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No parts of this book may be reproduced, stored in a retrieval system, of transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher. mock papers 1-foundation and higher tier

Questions 1 to 16 - Foundation tier . Higher tier starts at question 17.

Lithium is a metal. Lithium reacts with cold water to produce hydrogen.

- **1.** Lithium is
 - A a transition metal
 - **B** an alkali metal
 - C a halogen
 - **D** a noble gas
- 2. The test for hydrogen is that it
 - A relights a glowing splint
 - **B** pops when mixed with air and ignited
 - **C** turns limewater cloudy
 - **D** turns damp red litmus paper blue
- **3.** The symbol for an atom of lithium is
 - A L
 - B li
 - C Li
 - D LI
- 4. Potassium is in the same group of the periodic table as lithium. When potassium is added to cold water it is most likely to
 - A sink and react slowly
 - **B** react vigorously and give off hydrogen
 - **C** react vigorously and give off carbon dioxide
 - **D** float and show no reaction
- 5. An atom of lithium contains electrons, protons and neutrons. Which of these particles are found in the nucleus of this atom?
 - A electrons and protons
 - **B** electrons and neutrons
 - C protons and electrons
 - **D** protons and neutrons

6. This hazard symbol is used on bottles which contain potassium and lithium.



This symbol shows that potassium and lithium are

- А corrosive
- B toxic
- С explosive
- D flammable
- The positions of four elements in the periodic table are shown by the letters S, T, X and Y. 7. The letters shown are not the symbols of atoms of the elements.



Which letters show the positions of the metals lithium and potassium?

- X and S А
- X and Y B
- S and T С
- D Y and T
- 8. Lithium chloride, potassium chloride and sodium chloride are all colourless, crystalline solids. Which of the following tests could be used to identify these solids?
 - flame tests А
 - B adding limewater
 - С testing with indicator paper
 - applying a lighted splint D

Turn over

- 9. Some salts can be made by reacting an acid with an alkali. The reaction between the acid and alkali is called
 - A thermal decomposition
 - **B** combustion
 - C neutralisation
 - **D** a physical change
- **10.** Baking powder is often used in cake mixtures. The baking powder is used to
 - A make the cake rise
 - **B** add flavour
 - **C** preserve the cake
 - **D** help the cake set
- 11. Baking powder contains sodium hydrogencarbonate and an acidic substance. Baking powder is
 - A an element
 - **B** a compound
 - C a mixture
 - **D** a solution
- 12. Some cakes contain artificial sweeteners. Artificial means that the sweetener
 - A contains no chemical substances
 - **B** is man-made
 - C has no taste
 - **D** is obtained from sea water
- **13.** When a cake is cooked, the cake mixture changes. Cooking always causes
 - A a physical change
 - **B** a chemical change
 - **C** neutralisation
 - **D** precipitation

Gold can be found uncombined in the Earth's crust. 14. The gold is uncombined because it is

- expensive Α
- В rare
- unreactive С
- D an element
- Iron ore is found in the Earth's crust. 15. Iron is extracted from its ore by
 - electrolysis Α
 - distillation В
 - С
 - heating with carbon heating with oxygen D
- The table shows some possible uses of gold, copper and iron. 16. Which row of the table is correct?

	use of gold	use of copper	use of iron
Α	jewellery	electrical wiring	making steel
B	jewellery	making steel	electrical wiring
С	making steel	jewellery	making steel
D	making steel	electrical wiring	jewellery

Turn over

Use the following information to answer questions 17 to 19.

The positions of five elements in the periodic table are shown by letters P, Q, R, S and T. The letters shown are not the symbols of atoms of the elements.



17. Which letter shows the position of an unreactive gas?

- A
 P

 B
 Q
- C R
- D S

18. Which letter shows the position of the transition metal, iron?

- A P
- **B** Q
- C R
- **D** T

19. In the periodic table, elements are arranged in order of increasing atomic number. Which letter shows the position of the element with atomic number 9?

- A P
- **B** Q
- C R
- **D** T

20. An atom of an element contains 19 electrons, 20 neutrons and 19 protons.

The element has an atomic number of

- A 19
- **B** 20
- C 38
- **D** 39
- 21. Which row in the table shows the correct charges on an electron, a neutron and a proton?

	electron	neutron	proton
Α	negative	positive	no charge
В	negative	no charge	positive
С	no charge	positive	negative
D	positive	no charge	negative

Turn over

22. When calcium carbonate is heated strongly, calcium oxide is formed. The equation for the reaction is

$$CaCO_3 \rightarrow CaO + CO_2$$

This reaction is an example of

- A hydration
- **B** neutralisation
- **C** oxidation
- **D** thermal decomposition
- **23.** Calcium oxide can be used to make calcium hydroxide. The equation for the reaction is

$$CaO + H_2O \rightarrow Ca(OH)_2$$

This reaction is an example of

- A hydration
- **B** neutralisation
- **C** oxidation
- **D** thermal decomposition
- 24. A solution of calcium hydroxide is used to test for
 - A oxygen
 - **B** carbon dioxide
 - C chlorine
 - **D** argon

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS



Which diagram shows the method of collection that can be used whatever the properties of the gas?



26. The chemist thought the gas might be ammonia. To test if she was correct, she should test the gas with

- A a lighted splint and expect a pop sound
- **B** a glowing splint and expect the splint to relight
- C moist red litmus paper and expect the litmus paper to turn blue
- **D** limewater and expect the limewater to go milky
- 27. The formula of a molecule of ammonia is
 - A NH^3
 - **B** NH₃
 - C N₃H
 - **D** NH₄

28. Which of the following statements about ammonia are true?

- 1 ammonia can be used to make nitric acid
- 2 ammonia is more dense than air and is collected by downward delivery
- A 1 only
- **B** 2 only
- **C** 1 and 2
- **D** neither 1 nor 2

Turn over

29. Lead nitrate solution is reacted with potassium iodide solution.A precipitate of lead iodide is formed.A pure, dry sample of the lead iodide could be obtained from the reaction mixture by

- A evaporating
- **B** filtering, then drying
- **C** filtering, then washing, then drying
- **D** washing, then filtering, then drying
- **30.** KNO₃ is the formula of a salt. The name of this salt is
 - A potassium nitride
 - **B** potassium nitrogen oxide
 - **C** potassium nitrate
 - **D** potassium nitro-oxide
- **31.** Salts of copper, potassium and sodium are used to produce colours in firework flames. Which row of the table shows the correct colour produced by each of these salts?

	copper salt	potassium salt	sodium salt
Α	green-blue	yellow	lilac
В	green-blue	lilac	yellow
C	lilac	green-blue	yellow
D	lilac	yellow	green-blue

32. The balanced equation for the reaction of calcium carbonate with hydrochloric acid is

$$A \qquad CaCO_3 + HCl \rightarrow CaCl + H_2O + CO_2$$

- **B** $CaCO_3 + HCl_2 \rightarrow CaCl_2 + H_2O + CO_2$
- $\mathbf{C} \qquad \quad \mathbf{C}\mathbf{a}\mathbf{C}\mathbf{O}_3 + 2\mathbf{H}\mathbf{C}\mathbf{l} \ \rightarrow \mathbf{C}\mathbf{a}\mathbf{C}\mathbf{l}_2 + \mathbf{H}_2\mathbf{O} + \mathbf{C}\mathbf{O}_2$
- **D** $CaCO_3 + H_2Cl \rightarrow CaCl + H_2O + CO_2$

33. Which row of the table shows a halogen with its correct colour and state at room temperature?

	halogen	colour	state at room temperature
Α	fluorine	pale yellow	gas
В	chlorine	grey	solid
С	bromine	yellow-green	liquid
D	iodine	purple	solid

34. Which of these statements about the halogens are correct?

- 1 the halogens all exist as diatomic molecules
- 2 the halogens increase in reactivity with increasing atomic number
- A 1 only
- **B** 2 only
- **C** 1 and 2
- **D** neither 1 nor 2
- **35.** Chlorine reacts with potassium bromide solution. The equation for the reaction is
 - $\mathbf{A} \qquad \mathbf{Cl} \ + \ \mathbf{KBr} \ \rightarrow \ \mathbf{KCl} \ + \ \mathbf{Br}$
 - **B** $Cl_2 + 2KBr \rightarrow 2KCl + 2Br$
 - $\mathbf{C} \qquad \qquad \mathbf{Cl}_2 + \quad \mathbf{KBr}_2 \rightarrow \quad \mathbf{KCl}_2 + \quad \mathbf{Br}_2$
 - $\mathbf{D} \qquad Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

Acids

36. The table shows some possible uses of ethanoic acid, citric acid and phosphoric acid. Which row of the table is correct?

	use of ethanoic acid	use of citric acid	use of phosphoric acid
Α	as food flavouring	in rust remover	as vinegar
В	in rust remover	as food flavouring	as vinegar
С	in rust remover	as vingear	as food flavouring

|--|

Turn over

37. Many metals can be found in the Earth's crust.Platinum is found uncombined.Aluminium is extracted using electrolysis.Lead is extracted using carbon.

Which is the correct order of reactivity of platinum, aluminium and lead?

	most reactive —		 least reactive
A	aluminium	platinum	lead
B	platinum	lead	aluminium
С	aluminium	lead	platinum
D	lead	aluminium	platinum

38. When copper oxide is heated in hydrogen, copper is produced.

$$CuO + H_2 \rightarrow Cu + H_2O$$

Which of these statements about this reaction are correct?

1 copper oxide is reduced

- 2 the reaction is a dehydration reaction
- A 1 only
- **B** 2 only
- C both 1 and 2
- **D** neither 1 nor 2
- **39.** When sodium hydroxide solution is added to copper sulphate solution, a precipitate forms. The colour of the precipitate is
 - A pale green
 - **B** red-brown
 - C pale blue
 - **D** white

40. The equation for the reaction between sodium hydroxide solution and copper sulphate solution is

$$CuSO_4 + xNaOH \rightarrow yNa_2SO_4 + zCu(OH)_2$$

Which row of the table shows values of \mathbf{x} , \mathbf{y} and \mathbf{z} that give a balanced equation?

	X	У	Z
Α	2	1	2
В	2	1	1
С	2	2	1
D	2	2	2

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

mock papers 2-foundation and higher tier

Questions 1 to 16 - Foundation tier . Higher tier starts at question 17.

- 1. Global warming is an increase in the
 - A number of hours of sunshine
 - **B** temperature of the Sun
 - **C** temperature of the Earth
 - **D** number of days with no rain
- 2. Which of these may cause an increase in global warming?
 - A growing more trees
 - **B** growing crops to make bio-fuels
 - C walking instead of travelling by car
 - **D** burning fossil fuels
- **3.** What percentage of the Earth's atmosphere is carbon dioxide?
 - A 70%
 - **B** 20%
 - C 5%
 - **D** less than 1%
- 4. The formula for carbon dioxide is
 - A CO
 - **B** CO^2
 - C Co
 - **D** CO_2
- 5. Some people think that it would be better to use hydrogen rather than petrol as a fuel for cars. This is because
 - A large amounts of hydrogen gas are present in the atmosphere
 - **B** when hydrogen burns carbon dioxide is removed from the atmosphere
 - **C** when hydrogen burns the only substance formed is water
 - **D** burning hydrogen produces oxygen

6. Some plant pots are made from bamboo plants. The bamboo used is from a sustainable source. The fact that bamboo is from a sustainable source means

- A bamboo is a waste product
- **B** new bamboo is grown to replace the bamboo plants cut down to make pots
- **C** bamboo is unsuitable for other uses
- **D** there are large amounts of bamboo available from this source
- 7. People are encouraged to recycle empty drink cans made of aluminium. This is because
 - A aluminium is a very rare metal
 - **B** aluminium rusts quickly
 - **C** drink cans made of aluminium are refilled
 - **D** recycling reduces waste
- 8. Sea water contains dissolved salts.Pure water for drinking can be obtained from sea water by
 - A distillation
 - **B** adding chlorine to the sea water
 - **C** filtration
 - **D** boiling the water before using it

Turn over

Instruments used by dentists can be put in a special pouch before being sterilised at a high temperature.
 These pouches have a pink arrow on the outside.
 The arrow turns brown when sterilisation is complete.

The arrow is likely to be made of

- A a smart material
- **B** universal indicator
- C litmus
- **D** Thinsulate
- **10.** Tom likes to go sea fishing.



Tom's fishing rod is reinforced with fibres. The best fibres for this reinforcing would be

- A carbon fibres that are strong and light
- **B** Nomex fibres that are flame resistant
- **C** steel fibres that are strong and dense
- **D** Dacron fibres that provide good thermal insulation
- 11. Tom wears a coat to keep him warm. Which of these is the most important property of the material used to make this coat?
 - A flame retardant
 - **B** strong
 - C good thermal insulator
 - **D** brightly coloured

- **12.** Tom's boots have a waterproof, breathable lining. This lining could be made from
 - A Kevlar
 - **B** Gore-Tex
 - C Lycra
 - **D** Thinsulate

This is part of a label from a pack containing coffee.

This packet contains coffee in a protective atmosphere of an unreactive gas.

- **13.** The coffee is packed in a protective atmosphere to
 - A prevent the pack being damaged by sharp objects
 - **B** prevent oxygen causing the coffee to deteriorate
 - **C** make the packaging smart
 - **D** reduce the amount of caffeine in the coffee
- 14. The gas used in the packaging is likely to be
 - A nitrogen
 - B air
 - C hydrogen
 - **D** carbon monoxide
- **15.** Alcoholic drinks are made by converting sugars into ethanol. This process is
 - A distillation
 - **B** nanotechnology
 - C emulsification
 - **D** fermentation
- **16.** Drinking alcoholic drinks can cause
 - A improved thinking
 - **B** faster reactions
 - C liver damage
 - **D** clearer vision

Turn over

- 17. Common salt is often added to food. This salt is
 - A sodium
 - **B** sodium hydroxide
 - C sodium carbonate
 - **D** sodium chloride
- **18.** Hydrogen is used in the food industry. An important use of hydrogen is
 - A as a solvent
 - **B** in the sterilisation of milk
 - **C** in the manufacture of margarine
 - **D** as an oven cleaner
- **19.** Mayonnaise is made from egg yolks, oil and vinegar. If the egg yolks are not added to the mixture, the oil and vinegar
 - A react
 - **B** separate
 - C deteriorate
 - **D** solidify
- 20. Beer is made using hops and malt.Sugar from the malt is converted into ethanol by yeast.The complete word equation for the reaction that takes place is
 - A sugar + yeast \rightarrow ethanol
 - **B** sugar \rightarrow ethanol
 - C sugar \rightarrow ethanol + carbon dioxide
 - **D** sugar + carbon dioxide \rightarrow ethanol
- **21.** Some saucepans have a non-stick coating made of Teflon. Teflon
 - A was first produced as a coating for saucepans
 - **B** is a natural substance
 - **C** has uses which only became apparent some time after it was first made

D is only used for coating saucepans

22. Bio-ethanol can be used as a fuel for cars. An advantage of using bio-ethanol instead of petrol is

- A growing plants to produce bio-ethanol removes carbon dioxide from the atmosphere
- **B** incomplete combustion of bio-ethanol cannot produce carbon monoxide
- **C** complete combustion of bio-ethanol does not produce carbon dioxide
- **D** growing plants to produce bio-ethanol does not affect the amount of land available for food production
- 23. Nanotechnology is being used to produce catalysts which make diesel fuel burn more efficiently.Use of these catalysts will
 - A prevent waste products being produced
 - **B** reduce the percentage of toxic gases in exhaust fumes
 - **C** allow diesel-fuelled cars to use petrol as a fuel
 - **D** allow diesel-fuelled cars to travel more safely at high speeds
- 24. Kerosene fuel is a mixture of hydrocarbons. The complete combustion of kerosene will produce
 - A carbon monoxide only
 - **B** carbon dioxide only
 - C carbon monoxide and water
 - **D** carbon dioxide and water

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Turn over

Nanotechnology is used to produce nanoparticles.

- 25. Scientists are interested in nanoparticles because the nanoparticles
 - A are the major cause of global warming, when released into the atmosphere
 - **B** are intelligent
 - **C** can make copies of themselves
 - **D** have some unusual properties
- **26.** Nanoparticles of titanium(IV) oxide are used in some sunscreens. These particles are
 - A just visible to the naked eye
 - **B** smaller than atoms of titanium
 - **C** smaller than molecules of oxygen but larger than atoms of titanium
 - **D** smaller than conventional particles of titanium(IV) oxide
- 27. Which of these statements are correct?
 - 1 the media always produce reliable reports about nanotechnology
 - 2 the risks involved in the use of nanotechnology are fully understood
 - A 1 only
 - **B** 2 only
 - C both 1 and 2
 - **D** neither 1 nor 2

Some food substances are emulsions.

- **28.** An emulsion consists of an emulsifier in a mixture of
 - A two liquids
 - **B** a soluble solid and a liquid
 - **C** an insoluble gas and a liquid
 - **D** two aqueous solutions
- **29.** Lecithin is a common emulsifier. Which of these statements are correct?
 - 1 lecithin molecules have a hydrophilic part and a hydrophobic part
 - 2 the hydrophilic part of a lecithin molecule is attracted to oil
 - A 1 only
 - **B** 2 only
 - C both 1 and 2
 - **D** neither 1 nor 2
- **30.** Some food packaging has a special coloured spot on it. This spot changes colour to show when the food is no longer fresh enough to eat. This method of packaging
 - A stops the food from decaying
 - **B** makes the packaging microbe resistant
 - **C** makes the packaging easier to recycle
 - **D** is intelligent packaging
- **31.** These ingredients are used to brew beer.
 - 1 hops
 - 2 water
 - 3 sugar
 - 4 yeast

Which of these must be present to produce the ethanol in the beer?

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

Turn over

- **32.** In industry, oxygen is obtained from air. This is done by
 - A cooling the air until the oxygen separates as a liquid
 - **B** liquefying the air and then raising the temperature to boil the liquid air
 - **C** reacting the nitrogen in air with hydrogen and removing the ammonia formed
 - **D** passing the air into sodium hydroxide solution to remove all gases except oxygen

Use this information to answer questions 33 to 35.

The diagram shows a fractionating column used to separate crude oil into useful fractions.



- **33.** Which of these statements is **not** correct?
 - A crude oil enters the bottom of the column as a liquid
 - **B** each fraction contains more than one compound
 - **C** different fractions condense at different temperatures
 - **D** different crude oils have different compositions
- **34.** The table gives names, average numbers of carbon atoms in a molecule and uses of the fractions F, H, J and K.

The average number of carbon atoms in the molecules in the petrol fraction is 8.

Which row of the table is correct?

	fraction	name	average number of carbon atoms in the molecules	used as a fuel for
Α	F	gases	15	camping stoves
В	Н	bitumen	20	lorries
С	J	fuel oil	45	ships
D	K	kerosene	13	aeroplanes

35. Compare fractions J and H.

Which row of the table is correct?

	boiling point of J	viscosity of J
Α	higher than H	lower than H
B	higher than H	higher than H
С	lower than H	lower than H
D	lower than H	higher than H

Burning fuels

36. Butane is used as a fuel. Which of these equations are for reactions involving the incomplete combustion of butane?

- $\begin{array}{rl} 1 & 2C_4H_{10} + 5O_2 \rightarrow 8C + 10H_2O \\ 2 & C_4H_{10} + 2O_2 \rightarrow 4CO + 5H_2 \\ 3 & 2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O \end{array}$
- A 1 only
- **B** 2 only
- C 1 and 2 only
- **D** 1 and 3 only
- **37.** Some cars use hydrogen as a fuel. Which of these statements about the use of hydrogen as a fuel are correct?
 - 1 waste products are not released into the environment
 - 2 hydrogen can be produced from water but large amounts of energy are required
 - A 1 only
 - **B** 2 only
 - C both 1 and 2
 - **D** neither 1 nor 2
- **38.** The incomplete combustion of fuels can produce carbon monoxide. This occurs with
 - A fossil fuels only
 - **B** fuels obtained from crude oil only
 - C all fuels

D any fuel containing carbon

Turn over

39. Ethanol can be used as a fuel. Which of these is the balanced equation for the complete combustion of ethanol?

- $\begin{array}{ll} {\bf A} & & 2{C_2}{H_5}OH + 5{O_2} \rightarrow 2C{O_2} + 2CO + 6{H_2}O \\ {\bf B} & & 2{C_2}{H_5}OH + 7{O_2} \rightarrow 4C{O_2} + 6{H_2}O \\ {\bf C} & & {C_2}{H_5}OH + 3{O_2} \rightarrow 2C{O_2} + 3{H_2}O \end{array}$
- **D** $C_2H_5OH + O_2 \rightarrow CH_3COOH + H_2O$
- **40.** Carbon monoxide is very dangerous because it is difficult to detect and toxic. Which row of the table explains why carbon monoxide is difficult to detect and toxic?

	difficult to detect because it is	toxic because it combines with
Α	colourless and odourless	oxygen
В	heavier than air	oxygen
С	colourless and odourless	haemoglobin in the blood
D	heavier than air	haemoglobin in the blood

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

mock papers 3-foundation and higher tier

Questions 1 to 16 - Foundation tier. Higher tier starts at question 17.

1. Which of these hazard symbols is used to show that hydrogen is flammable?



- 2. When potassium reacts with water, hydrogen is produced. During the reaction heat is given out. The reaction is
 - A a thermal decomposition
 - **B** endothermic
 - **C** exothermic
 - **D** a neutralisation
- **3.** Hydrogen is often collected using this apparatus.



This method is known as collecting the gas

- A under water
- **B** over water
- **C** by downward delivery
- **D** by upward delivery
- 4. A mixture of hydrogen and air explodes if it is ignited. This explosion is the result of
 - A a slow physical change
 - **B** a fast physical change
 - **C** a slow chemical reaction
 - **D** a fast chemical reaction

This is part of the label from a bottle containing cola.

 Ingredients	~
carbonated water phosphoric acid flavourings sweeteners (aspartame, sodium saccharide) preservative (E211) colour (E150d)	

- 5. E211 has the formula $NaC_6H_5CO_2$. E211 contains atoms of the element
 - A carbohydrate
 - **B** nitrogen
 - C hydrogen
 - D cobalt
- 6. The cola contains artificial sweeteners. Artificial means
 - A less sweet than sugar
 - **B** obtained from plants
 - C man-made
 - **D** dissolves easily
- 7. A chemist tests a sample of the sweetener, sodium saccharide, to prove that it is a sodium salt. To do this the chemist should use
 - A a flame test
 - **B** nitric acid
 - C universal indicator solution
 - **D** sodium hydroxide solution
- 8. Warming the cola causes a gas to be released. This gas turns limewater milky. The gas is
 - A oxygen
 - **B** carbon dioxide
 - C nitrogen
 - **D** steam

- 9. The cola contains phosphoric acid. Another use for phosphoric acid is
 - A to make fertilisers
 - **B** in vinegar
 - C as table salt
 - **D** to make nitric acid

Metals

- **10.** Most metals are found in the Earth's crust as
 - A liquids
 - **B** alloys
 - C ores
 - **D** uncombined elements
- 11. Which letter shows the position of a metal in the periodic table?



- **12.** The symbol for an atom of copper is
 - A C
 - B Co
 - C Cu
 - D Cp
- Monica added a reagent to copper nitrate solution. This produced a blue precipitate. The reagent was
 - A sodium chloride solution
 - **B** sodium hydroxide solution
 - C water
 - **D** dilute sulphuric acid

14. Lithium is an alkali metal.

Which letter shows the position of lithium in the periodic table?



- 15. Gold is found as the uncombined metal in the Earth's crust. Gold is found as the uncombined metal because gold metal is
 - A unstable
 - **B** hard
 - C heavy
 - **D** unreactive
- 16. Rubidium and caesium are in the same group of the periodic table. Rubidium and caesium have
 - A very different physical properties and very different chemical reactions
 - **B** the same physical properties but very different chemical reactions
 - C different physical properties and similar chemical reactions
 - **D** the same physical properties and similar chemical reactions

- **17.** Baking powder contains
 - A sodium carbonate only
 - **B** sodium hydrogencarbonate only
 - **C** sodium carbonate and an acidic substance
 - **D** sodium hydrogencarbonate and an acidic substance
- **18.** When anhydrous magnesium carbonate is heated, a gas is produced. This reaction is an example of
 - A neutralisation
 - **B** thermal decomposition
 - **C** oxidation
 - **D** dehydration
- **19.** When potassium hydrogencarbonate is heated, a gas is produced. The gas is
 - A oxygen
 - **B** hydrogen
 - **C** carbon monoxide
 - **D** carbon dioxide
- **20.** Barium carbonate is an insoluble salt. Barium carbonate is best prepared by
 - A mixing solutions of barium nitrate and potassium carbonate
 - **B** heating a mixture of barium and potassium carbonate
 - **C** adding barium oxide to potassium carbonate solution
 - **D** evaporating a mixture of barium hydroxide and carbonic acid

The table gives information about four halogens.

name	atomic number
fluorine	9
chlorine	17
bromine	35
iodine	53

- 21. The least reactive halogen shown in the table is
 - A fluorine
 - **B** chlorine
 - C bromine
 - **D** iodine
- **22.** Every bromine atom must
 - A contain 35 neutrons
 - **B** contain 35 protons
 - **C** contain the same number of electrons as a fluorine atom
 - **D** have a negative charge
- **23.** The nucleus of an atom of iodine contains
 - A protons only
 - **B** electrons only
 - **C** protons and neutrons
 - **D** protons and electrons
- 24. If chlorine is bubbled into potassium bromide solution, bromine is formed. The reaction taking place is known as
 - A displacement
 - **B** dehydration
 - C neutralisation
 - **D** thermal decomposition

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

The positions of some elements in the periodic table are shown.



The letters shown are not the symbols of atoms of the elements.

- **25.** Which letter shows the position of an element that is a gas at room temperature and is unreactive?
 - A
 Q

 B
 S

 C
 U

 D
 X

26. Which letter shows the position of a halogen that is more reactive than bromine?

- A
 R

 B
 T

 C
 X

 D
 Y
- 27. Which letter shows the position of a transition metal in period 4?
 - A
 S

 B
 T

 C
 V

 D
 W

28. Which letter shows the position of an alkali metal that is less reactive than potassium?

 A
 P

 B
 Q

 C
 S

 D
 Y

29. Which row of the table shows reagents that could be added to dilute hydrochloric acid to make magnesium chloride solution?

	magnesium oxide	magnesium hydroxide	magnesium carbonate
Α	yes	yes	yes
В	yes	yes	no
С	no	yes	yes
D	yes	no	no

30. Calcium oxide reacts with water to form calcium hydroxide. The equation for the reaction is

$$CaO + H_2O \rightarrow Ca(OH)_2$$

In this reaction the calcium oxide is

- A reduced
- **B** oxidised
- C dehydrated
- **D** hydrated

Barium chloride solution, BaCl₂, was mixed with dilute sulphuric acid.A white precipitate of barium sulphate was formed.The equation for the reaction is

Α	$BaCl_2 + 2HSO_4$	\rightarrow Ba(SO ₄) ₂ + 2HCl
B	$BaCl_2 + H(SO_4)$	$(A)_2 \rightarrow Ba(SO_4)_2 + HCl_2$
С	$2BaCl_2 + H_2SO_4$	$\rightarrow Ba_2SO_4 + 2HCl_2$
D	$BaCl_2 + H_2SO_4$	\rightarrow BaSO ₄ + 2HCl

32. Jane carried out flame tests on four salts, W, X, Y and Z. Her results are shown in the table.

salt	flame colour
W	yellow
X	blue-green
Y	lilac
Z	green

Which of these are salts of metals in group 1 of the periodic table?

- A W only
- **B** Y and Z
- C W and Y
- **D** X and Y
- 33. Sodium nitrate is soluble in water.A pure sample of solid sodium nitrate is prepared in the laboratory.Which of these methods could safely be used?
 - A mix solutions of sodium chloride and potassium nitrate and filter the mixture
 - **B** react excess sodium with dilute nitric acid and filter the mixture
 - **C** mix solutions of sodium chloride and potassium nitrate and obtain crystals from the solution
 - **D** neutralise sodium hydroxide solution with dilute nitric acid and obtain crystals from the solution
- **34.** The formula of a salt is $NaClO_3$. The name of this salt is
 - A sodium chlorioxide
 - **B** sodium oxichloride
 - **C** sodium chlorate
 - **D** sodium chloride

35. When copper oxide is heated with substance X, copper is formed. Which row of the table shows substance X and what is happening to copper oxide during the reaction?

	substance X	copper oxide is
Α	carbon dioxide	reduced
В	carbon	reduced
С	carbon dioxide	thermally decomposed
D	carbon	thermally decomposed

36. In industry, phosphoric acid is used to make some useful substances. Which row of the table is correct?

	phosphoric acid is used to make			
	synthetic detergents fertilisers			
Α	no	no		
В	no	yes		
С	yes no			
D	yes	yes		

37. Max added sodium hydroxide solution to a solution of a salt. He obtained a pale green precipitate. The formula of the substance precipitated could be

- A Cu(OH)₂
- **B** $Fe(OH)_2$
- $C Zn(OH)_2$
- **D** $Fe(OH)_3$
- **38.** The table shows the boiling points of four halogens, W, X, Y and Z.

halogen	boiling point (°C)
W	59
Х	-188
Y	184
Z	-34

Which of these shows the four halogens in order of increasing atomic number?

A Z, W, Y, X
 B X, Z, W, Y
 C Y, W, Z, X
 D Z, X, W, Y

39. Chlorine reacts with potassium iodide solution. The equation for this reaction is

Α	C1	+	KI	\rightarrow	KCl	+	Ι
B	Cl_2	+	KI_2	\rightarrow	KCl_2	+	I_2
С	2C1	+	2KI	\rightarrow	2KCl	+	I_2
D	Cl_2	+	2KI	\rightarrow	2KCl	+	I_2

40. Which of these statements about chlorine are correct?

- 1 chlorine turns moist red litmus paper blue and then bleaches it
- 2 chlorine is collected in the laboratory by downward delivery because it is soluble in water and less dense than air
- A 1 only
- **B** 2 only
- C both 1 and 2
- **D** neither 1 nor 2

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

mock papers 4-foundation and higher tier



- 1. Methane is a hydrocarbon which is used as a fuel. Hydrocarbons are compounds containing
 - A carbon and oxygen only
 - **B** carbon and hydrogen only
 - **C** carbon, hydrogen and oxygen
 - **D** carbon, hydrogen and nitrogen
- 2. Incomplete combustion of a hydrocarbon can form carbon monoxide. Carbon monoxide is formed in this reaction because there is not enough
 - A heat
 - **B** hydrocarbon
 - C oxygen
 - **D** nitrogen
- 3. If a gas-fired boiler is not checked regularly, it can be dangerous to use it. The biggest danger is that using a boiler that has not been checked may
 - A release waste gases
 - **B** release a toxic gas
 - C waste fossil fuel
 - **D** waste heat energy
- 4. Burning hydrogen produces
 - A water only
 - **B** carbon dioxide only
 - C water and carbon dioxide
 - **D** water and carbon monoxide

- 5. Which of these is a fossil fuel?
 - A hydrogen
 - **B** natural gas
 - C oxygen
 - **D** water
- 6. Bio-fuels are produced from plants. A disadvantage of using bio-fuels instead of fossil fuels is that
 - A growing plants, from which they are made, uses large areas of fertile land
 - **B** growing plants, from which they are made, produces large amounts of carbon dioxide
 - **C** they always burn with a sooty flame
 - **D** they produce no energy when burnt

A comfortable, protective jacket has been made for use by police in dangerous situations.

The jacket has a Kevlar lining.

- 7. What properties does Kevlar have that make it suitable for this use?
 - A lightweight and magnetic
 - **B** odourless and colourless
 - **C** hard and transparent
 - **D** stab resistant and flexible
- 8. Steel could be used instead of Kevlar. Kevlar is preferred to steel. This is because Kevlar is
 - A less flexible
 - **B** less dense
 - **C** more expensive
 - **D** heavier

- 9. When vegetable oil and vinegar are mixed, shaken and left for some time, they separate. When egg yolk is mixed with these two liquids, they do not separate after shaking and mayonnaise is formed. Mayonnaise is
 - A a compound
 - **B** a salt
 - C an element
 - **D** an emulsion
- **10.** Foods can be preserved by removing
 - A carbon dioxide
 - **B** nitrogen
 - C salt
 - **D** water
- 11. A gas is put into some packets of peanuts before the packets are sealed.



The gas keeps the peanuts in good condition. The best gas for this purpose is

- A carbon monoxide
- B hydrogen
- C oxygen
- D nitrogen
- 12. A new lunchbox has been designed which has a special coloured spot on it. The spot changes colour, as the temperature rises. The coloured spot must be made of a material that is
 - A soluble
 - B smart
 - C toxic
 - **D** breathable

Beer is an alcoholic drink.

- **13.** Beer is made by
 - A combustion
 - **B** desalination
 - **C** fermentation
 - **D** fractional distillation
- **14.** Most of the alcohol in beer is
 - A ethanol
 - **B** glucose
 - C methanol
 - **D** water
- **15.** Drinking alcohol can damage your health. Government information states that

a healthy, adult male should not drink more than 4 units of alcohol a day a healthy, adult female should not drink more than 3 units of alcohol a day

The table shows the alcohol in some drinks.

drink	volume of drink (cm ³)	number of units of alcohol in the glass
small glass of wine	125	1.5
large glass of wine	250	3.0
large glass of standard lager	568	2.3
small glass of strong cider	284	2.3

A healthy, adult male would drink more than the stated daily amount of alcohol, in one day, if he drank

- A two small glasses of wine
- **B** one large glass of wine
- **C** one large glass of standard lager
- **D** two small glasses of strong cider
- 16. One effect of drinking too much beer is
 - A faster response times
 - **B** improved awareness
 - **C** improved vision
 - **D** slower reactions

- Hydrogen could be a useful fuel in the future.An advantage of using hydrogen as a fuel is that
 - A it is a bio-fuel obtained from plants
 - **B** it is easily obtained from liquid air
 - **C** no energy is used to produce it
 - **D** the raw material from which it is obtained is readily available

Use the following information to answer questions 18 and 19.

Manufacturers make paper from wood pulp obtained from trees.

- **18.** Some manufacturers plant three trees for every tree they cut down. By doing this, these manufacturers are making sure that their product is
 - A high quality paper
 - **B** easy to recycle
 - C non-renewable
 - **D** sustainable

19. Many companies now recycle paper. A reason for recycling paper, rather than making new paper from raw materials, is that

- A paper is not biodegradable
- **B** paper is made from non-renewable substances
- **C** recycling conserves raw materials
- **D** recycling uses no energy

20. The bar chart shows the percentage of the atmosphere which is gas R and the percentage of the atmosphere which is gas S.



What is the name of gas **R**?

- A oxygen
- **B** argon
- C nitrogen
- D hydrogen

21. Which of the following gases in the atmosphere is most likely to contribute to global warming?

- A carbon dioxide
- **B** hydrogen
- C nitrogen
- **D** oxygen
- 22. Oxygen is obtained from liquid air by
 - A combustion
 - **B** desalination
 - **C** fermentation
 - **D** fractional distillation

23. Which row of the table shows how the amounts of carbon dioxide and oxygen in the Earth's atmosphere have changed since the Earth was formed?

	amount of		
	oxygen carbon dioxide		
Α	increased	increased	
В	increased decreased		
С	decreased increased		
D	decreased	decreased	

24. The graph shows the average temperature on the Earth from 1880 to 2005.



Using the graph, scientists can be certain that, during this period, the average temperature on Earth has

- A decreased every year
- **B** increased every year
- **C** increased overall
- **D** increased because of the increased use of fossil fuels

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

25. Chemists have investigated coatings for the underside of skis. The ideal coating needs to be very slippery. Which of these would make the best coating?

- A Gore-Tex
- **B** Kevlar
- C Lycra
- **D** Teflon
- 26. Jackie buys a new jacket for skiing. The jacket is made of waterproof and breathable fabric. The fabric is waterproof and breathable because it has
 - A loosely packed fibres which trap air
 - **B** small molecules with strong bonds between the atoms
 - **C** a membrane with microscopic pores not much bigger than a water molecule
 - **D** a membrane with pores much bigger than a water molecule
- 27. When Jackie goes skiing she buys a bottle of sunscreen.

The sunscreen contains an emulsifier.

Molecules of the emulsifier have a hydrophilic part and a hydrophobic part. Which row of the table gives a correct description of hydrophilic or hydrophobic?

Α	hydrophobic	water loving	attracted to oil	repels water
В	hydrophobic	water hating	attracted to water	repels oil
С	hydrophilic	water loving	attracted to water	repels oil
D	hydrophilic	water hating	attracted to oil	repels water

- **28.** Some sunscreens contain nanoparticles, others do not. An advantage of sunscreens containing nanoparticles is
 - A nanoparticles are a new technology
 - **B** all nanoparticles are known to be safe
 - **C** the nanoparticles do not absorb UV light
 - **D** the nanoparticles give good protection from the sun but do not leave a white covering on the skin

- **29.** Which of the following statements about nanotechnology are correct?
 - 1 a material that has nanoparticles used in combination with another material is known as a nanocomposite
 - 2 nanoparticles are bigger than individual atoms
 - A 1 only
 - **B** 2 only
 - C both 1 and 2
 - **D** neither 1 nor 2

Fractions are obtained from crude oil by fractional distillation.

- **30.** Which of the following is a use of the gaseous fraction?
 - A fuel for aeroplanes
 - **B** fuel for some cars
 - **C** fuel for ships
 - **D** fuel for some diesel engines
- **31.** Fraction **Y** is obtained from the top of the fractionating column and fraction **Z** is obtained from the bottom of the fractionating column.

Which row of the table correctly compares fraction **Y** with fraction **Z**?

	boiling point of fraction Y	average length of carbon chain in fraction Y
Α	lower	shorter
В	higher	longer
С	lower	longer
D	higher	shorter

- **32.** Which of the following statements about the viscosity of fractions are true?
 - 1 fractions containing longer chain hydrocarbon molecules have higher viscosities than fractions containing shorter chain hydrocarbon molecules
 - 2 a fraction with a higher viscosity will be harder to ignite than a fraction with a lower viscosity
 - A 1 only
 - **B** 2 only
 - **C** both 1 and 2
 - **D** neither 1 nor 2

33. Propane is a fuel.

Which is the balanced equation for the complete combustion of propane?

A	C_3H_8	+	$2O_2$	\rightarrow	3C	+	$4\mathrm{H}_{2}\mathrm{O}$
B	C_3H_8	+	5O ₂	\rightarrow	3CO_2	+	$4\mathrm{H}_{2}\mathrm{O}$
С	$2C_3H_8$	+	$7O_2$	\rightarrow	6CO	+	$8 H_2 O$
D	C_3H_8	+	$7O_2$	\rightarrow	$3CO_2$	+	$8H_2O$

- **34.** Incomplete combustion of hydrocarbons can form carbon monoxide. Which of the following statements about carbon monoxide are correct?
 - 1 carbon monoxide is a colourless gas with a pungent odour
 - 2 carbon monoxide is toxic because it prevents oxygen being carried around the body
 - A 1 only
 - **B** 2 only
 - C both 1 and 2
 - **D** neither 1 nor 2
- **35.** Incomplete combustion of hydrocarbons can also produce carbon in the form of soot. What is the correct atomic symbol, with its state symbol, for carbon in the form of soot?
 - $\begin{array}{ccc} \mathbf{A} & \mathbf{c} (\mathbf{g}) \\ \mathbf{B} & \mathbf{C} (\mathbf{g}) \\ \mathbf{C} & \mathbf{c} (\mathbf{s}) \end{array}$
 - $\begin{array}{cc} \mathbf{C} & \mathbf{c} (\mathbf{s}) \\ \mathbf{D} & \mathbf{C} (\mathbf{s}) \end{array}$
- **36.** Sodium chloride and pure water can be obtained from seawater by
 - A desalination
 - **B** electrolysis
 - **C** fermentation
 - **D** filtration
- 37. Which row of the table shows correct uses of sodium chloride and of sodium hydroxide?

	use of sodium chloride	use of sodium hydroxide
A	to make paper	to produce soap
В	to make paper	to absorb acidic gases
С	as a preservative	to absorb acidic gases
D	to flavour food	to absorb alkaline gases

- **38.** Sodium hydroxide is obtained from sodium chloride solution. The formula of sodium hydroxide is
 - A Na₂OH
 - **B** NaOH₂
 - C Na(OH)₂
 - D NaOH

Fermentation

- 39. Ethanol is made by fermentation.The reaction mixture for the process contains yeast.Which of the following statements about this process are correct?
 - 1 after a time the yeast is used up and no more ethanol is produced
 - 2 the ideal temperature for the process is $70 \,^{\circ}\text{C}$
 - A 1 only
 - **B** 2 only
 - C both 1 and 2
 - **D** neither 1 nor 2
- **40.** Which is the balanced equation for the formation of ethanol from a sugar?

A	$C_{6}H_{12}O_{6}$			\rightarrow	$2C_2H_5OH$	+	$2CO_2$
B	$C_6H_{12}O_6$	+	6O ₂	\rightarrow	6CO ₂	+	$6H_2O$
С	$2C_2H_5OH$	+	2CO_2	\rightarrow	$C_6H_{12}O_6$		
D	C ₂ H ₅ OH	+	3O ₂	\rightarrow	$2CO_2$	+	$3 H_2 O$

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END