iron.

C Zinc is less reactive than iron and corrodes in preference to iron.

D Zinc is less reactive than iron and loses electrons more easily than iron.

---

04. 0620_s21_qp_23 Q: 27

Which gas is an air pollutant that causes acid rain?

A argon

B carbon monoxide

C methane

D nitrogen dioxide

---

05. 0620_w21_qp_21 Q: 29

Covering iron with zinc prevents the iron from rusting even when the zinc is scratched.

Covering iron with tin prevents the iron from rusting, but when the tin is scratched the iron underneath starts to rust.

Which statement is correct?

A Both tin and zinc prevent iron from rusting by sacrificial protection.

B Both tin and zinc prevent iron from rusting by stopping water and carbon dioxide reaching the iron.

C Tin is more reactive than iron and prevents iron from rusting until it is scratched.

D Zinc loses electrons more easily than iron and prevents iron from rusting by corroding first.

---

06. 0620_w21_qp_22 Q: 28

Which statements explain why zinc is used to protect iron from rusting?

1 Zinc is more reactive than iron.

2 Zinc is less reactive than iron.

3 Zinc can form alloys with iron.

4 Zinc acts as a sacrificial metal.

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

---

07. 0620_w21_qp_23 Q: 28

Which statement describes how oxides of nitrogen are formed in a car engine?

A Nitrogen from the air reacts with oxygen from petrol.

B Nitrogen from the air reacts with oxygen from the air.

C Nitrogen from petrol reacts with oxygen from petrol.

D Nitrogen from petrol reacts with oxygen from the air.

---

08. 0620_w21_qp_23 Q: 29

Ships are made of steel, an alloy of iron.

Blocks of magnesium are attached to the underside of ships to prevent rusting.

Which statement explains how the magnesium prevents rusting?

A Magnesium oxidises instead of iron.

B Magnesium stops air and water getting to the iron.

C The magnesium forms an alloy with iron which does not corrode.

D The magnesium reacts with rust as soon as it is formed.

---

09. 0620_m20_qp_22 Q: 30

Sulfur dioxide, carbon monoxide and oxides of nitrogen are common gaseous pollutants found in the air.

Which pollutants contribute to acid rain?

A carbon monoxide and sulfur dioxide

B oxides of nitrogen and sulfur dioxide

C oxides of nitrogen only

D sulfur dioxide only

---

10. 0620_m20_qp_22 Q: 31

Oxides of nitrogen, such as NO and NO_2, are formed in the petrol engines of cars.

They are removed from the exhaust gases by reactions in the car's catalytic converter.

Which row describes how oxides of nitrogen are formed in a petrol engine, and a reaction that happens in the catalytic converter?

	how oxides of nitrogen are formed	a reaction that happens in the catalytic convertor
A	by the reaction between nitrogen and oxygen from the air	$2NO + 2CO \rightarrow N_2 + 2CO_2$
B	by the reaction between nitrogen and oxygen from the air	$2NO + 2H_2 \rightarrow N_2 + 2H_2O$
C	by the reaction between nitrogen compounds in petrol and oxygen from the air	$2NO + 2CO \rightarrow N_2 + 2CO_2$
D	by the reaction between nitrogen compounds in petrol and oxygen from the air	$2NO + 2H_2 \rightarrow N_2 + 2H_2O$

---

11. 0620_m20_qp_22 Q: 32

Zinc is used to cover iron to prevent it from rusting.

Why is zinc a suitable metal to use?

A Iron is more reactive than zinc.

B Iron atoms are bigger than zinc atoms.

C Zinc is more reactive than iron.

D Zinc atoms are bigger than iron atoms.

---

12. 0620_p20_qp_20 Q: 32

A catalytic converter removes harmful gases from motor car exhausts.

Which reaction does **not** take place in a catalytic converter?

A $2CO + O_2 \rightarrow 2CO_2$

B $N_2 + 2CO_2 \rightarrow 2NO + 2CO$

C $2NO_2 \rightarrow N_2 + 2O_2$

D $2NO_2 + 4CO \rightarrow N_2 + 4CO_2$

---

13. 0620_s20_qp_21 Q: 32

Coating iron helps to prevent rusting.

Which coating will continue to protect the iron even when the coating is damaged?

A copper

B paint

C plastic

D zinc

---

14. 0620_s20_qp_22 Q: 32

Which process, used to prevent iron from rusting, involves sacrificial protection?

A alloying

B electroplating

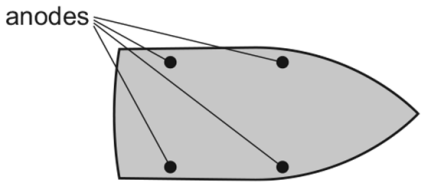
C galvanising

D painting

---

15. 0620_s20_qp_23 Q: 32

The diagram shows the positions of sacrificial anodes on the steel hull of a yacht.



Which metal is used to make the anodes?

A calcium

B copper

C sodium

D zinc

---

16. 0620_w20_qp_21 Q: 32

Iron can be protected from rusting by attaching a piece of a more reactive metal, e.g. magnesium, to the iron.

Which equation represents the reaction that takes place?

A $Fe(s) \rightarrow Fe^{2+}(aq) + 2e^-$

B $Fe^{2+}(aq) + 2e^- \rightarrow Fe(s)$

C $Mg(s) \rightarrow Mg^{2+}(aq) + 2e^-$

D $Mg^{2+}(aq) + 2e^- \rightarrow Mg(s)$

---

17. 0620_w20_qp_23 Q: 30

Which process is used to separate oxygen from liquid air?

A chromatography

B distillation

C filtration

D fractional distillation

---

18. 0620_m19_qp_22 Q: 32

What are the main substances produced by the fractional distillation of liquid air?

A oxygen and carbon dioxide

B oxygen and nitrogen

C helium and nitrogen

D hydrogen and oxygen

---

19. 0620_s19_qp_21 Q: 29

Oxides of nitrogen are formed in car engines and are a source of air pollution.

To decrease this pollution, catalytic converters are fitted to car exhausts.

What happens to the oxides of nitrogen in the catalytic converter?

A combustion

B cracking

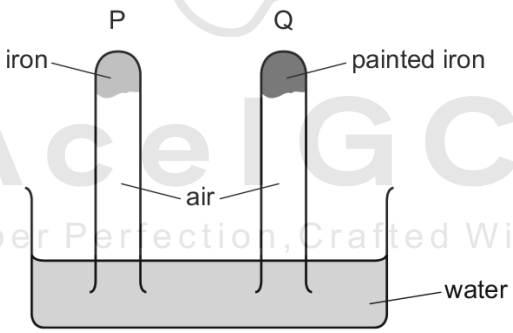
C oxidation

D reduction

---

20. 0620_s19_qp_21 Q: 30

The diagram shows an experiment to investigate how paint affects the rusting of iron.



What happens to the water level in tubes P and Q?

	tube P	tube Q
A	falls	rises
B	no change	rises
C	rises	falls
D	rises	no change

---

21. 0620_s19_qp_22 Q: 28

The exhaust gases from cars contain oxides of nitrogen.

How are these oxides of nitrogen formed?

A Nitrogen and oxygen from the air react together at the high temperatures in the engine.

B Nitrogen and oxygen from the petrol react together in the car exhaust.

C Nitrogen from the petrol reacts with oxygen at the high temperatures in the engine.

D Nitrogen reacts with oxygen from the air in the catalytic converter.

---

22. 0620_s19_qp_23 Q: 29

Catalytic converters in car exhausts change polluting gases into non-polluting gases.

Which statements about oxides of nitrogen and car engines are correct?

1 The nitrogen in oxides of nitrogen comes from compounds in petrol.

2 The oxygen in oxides of nitrogen comes from the air in the car engine.

3 Catalytic converters convert oxides of nitrogen into nitrogen and other gases.

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

---

23. 0620_w19_qp_21 Q: 28

Iron rusts but aluminium does not easily corrode.

Which statement explains why aluminium does **not** easily corrode?

A It is an alloy.

B It is below iron in the reactivity series.

C It is not a transition element.

D Its surface is protected by an oxide layer.

---

24. 0620_w19_qp_21 Q: 31

Which physical property is used to separate the nitrogen and oxygen from air?

A boiling point

B density

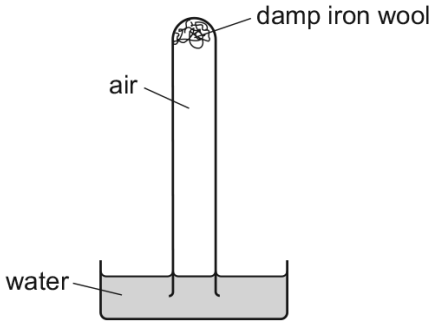
C electrical conductivity

D molecular mass

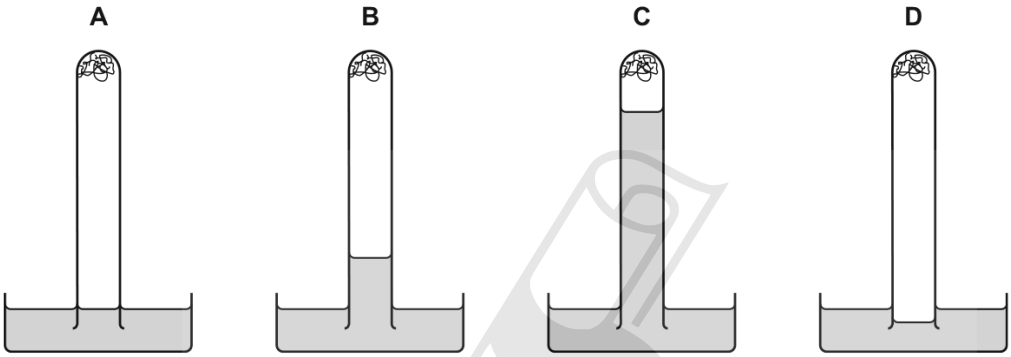
---

25. 0620_w19_qp_21 Q: 32

The apparatus shown is set up and left for a week.



Which diagram shows the level of the water at the end of the week?



---

26. 0620_w19_qp_22 Q: 31

Which process is used to separate nitrogen and oxygen from air?

A chromatography

B evaporation

C filtration

D fractional distillation

---

27. 0620_w19_qp_23 Q: 31

How are oxygen and nitrogen separated from air?

A chromatography

B condensation and filtration

C crystallisation

D fractional distillation

---

28. 0620_m18_qp_22 Q: 28

Air is a mixture of gases.

The melting and boiling points of some gases present in clean, dry air are shown.

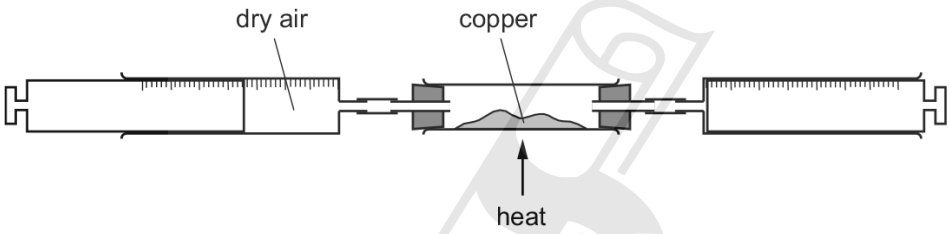
In the fractional distillation of liquid air, which gas boils first?

	gas	melting point / °C	boiling point / °C
A	argon	–189	–186
B	krypton	–157	–153
C	nitrogen	–210	–196
D	oxygen	–219	–183

---

29. 0620_s18_qp_21 Q: 28

Dry air is passed over hot copper until all the oxygen has reacted.



The volume of gas at the end of the reaction is 120 cm^3.

What is the starting volume of dry air?

A 132 cm^3 **B** 152 cm^3 **C** 180 cm^3 **D** 570 cm^3

---

30. 0620_s18_qp_21 Q: 29

A steel bicycle which had been left outdoors for several months was starting to rust.

What would **not** reduce the rate of corrosion?

A Remove the rust and paint the bicycle.

B Remove the rust and store the bicycle in a dry shed.

C Remove the rust and wipe the bicycle with a clean, damp cloth.

D Remove the rust and wipe the bicycle with an oily cloth.

---

31. 0620_w18_qp_21 Q: 29

Which statement about air pollutants is **not** correct?

A Carbon monoxide is formed from the complete combustion of petroleum.

B Lead compounds are formed from some types of petrol.

C Oxides of nitrogen are formed from the combustion reactions inside car engines.

D Sulfur dioxide is formed from the combustion of coal.

---

32. 0620_w18_qp_21 Q: 30

Argon is a noble gas used to fill light bulbs.

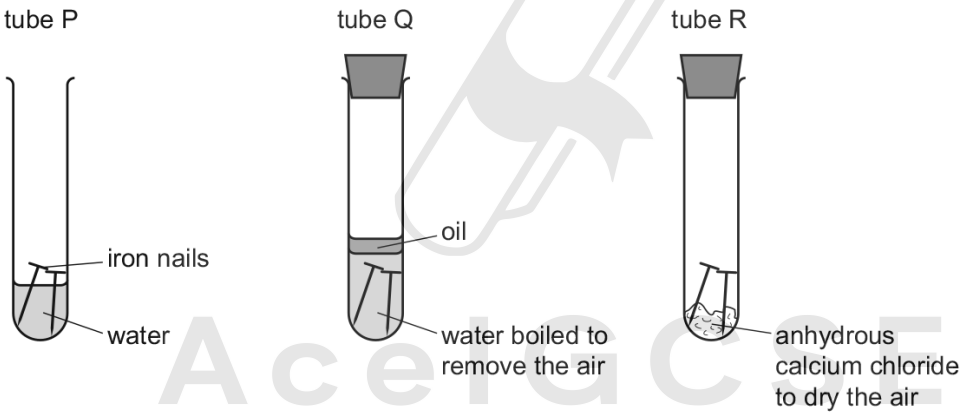
What is the approximate percentage of argon in air?

A 1% **B** 20% **C** 79% **D** 99%

---

33. 0620_w18_qp_21 Q: 31

The diagrams show experiments involving the rusting of iron.



A student predicted the following results.

1 In tube P, the iron nails rust.

2 In tube Q, the iron nails do not rust.

3 In tube R, the iron nails do not rust.

Which predictions are correct?

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

---

34. 0620_w18_qp_22 Q: 29

Which statements about sulfur dioxide pollution are correct?

1 It increases the pH of rivers.

2 It damages limestone buildings.

3 It causes respiratory problems.

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

---

35. 0620_w18_qp_23 Q: 29

Which equation represents the incomplete combustion of propane, C_3H_8?

A $2C_3H_8 + 7O_2 \rightarrow 6CO + 8H_2O$

B $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

C $2C_3H_8 + 11O_2 \rightarrow 6CO + 16H_2O$

D $C_3H_8 + 7O_2 \rightarrow 3CO_2 + 8H_2O$

---

36. 0620_m17_qp_22 Q: 30

Which two gases are obtained from liquid air by fractional distillation?

A carbon dioxide and oxygen

B carbon dioxide and water vapour

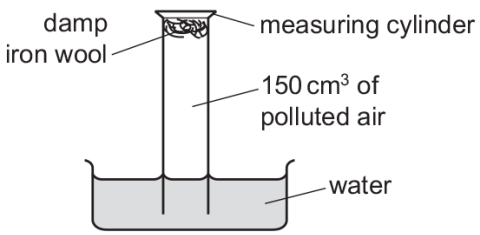
C nitrogen and oxygen

D nitrogen and water vapour

---

37. 0620_m17_qp_22 Q: 31

An experiment to find the percentage of oxygen in 150 cm^3 of polluted air is shown.



The apparatus is left for one week.

After this time, the volume of gas in the measuring cylinder is 122 cm^3.

What is the percentage of oxygen, to the nearest whole number, in the polluted air?

A 19% **B** 21% **C** 28% **D** 81%

---

38. 0620_s17_qp_21 Q: 30

Oxides of nitrogen are found in polluted air.

Which statement about oxides of nitrogen is correct?

A Oxides of nitrogen are formed by the reaction of nitrogen with oxygen during the fractional distillation of liquid air.

B Oxides of nitrogen are formed in a car engine by the reaction of petrol with nitrogen from the air.

C Oxides of nitrogen are removed from exhaust gases by reaction with carbon dioxide in a catalytic converter.

D Oxides of nitrogen are removed from exhaust gases by reduction in a catalytic converter.

---

39. 0620_s17_qp_22 Q: 32

Which chemical reaction decreases pollution in the air?

A $S + O_2 \rightarrow SO_2$

B $N_2 + O_2 \rightarrow 2NO$

C $2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$

D $2NO + 2CO \rightarrow 2CO_2 + N_2$

---

40. 0620_s17_qp_23 Q: 32

Petrol burns in a car engine to produce waste gases which leave through the car exhaust.

One of these waste gases is an oxide of nitrogen.

Which statement describes how this oxide of nitrogen is formed?

A Carbon dioxide reacts with nitrogen in the catalytic converter.

B Nitrogen reacts with oxygen in the car engine.

C Nitrogen reacts with oxygen in the catalytic converter.

D Petrol combines with nitrogen in the car engine.

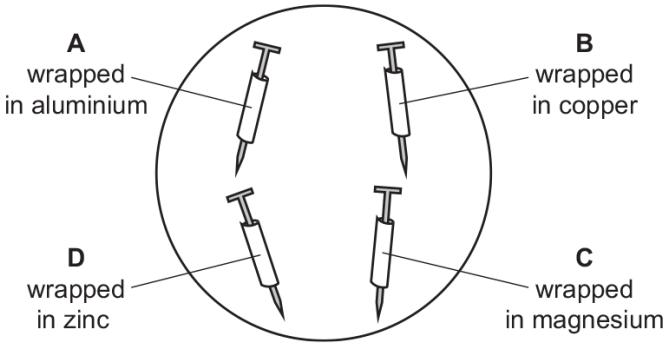
---

41. 0620_w17_qp_21 Q: 30

Four iron nails had different metals wrapped around them.

The nails were placed in an open dish filled with water and left for a week.

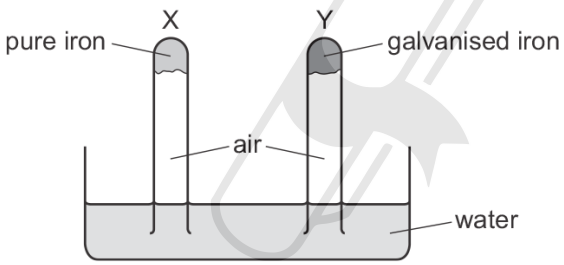
Which iron nail has no protection against rusting?



---

42. 0620_w17_qp_22 Q: 30

An experiment to investigate the effect of galvanising iron is shown.



The experiment is left for seven days.

What happens to the water level in tubes X and Y?

	tube X	tube Y
A	falls	rises
B	no change	no change
C	rises	falls
D	rises	no change

---

43. 0620_w17_qp_23 Q: 30

A piece of zinc is attached to the hull of a steel boat. Steel is an alloy of iron.

Which statement explains why the zinc prevents the iron from rusting?

A Zinc is less reactive than iron, and iron is less likely to lose electrons than zinc.

B Zinc is less reactive than iron, and iron is more likely to lose electrons than zinc.

C Zinc is more reactive than iron, and iron is less likely to lose electrons than zinc.

D Zinc is more reactive than iron, and iron is more likely to lose electrons than zinc.

---

44. 0620_m16_qp_22 Q: 28

One method of preventing the rusting of iron is to keep oxygen away from the surface of the metal.

Which way of rust prevention does **not** use this method?

A coating the iron with grease

B connecting the iron to a more reactive metal

C covering the iron with plastic

D painting the iron

---

45. 0620_m16_qp_22 Q: 30

Nitrogen monoxide is produced in a car engine when petrol is burnt.

The gases from the car engine are passed through a catalytic converter.

In the catalytic converter the nitrogen monoxide reacts with carbon monoxide to form nitrogen and carbon dioxide.

Which statement is **not** correct?

A Carbon monoxide is oxidised in the catalytic converter.

B Carbon monoxide is produced by the complete combustion of petrol.

C Nitrogen monoxide is formed by the reaction of nitrogen and oxygen.

D Nitrogen monoxide is reduced in the catalytic converter.

---

46. 0620_m16_qp_22 Q: 31

Which pollutant gas can be produced as a result of incomplete combustion of octane, C_8H_{18}?

A carbon

B carbon dioxide

C carbon monoxide

D methane

---

47. 0620_p16_qp_20 Q: 32

A catalytic converter removes harmful gases from motor car exhausts.

Which reaction does **not** take place in a catalytic converter?

A $2CO + O_2 \rightarrow 2CO_2$

B $N_2 + 2CO_2 \rightarrow 2NO + 2CO$

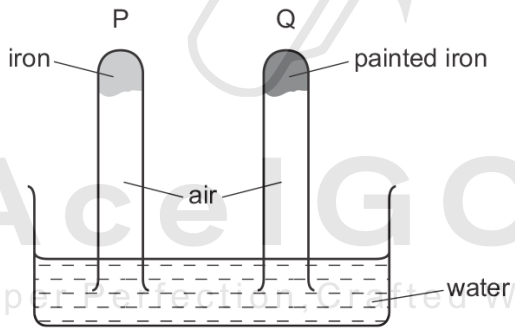
C $2NO_2 \rightarrow N_2 + 2O_2$

D $2NO_2 + 4CO \rightarrow N_2 + 4CO_2$

---

48. 0620_s16_qp_21 Q: 29

The diagram shows an experiment to investigate how paint affects the rusting of iron.



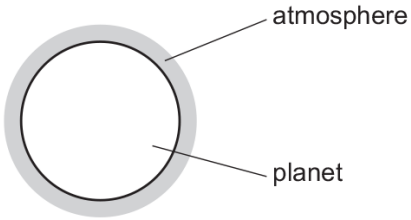
What happens to the water level in tubes P and Q?

	tube P	tube Q
A	falls	rises
B	no change	rises
C	rises	falls
D	rises	no change

---

49. 0620_s16_qp_21 Q: 30

A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of its atmosphere.

gas	percentage by volume
carbon dioxide	4
nitrogen	72
oxygen	24

Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

A carbon dioxide and oxygen

B carbon dioxide only

C nitrogen and oxygen

D nitrogen only

---

50. 0620_s16_qp_21 Q: 31

Many car exhaust systems contain a catalytic converter.

Which change does **not** occur in a catalytic converter?

A carbon dioxide → carbon

B carbon monoxide → carbon dioxide

C nitrogen oxides → nitrogen

D unburnt hydrocarbons → carbon dioxide and water

---

51. 0620_s16_qp_22 Q: 31

The gases coming from a car's engine contain oxides of nitrogen.

How are these oxides formed?

A Nitrogen reacts with carbon dioxide.

B Nitrogen reacts with carbon monoxide.

C Nitrogen reacts with oxygen.

D Nitrogen reacts with petrol.

---

52. 0620_s16_qp_23 Q: 31

Catalytic converters are used to remove some gaseous pollutants from car exhaust fumes.

Which gas is removed from the fumes by oxidation?

A carbon dioxide

B carbon monoxide

C nitrogen

D nitrogen oxide

---

53. 0620_w16_qp_21 Q: 29

Air is a mixture of gases.

Which gas is present in the largest amount?

A argon

B carbon dioxide

C nitrogen

D oxygen

---

54. 0620_w16_qp_21 Q: 31

Underwater steel pipes can be protected from corrosion by attaching magnesium blocks to them.

Which equation represents the reaction that prevents corrosion?

A $Fe \rightarrow Fe^{2+} + 2e^-$

B $Fe^{2+} \rightarrow Fe^{3+} + e^-$

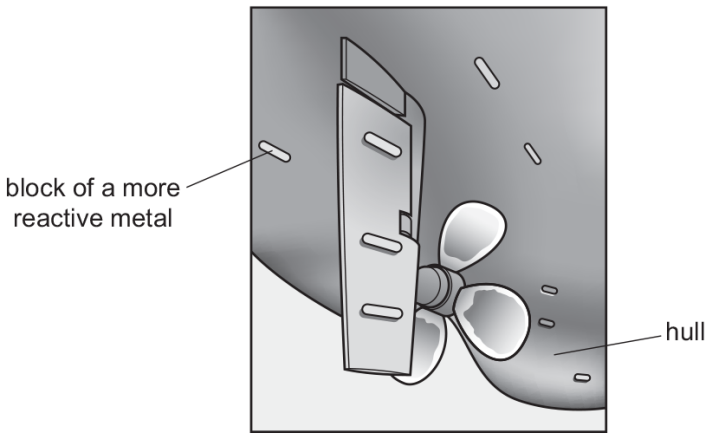
C $Mg \rightarrow Mg^{2+} + 2e^-$

D $Mg^{2+} + 2e^- \rightarrow Mg$

---

55. 0620_w16_qp_22 Q: 31

Boats made from steel can be protected from rusting by attaching blocks of a more reactive metal to the hull of the boat.



Which statement is correct?

A Copper is used for the blocks because it does not react with water.

B Magnesium is not used for the blocks because it reacts with steel.

C The metal used for the blocks loses electrons more easily than steel.

D This form of protection from rusting is called galvanising.

---

56. 0620_w16_qp_23 Q: 31

A metal, X, is used to make oil pipelines.

X corrodes in air and water.

X can be protected from corrosion by attaching blocks of element Y.

Which statement is correct?

A This process is known as galvanising.

B Y forms positive ions more readily than X.

C Y is an unreactive metal.

D Y is an unreactive non-metal.

SN	Paper	Q. No.	Answer
01	0620_m16_qp_22	29	D
02	0620_m21_qp_22	29	B
03	0620_s21_qp_23	24	A
04	0620_s21_qp_23	27	D
05	0620_w21_qp_21	29	D
06	0620_w21_qp_22	28	B
07	0620_w21_qp_23	28	B
08	0620_w21_qp_23	29	A
09	0620_m20_qp_22	30	B
10	0620_m20_qp_22	31	A
11	0620_m20_qp_22	32	C
12	0620_p20_qp_20	32	B
13	0620_s20_qp_21	32	D
14	0620_s20_qp_22	32	C
15	0620_s20_qp_23	32	D
16	0620_w20_qp_21	32	C
17	0620_w20_qp_23	30	D
18	0620_m19_qp_22	32	B
19	0620_s19_qp_21	29	D
20	0620_s19_qp_21	30	D
21	0620_s19_qp_22	28	A
22	0620_s19_qp_23	29	B
23	0620_w19_qp_21	28	D
24	0620_w19_qp_21	31	A
25	0620_w19_qp_21	32	B
26	0620_w19_qp_22	31	D
27	0620_w19_qp_23	31	D
28	0620_m18_qp_22	28	C
29	0620_s18_qp_21	28	B
30	0620_s18_qp_21	29	C
31	0620_w18_qp_21	29	A
32	0620_w18_qp_21	30	A
33	0620_w18_qp_21	31	A
34	0620_w18_qp_22	29	D
35	0620_w18_qp_23	29	A
36	0620_m17_qp_22	30	C
37	0620_m17_qp_22	31	A
38	0620_s17_qp_21	30	D
39	0620_s17_qp_22	32	D
40	0620_s17_qp_23	32	B
41	0620_w17_qp_21	30	B
42	0620_w17_qp_22	30	D
43	0620_w17_qp_23	30	C
44	0620_m16_qp_22	28	B
45	0620_m16_qp_22	30	B
46	0620_m16_qp_22	31	C
47	0620_p16_qp_20	32	B
48	0620_s16_qp_21	29	D
49	0620_s16_qp_21	30	A

SN	Paper	Q. No.	Answer
50	0620_s16_qp_21	31	A
51	0620_s16_qp_22	31	C
52	0620_s16_qp_23	31	B
53	0620_w16_qp_21	29	C
54	0620_w16_qp_21	31	C
55	0620_w16_qp_22	31	C
56	0620_w16_qp_23	31	B