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 9 June 2010 – Afternoon

Time: 20 minutes

Materials required for examination	**Items included with question papers**
Multiple Choice Answer Sheet HB pencil, eraser and calculator	Nil

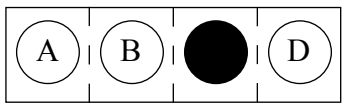
Instructions to Candidates

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.

Printer's Log. No.
N37745A

N 3 7 7 4 5 A

W850/R1535/57570 6/6/5/6/2/

Turn over

edexcel
advancing learning, changing lives

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

Copper

1. Copper is a metal.
One property of copper is that it

A has a low boiling point
B is a good conductor of heat
C is brittle
D is soluble in water

2. Copper conducts electricity.
It conducts electricity because

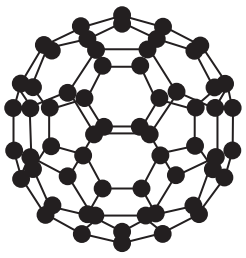
A its structure contains very small molecules
B electrons are free to move through its structure
C the bonding in its structure is covalent
D the bonding in its structure is ionic

3. Bronze is formed from copper and tin.
Bronze is

A an alloy
B an element
C a pure metal
D a compound

Carbon

A new form of carbon was discovered, by chance, in 1985.
This is a diagram of its molecule.



4. The diagram shows a molecule of

A a carbon nanotube
B diamond
C Buckminsterfullerene
D carbon dioxide

5. This substance is

A an element
B a compound
C an ion
D a mixture

6. The bonds in the molecule are

A covalent
B positive
C ionic
D negative

7. Graphite is another form of carbon.
Graphite is used in pencils because it

A has a high melting point
B has layers that slide easily over each other
C conducts electricity
D is very hard

8. Carbon has the electronic configuration 2.4.
What is the atomic number of carbon?

A 2
B 4
C 6
D 8

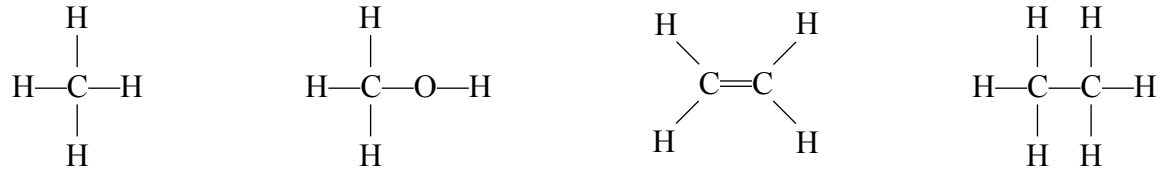
9. The symbol for an atom of carbon is

A Cb
B Ca
C c
D C

Carbon compounds

Use the following information to answer questions 10 to 13.

The diagrams show the structures of four molecules, W, X, Y and Z.



10. Which molecule is **not** a hydrocarbon?

A W
B X
C Y
D Z

11. Which molecule is an alkene?

A W
B X
C Y
D Z

12. What is the relative formula mass of the molecule X?
(Relative atomic masses: C = 12, H = 1, O = 16)

A 16
B 29
C 31
D 32

13. Molecules Y and Z can be made from a butane molecule.
The process used to change a butane molecule into Y and Z is

A cracking
B fractional distillation
C polymerisation
D the Haber process

Rates of reaction

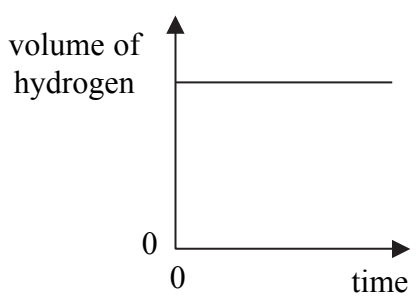
Use the following information to answer questions 14 to 16.

Jasmine investigated the reaction between magnesium powder and dilute hydrochloric acid.
She added one spatula of magnesium powder to 25 cm^3 of dilute hydrochloric acid.

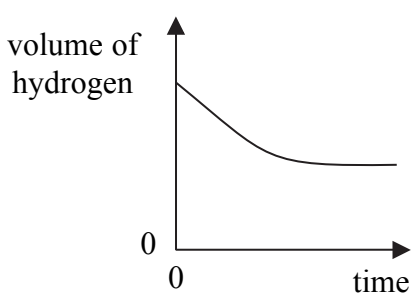
14. When the magnesium powder was added to the dilute hydrochloric acid, the temperature of the acid increased.
The reaction is

A a physical change
B exothermic
C endothermic
D a polymerisation

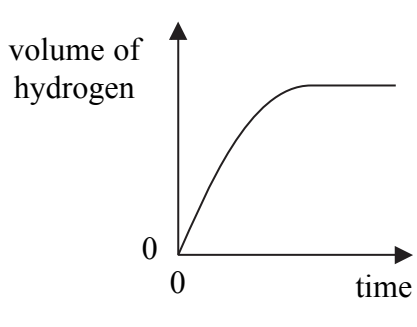
15. The volume of hydrogen produced during the reaction was measured every 30 seconds, until after the reaction had finished.
Which graph shows the results that Jasmine should have obtained?



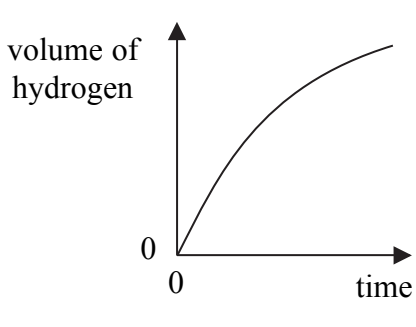
A



B



C



D

16. What change could Jasmine make to slow down the reaction?

A increase the concentration of the hydrochloric acid
B add a catalyst
C use pieces of magnesium ribbon instead of powdered magnesium
D increase the temperature of the hydrochloric acid

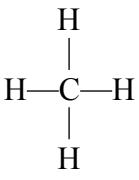
Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier.

Poly(ethene)

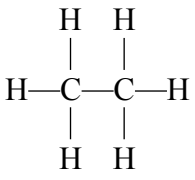
17. Poly(ethene) is used to make carrier bags.
Disposing of these bags can cause an environmental problem because they

A do not burn
B do not rot
C cannot be reused
D are biodegradable

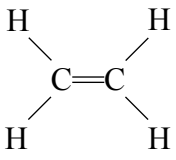
18. Poly(ethene) is a polymer.
The monomer molecule used to form poly(ethene) is



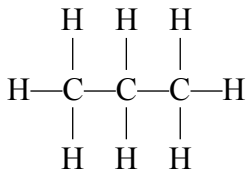
A



B



C



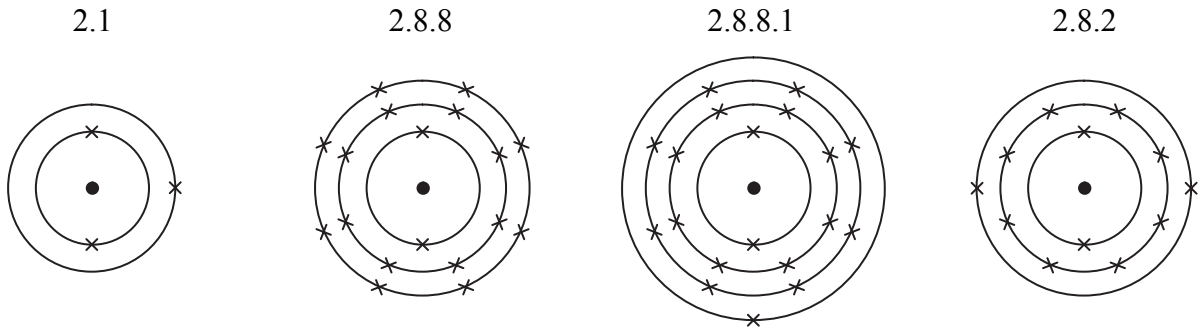
D

19. Cross-links can be introduced between polymer molecules.
Introduction of these cross-links would be expected to increase the polymer's

A flexibility
B solubility
C strength
D biodegradability

Use the following information to answer questions 20 to 22.

The diagrams show the electronic configurations of atoms of four different elements, R, S, T and U.



R S T U

20. Which is the **least** reactive of the four elements?

A R
B S
C T
D U

21. Which element is most likely to form an ion with a charge of 2+?

A R
B S
C T
D U

22. In the periodic table, element T is in period

A 1
B 2
C 3
D 4

Olive oil

23. Olive oil is a monounsaturated, liquid oil.
Monounsaturated means that each molecule of the oil contains

A single bonds only
B double bonds only
C only one carbon-carbon double bond
D more than one carbon-carbon double bond

24. Olive oil can be processed to make a solid margarine.
Which row of the table shows the name of the process, the change occurring during the process and the viscosity of the margarine compared to olive oil?

	name of process	**change during process**	**viscosity of margarine**
A	hydrogenation	hydrogen is removed	less viscous than olive oil
B	hydrogenation	hydrogen is added	more viscous than olive oil
C	dehydrogenation	hydrogen is removed	less viscous than olive oil
D	dehydrogenation	hydrogen is added	more viscous than olive oil

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.

Halogens

25. In a bromine molecule, two bromine atoms are joined by a single bond.
Which row of the table correctly describes the bond and how the electrons form it?

	bond	**electrons are**
A	ionic	transferred
B	covalent	transferred
C	ionic	shared
D	covalent	shared

26. The electronic configurations of fluorine and chlorine are

fluorine	2.7
chlorine	2.8.7

These electronic configurations show that both fluorine and chlorine

A are in period 2 of the periodic table
B are in group 7 of the periodic table
C are in period 7 of the periodic table
D have the same reactivity

27. The table shows the melting and boiling points of the halogens.

halogen	melting point (°C)	boiling point (°C)
fluorine	–220	–188
chlorine	–101	–34
bromine	–7	59
iodine	114	184

Which of these statements are correct?

1 the melting points and boiling points of the halogens decrease with increasing atomic number
2 the force of attraction between two bromine molecules is stronger than the force of attraction between two chlorine molecules

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

28. Chlorine has two stable isotopes X and Y.
Which row of the table correctly compares the relative masses and atomic numbers of X and Y?

	relative masses of X and Y	atomic numbers of X and Y
A	same	same
B	different	same
C	same	different
D	different	different

Ammonia

In the Haber process, nitrogen and hydrogen react to form ammonia.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

The forward reaction is exothermic.

29. Which of these statements about exothermic reactions are correct?

1 exothermic reactions take in heat energy
2 bond making is exothermic

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

30. Which of the following changes would decrease the yield of ammonia?

A adding a catalyst
B increasing the pressure
C increasing the temperature
D removing ammonia from the reaction vessel as it is formed

31. The reaction is reversible.
The reaction can reach a dynamic equilibrium.
Which row of the table shows the substances present in the mixture at equilibrium?

	hydrogen	**nitrogen**	**ammonia**
A	yes	yes	no
B	no	no	yes
C	yes	yes	yes
D	no	yes	yes

32. Ammonia has a low melting point and a low boiling point.
It does not conduct electricity.
Ammonia has a structure that is

A giant ionic
B giant molecular covalent
C simple ionic
D simple molecular covalent

Aluminium oxide

33. Aluminium oxide is an ionic compound.
It contains aluminium ions, Al^{3+} and oxide ions, O^{2-}.
What is the formula of aluminium oxide?

A Al_2O
B Al_3O_2
C Al_2O_3
D AlO

34. Aluminium has an atomic number of 13.
Which row shows the electronic configurations of an aluminium atom, Al, and of an aluminium ion, Al^{3+}?

	electronic configuration of	
	Al	**Al^{3+}**
A	3.8.2	2.8.8
B	2.8.3	2.8
C	2.8.3	2.8.6
D	3.8.2	6.8.2

35. Electrolysis can decompose aluminium oxide into aluminium and oxygen.
The correct half equation for the reaction at the negatively charged electrode is

A $Al^{3+} + 3e \rightarrow Al$
B $Al \rightarrow Al^{3+} + 3e$
C $2O^{2-} \rightarrow O_2 + 4e$
D $O_2 + 4e \rightarrow 2O^{2-}$

Ethene

Use the following information to answer questions 36 to 40.

Ethene reacts with steam to form ethanol.
The equation for the reaction is

$$C_2H_4 + H_2O \rightleftharpoons C_2H_5OH$$

36. What is the empirical formula of ethene?

A CH
B CH_2
C C_2H_4
D C_2H_6O

37. Bromine water is mixed with samples of ethene and ethanol.
Which row of the table shows what happens to the bromine water in each case?

	with ethene	**with ethanol**
A	stays orange	stays orange
B	goes colourless	goes colourless
C	stays orange	goes colourless
D	goes colourless	stays orange

38. Phosphoric acid is a catalyst for the reaction of ethene with steam.
Which of the following statements about the catalyst are correct?

1 the catalyst is used to increase the yield of ethanol
2 the reaction will only stop when all the catalyst has been used up

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

39. Which of these statements about the reaction of ethene with steam are correct?

1 the atom economy for the formation of ethanol in this reaction is 100%
2 the reactants are both in the gaseous state

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

40. What mass of ethanol would be produced if 56 g of ethene reacted completely with excess steam?
(Relative atomic masses: C = 12, H = 1, O = 16)

A 28 g
B 46 g
C 56 g
D 92 g

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

END

BLANK PAGE

BLANK PAGE