

Surname	Initial(s)
Signature	

Paper Reference(s)

5017 5037

Edexcel GCSE

Additional Science (5017)

Chemistry (5037)

C2 – Topics 5 to 8

Foundation and Higher Tier

Wednesday 18 November 2009 – Morning

Time: 20 minutes

Materials required for examination

Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers

Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.

Higher tier candidates: answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

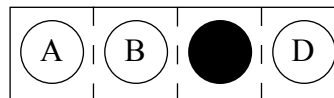
Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

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Turn over

**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

Polymers

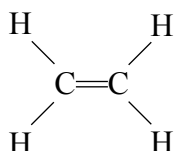
1. Ethene is used to make poly(ethene).
In this reaction ethene is
- A** a large molecule called a monomer
 - B** a large molecule called a polymer
 - C** a small molecule called a monomer
 - D** a small molecule called a polymer
2. The disposal of carrier bags made of poly(ethene) can cause problems.
This is because they
- A** are rigid
 - B** are biodegradable
 - C** do not rot
 - D** burn easily

3. A polymer is required for packaging.
The packaging is to be reused.
The packaging is to be transported by air.

The table below shows properties of four polymers.
Which of these polymers **A**, **B**, **C** or **D** is most suitable?

polymer	properties
A	biodegradable, low density
B	biodegradable, high density
C	non-biodegradable, low density
D	non-biodegradable, high density

4. Ethene has the structure



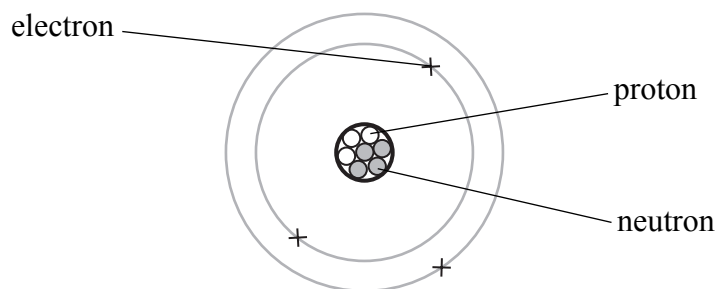
Ethene is

- A** a saturated carbohydrate
- B** an unsaturated carbohydrate
- C** a saturated hydrocarbon
- D** an unsaturated hydrocarbon

5. Ethene has the formula C_2H_4 .
What is the relative formula mass of ethene?
(Relative atomic masses: C = 12, H = 1)
- A 6
 - B 13
 - C 28
 - D 50
6. In a manufacturing process, it is desirable to use a reaction with a ‘high atom economy’.
This is
- A to make a better product
 - B to make the product more quickly
 - C to make the product biodegradable
 - D to produce the maximum amount of product from the starting materials

Lithium and its compounds

The diagram shows the particles in an atom of the element lithium.



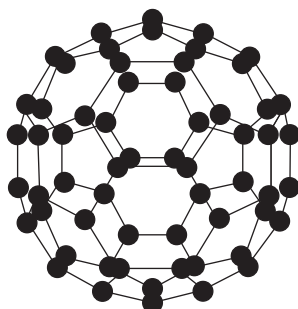
7. The mass number of this atom is
- A** 3
B 4
C 7
D 10
8. In the periodic table lithium is in group
- A** 1
B 3
C 4
D 7
9. To form a lithium ion, Li^+ , a lithium atom must
- A** share an electron
B lose an electron
C gain an electron
D gain a proton
10. Lithium chloride is an ionic compound.
It contains lithium ions, Li^+ , and chloride ions, Cl^- .
Lithium chloride is electrolysed.

Which row of the table describes the state lithium chloride must be in when it is electrolysed and what happens to the ions during the electrolysis?

	state of lithium chloride	ion that moves to positive electrode	ion that moves to negative electrode
A	liquid	chloride	lithium
B	solid	lithium	chloride
C	liquid	lithium	chloride
D	solid	chloride	lithium

Structures

11. The diagram shows a molecule of buckminsterfullerene.



key

● carbon atom

Buckminsterfullerene is

- A** a covalent compound
B an ionic compound
C a form of carbon
D a mixture
12. Buckminsterfullerene was discovered in 1985. Scientists fired lasers at graphite in an attempt to make long carbon chain molecules. Buckminsterfullerene was discovered because
- A** the scientists had succeeded in making a long chain molecule
B graphite is a metal
C the scientists' experiment gave an unexpected result
D the scientists were expecting to make it
13. Potassium chloride is an ionic compound found in sea water. Which of these substances could be potassium chloride?

substance	melting point (°C)	solubility in water
A	-114	soluble
B	776	soluble
C	1410	insoluble
D	17	soluble

Reacting substances

14. An endothermic reaction is a reaction in which
- A a single substance reacts to form two or more substances
 - B heat is given out
 - C more energy is needed to break bonds than is released in making bonds
 - D new bonds are made but no bonds are broken

15. Calcium carbonate reacts with dilute hydrochloric acid.
If calcium carbonate is used as a powder instead of as lumps, the speed of the reaction changes.

Which row of the table describes and explains the change in the speed of the reaction when powder is used instead of lumps?

	change in speed of reaction	explanation
A	decreases	surface area is smaller
B	increases	surface area is larger
C	increases	powder is more concentrated
D	increases	surface area is smaller

16. The speed of reaction between lumps of calcium carbonate and dilute hydrochloric acid is increased by
- A adding more acid
 - B using less calcium carbonate
 - C putting the reactants into a smaller beaker
 - D using a more concentrated acid

**Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier**

Useful materials

17. Thermoplastic polymers are
- A softened by heating because they have no cross links between chains
 - B not softened by heating because they have cross links between chains
 - C softened by heating because the bonds in the polymer molecules are weak
 - D not softened by heating because the bonds in the polymer molecules are strong
18. Alloys are stronger than pure metals because
- A they have strong bonds between the different molecules
 - B they contain atoms of different sizes
 - C they combine the properties of both metals
 - D the different atoms transfer electrons to fill their outer shells
19. Graphite is used as a lubricant.
This is because graphite has
- A a low melting point
 - B a high boiling point
 - C covalent bonds which are all weak
 - D layers of atoms which slide over one another
20. Carbon dioxide is a gas at room temperature.
Carbon dioxide exists as
- A giant molecules with covalent bonds formed by sharing electrons
 - B simple molecules with ionic bonds formed by the transfer of electrons
 - C simple molecules with covalent bonds formed by sharing electrons
 - D simple molecules with covalent bonds formed by the transfer of electrons
21. Which row of the table shows the particles that move to carry an electric current when copper and molten copper chloride conduct electricity?

			particles moving in	
			copper	molten copper chloride
A		ions		molecules
B		electrons		electrons
C		electrons		ions
D		ions		electrons

Fertilisers

22. Ammonia is formed by the reaction between nitrogen and hydrogen.
The balanced equation for this reaction is
- A $\text{N}_2 + 4\text{H}_2 \rightleftharpoons 2\text{NH}_4$
 - B $2\text{N} + 6\text{H} \rightleftharpoons 2\text{NH}_3$
 - C $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$
 - D $\text{N}_2 + \text{H}_2 \rightleftharpoons 2\text{NH}$
23. When artificial fertilisers are made from ammonia, the ammonia must be
- A neutralised
 - B hydrated
 - C dehydrated
 - D reduced
24. An advantage of an artificial fertiliser over a natural fertiliser is that it
- A does not pollute water supplies
 - B has a known composition
 - C requires very little energy to make it
 - D is completely unreactive

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

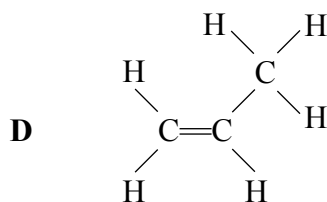
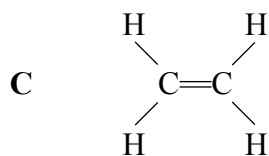
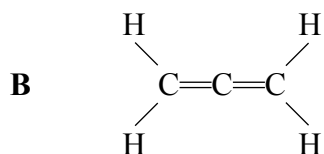
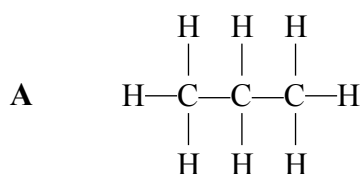
Foundation tier candidates do not answer any more questions after question 24.

Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.

Carbon and its compounds

25. Some crude oil fractions are cracked.
Which of these statements about cracking is **not** correct?
- A There is more demand for the products of cracking than for the original fraction
 - B Cracking produces smaller molecules
 - C Cracking produces some unsaturated compounds
 - D Polymers are formed during cracking

26. Which of these shows the structure of a propene molecule?



27. If propene is shaken with bromine water, the liquid
- A does not change colour
 - B becomes clear
 - C changes from orange to colourless
 - D changes from colourless to orange

Use the following information to answer questions 28 and 29.

Ethene reacts with water, in the form of steam, to produce ethanol.



28. What is the maximum mass of ethanol, in tonnes, that can be obtained from 56 tonnes of ethene?

(Relative atomic masses: C =12, H =1, O =16)

- A 34
- B 46
- C 92
- D 143

29. Here are two statements about this reaction.

- 1 the reaction is hydration
- 2 the atom economy of the reaction is 100%

Which of these statements are correct?

- A 1 only
- B 2 only
- C both 1 and 2
- D neither 1 nor 2

30. Vegetable oils are unsaturated.

Which row of the table correctly describes molecules of monounsaturated and polyunsaturated oils?

	a molecule of a monounsaturated oil contains	a molecule of a polyunsaturated oil contains
A	one carbon-carbon double bond	more than one carbon-carbon double bond
B	one carbon-carbon double bond	double bonds between all carbon atoms
C	more than one carbon-carbon double bond	single bonds between all carbon atoms
D	more than one carbon-carbon double bond	one carbon-carbon double bond

Elements and compounds

31. Mendeleev produced the first periodic table.
Which statement about his table is **not** correct?

A He left gaps for elements not yet discovered
B He arranged the elements in order of increasing atomic number
C His table did not include the noble gases
D He predicted the properties of some undiscovered elements

32. Here are two statements about metals

1 most metals are malleable because their atoms can slide past each other
2 most metals have high melting points because they have strong bonds between molecules

Which of these statements are correct?

A 1 only
B 2 only
C both 1 and 2
D neither 1 nor 2

33. Naturally occurring magnesium contains three isotopes.

79% of the atoms are magnesium-24
10% of the atoms are magnesium-25
11% of the atoms are magnesium-26

The relative atomic mass of magnesium is

A 24.0
B 24.3
C 24.8
D 25.0

34. Which of these statements about reactivity is correct?

A Reactivity in the halogens increases with increasing atomic number because outer shell electrons are lost more easily
B Reactivity in the halogens decreases with increasing atomic number because outer shell electrons are lost more easily
C Reactivity in the alkali metals increases with increasing atomic number because outer shell electrons are lost more easily
D Reactivity in the alkali metals decreases with increasing atomic number because outer shell electrons are lost more easily

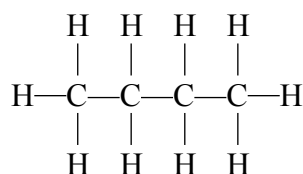
35. The symbol of a calcium ion is Ca^{2+} and the symbol of an iodide ion is I^- .
What is the formula of calcium iodide?

- A CaI
- B CaI_2
- C Ca_2I
- D Ca_2I_2

36. Ammonia is a gas at room temperature.
Which row of the table correctly describes some properties of ammonia?

	type of structure	strength of forces between ammonia molecules	strength of bonds between atoms in ammonia molecule
A	giant ionic	weak	strong
B	giant molecular, covalent	strong	strong
C	simple molecular, covalent	weak	strong
D	simple molecular, covalent	strong	weak

37. The structure of a butane molecule is often shown as



Which of these statements about a butane molecule are correct?

- 1 a butane molecule is a flat plane of atoms
- 2 the angle between the bonds in a butane molecule is 90°

- A 1 only
- B 2 only
- C both 1 and 2
- D neither 1 nor 2

Ammonia

38. The reaction of nitrogen with hydrogen to make ammonia reaches equilibrium. This reaction is exothermic.

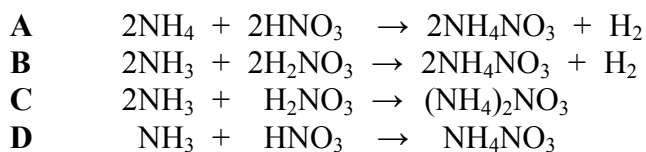
Which row of the table shows the effect of increasing the temperature on the yield of ammonia at equilibrium and on the rate at which the reaction reaches equilibrium?

	yield at equilibrium	rate at which the reaction reaches equilibrium
A	increased	increased
B	decreased	decreased
C	decreased	increased
D	increased	decreased

39. Which row of the table shows the effect of increasing the concentration of a reactant on the frequency and energy of collisions between the reactant particles?

	effect on frequency of collisions	effect on energy of collisions
A	increased	increased
B	increased	no effect
C	no effect	increased
D	no effect	no effect

40. Which of these is the balanced equation for the reaction of ammonia with nitric acid?



TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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