

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

Friday 12 June 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.

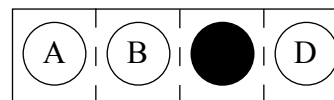
Before the test begins:

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

Metals

Aluminium and magnesium are metals.
Aluminium and magnesium are melted together to form magnalium.
Magnalium is used to make some parts of aeroplanes.

1. All metals
 - A have low melting points
 - B are brittle
 - C are poor conductors of heat
 - D are good conductors of electricity

2. The correct symbol for an atom of aluminium is
 - A AL
 - B Au
 - C Al
 - D aL

3. Magnalium is
 - A an alloy
 - B an element
 - C a compound
 - D a non-metal

4. Magnalium, instead of pure aluminium, is used to make parts of aeroplanes because magnalium is
 - A brittle
 - B stronger than aluminium
 - C a non-conductor
 - D softer than aluminium

Methane

Methane is a hydrocarbon.

Methane burns in air to produce heat energy.

5. Methane is

- A an alkene
- B a monomer
- C a polymer
- D an alkane

6. The formula for methane is

- A CH
- B C₄H
- C CH₄
- D C₄H₄

7. The burning of methane in air is an example of

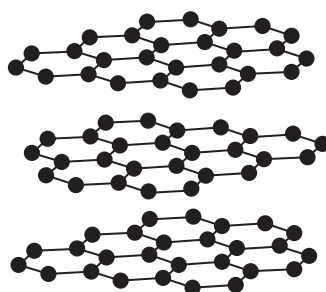
- A an exothermic reaction
- B a neutralisation
- C a polymerisation
- D an endothermic reaction

8. When methane burns in air, the bonds in methane molecules and oxygen molecules are

- A both made and broken
- B only broken
- C only made
- D neither broken nor made

Carbon chemistry

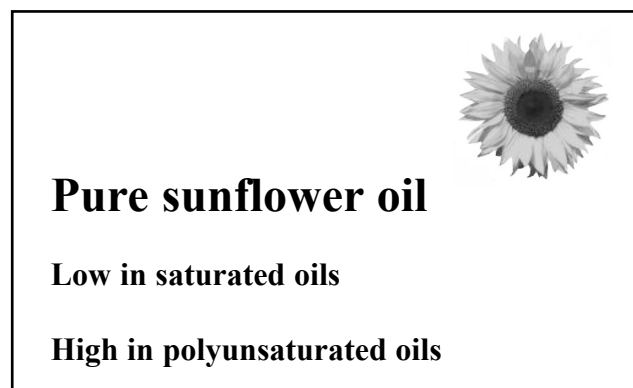
Graphite is a form of carbon.
The structure of graphite is shown.



9. In this diagram ● represents a carbon
- A molecule
 - B proton
 - C atom
 - D electron
10. A property of graphite is that it
- A has layers that slide over one another
 - B is a poor conductor of electricity
 - C has a low melting point
 - D has a low boiling point
11. Another form of pure carbon is
- A coal
 - B ethene
 - C Buckminsterfullerene
 - D carbon dioxide
12. The atomic number of carbon is 6.
The electronic configuration of carbon is
- A 4.2
 - B 2.4
 - C 6
 - D 2.2.2

Oils and fats

This is the label on a bottle of vegetable oil.

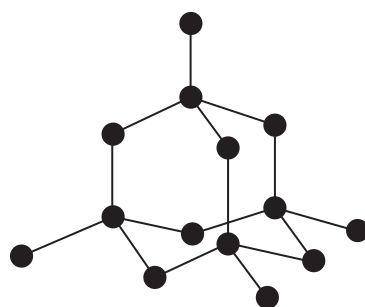


13. Polyunsaturated oils are
- A all solids at room temperature
 - B less viscous than saturated animal fats
 - C only obtained from sunflowers
 - D less runny than saturated oils
14. Vegetable oils are reacted with hydrogen in the production of
- A margarine
 - B milk
 - C thermoplastics
 - D crude oil
15. A polyunsaturated molecule in vegetable oils contain
- A only single bonds
 - B more than one double bond
 - C ionic bonds
 - D one double bond only
16. Saturated and unsaturated fats have different
- A reactions with limewater
 - B reactions with bromine water
 - C colours
 - D effects on litmus paper

**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**

Silicon and silica

17. The structure of silicon is



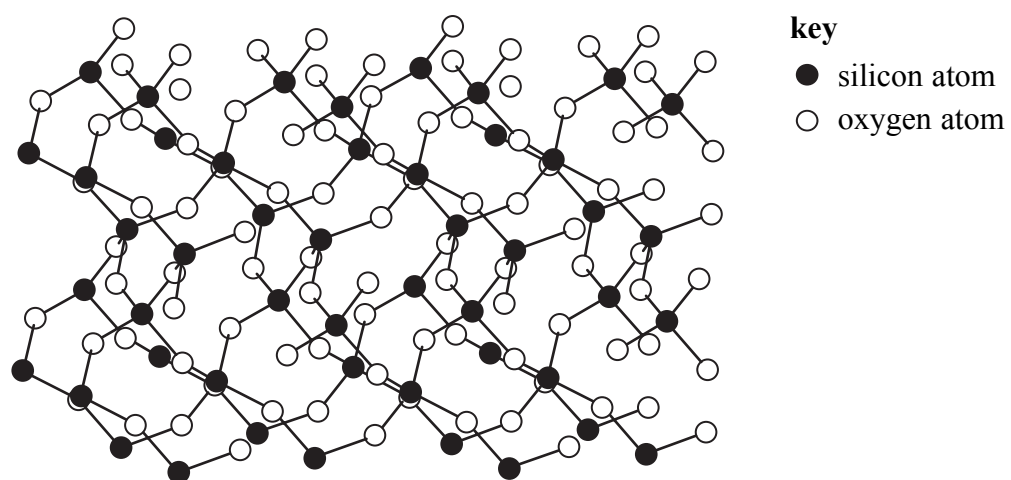
The arrangement of particles in silicon is the same as the arrangement of particles in

- A carbon nanotubes
- B sodium chloride
- C diamond
- D Buckminsterfullerene

Use the following information to answer questions 18 and 19.

Silica is a covalent oxide of silicon.

This diagram shows part of the structure of silica.



18. The structure of silica is

- A giant molecular
- B metallic
- C simple molecular
- D giant ionic

19. In the covalent bonds between silicon and oxygen in silica, electrons are

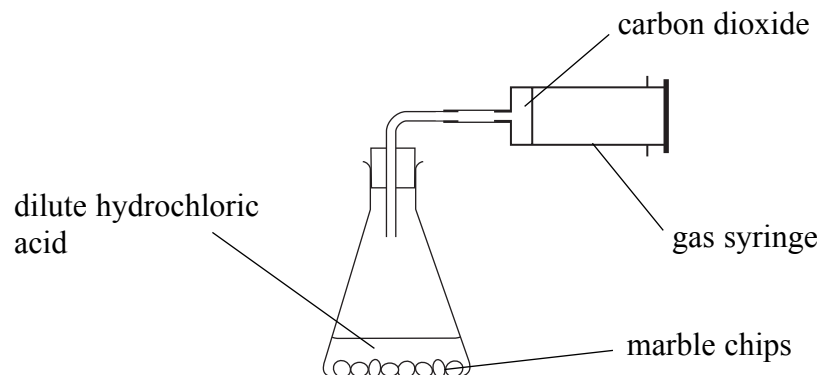
- A not involved in the bonding
- B transferred from silicon atoms to oxygen atoms
- C shared between the atoms
- D transferred from oxygen atoms to silicon atoms

20. The formula of silica is SiO_2
Its relative formula mass is
(Relative atomic masses: O = 16, Si = 28)

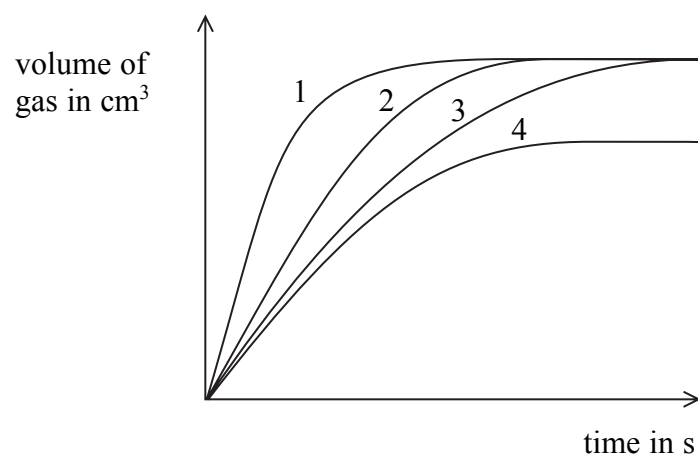
- A 44
- B 60
- C 72
- D 88

Rates of reaction

A student investigated the speed of reaction between dilute hydrochloric acid and marble chips (calcium carbonate) using the apparatus shown.



Four separate experiments, 1, 2, 3 and 4, were carried out. In each experiment the volume of carbon dioxide in the gas syringe was measured every 30 seconds. The conditions in all four experiments were the same except that different sized marble chips were used. The results of the experiments are shown on the graph.



21. In which experiment were the smallest marble chips used?
- A experiment 1
 - B experiment 2
 - C experiment 3
 - D experiment 4
22. In which experiment did some carbon dioxide leak from the gas syringe during the experiment?
- A experiment 1
 - B experiment 2
 - C experiment 3
 - D experiment 4

23. Which is the balanced equation for the reaction of calcium carbonate with hydrochloric acid to give calcium chloride, water and carbon dioxide?

- A $\text{CaCO}_3 + \text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
B $2\text{CaCO}_3 + \text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
C $\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
D $2\text{CaCO}_3 + 2\text{HCl} \longrightarrow 2\text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$

24. The rates of most reactions can be increased by

- A cooling the reactants
B adding a suitable catalyst
C decreasing the surface area of a solid reactant
D lowering the concentration of a reactant

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.

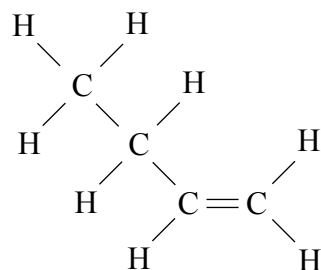
Hydrocarbons

The hydrocarbon propene is an alkene.

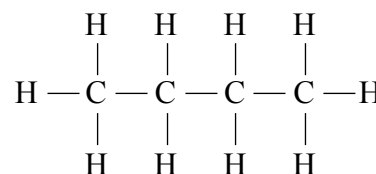
25. The formula for a molecule of propene is

- A C_2H_4
- B C_2H_6
- C C_3H_6
- D C_3H_8

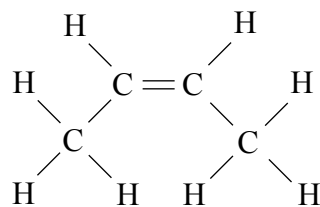
26. Which of these structures represents a butane molecule?



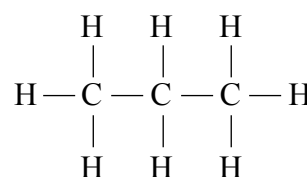
A



B



C



D

27. The hydrocarbon propane is a simple molecular, covalent substance.
Which row of the table describes the boiling point and the electrical conductivity of propane?

	boiling point	electrical conductivity
A	low	good
B	high	poor
C	low	poor
D	high	good

28. When propane is shaken with bromine water, the bromine water will
- A turn brown
 - B turn clear
 - C turn colourless
 - D remain orange

Bromides

Magnesium bromide and lead bromide are ionic solids.
 The symbol for a magnesium ion is Mg^{2+} .
 The symbol for a bromide ion is Br^- .

29. The formula of magnesium bromide is

- A MgBr
- B Mg_2Br
- C MgBr_2
- D Mg_2Br_2

30. Which row of the table shows the movement of the ions when molten magnesium bromide is electrolysed?

	magnesium ions move towards the	bromide ions move towards the
A	positive electrode	positive electrode
B	negative electrode	positive electrode
C	negative electrode	negative electrode
D	positive electrode	negative electrode

31. Lead bromide is insoluble in cold water and in hexane.
 Lead bromide can conduct an electric current when it is

- A powdered
- B mixed with cold water
- C molten
- D mixed with hexane

32. Which equation represents the formation of bromine when lead bromide is electrolysed?

- A $\text{Br}_2 \longrightarrow 2\text{Br}^- + 2\text{e}$
- B $2\text{Br}^- + 2\text{e} \longrightarrow \text{Br}_2$
- C $\text{Br}_2 + 2\text{e} \longrightarrow 2\text{Br}^-$
- D $2\text{Br}^- \longrightarrow \text{Br}_2 + 2\text{e}$

Halogens and their compounds

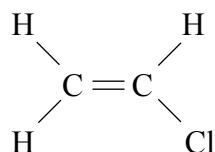
halogen	atomic number
fluorine	9
chlorine	17
bromine	35
iodine	53

33. As the atomic numbers of the halogens increase, the intermolecular forces of attraction
- A increase
 - B stay the same
 - C decrease
 - D decrease and then increase

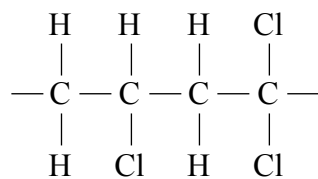
34. As the atomic numbers of the halogens increase, their reactivity decreases. The reason for this is that, as the atomic number increases

- A the atoms become smaller
- B the number of electrons in the outer shell increases
- C the number of protons in the nuclei of the atoms decreases
- D the number of shells of electrons increases

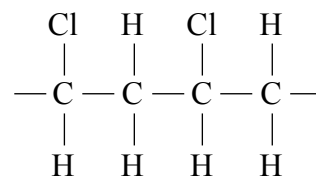
35. Chloroethene has a molecular formula, C_2H_3Cl . The structure of its molecule is



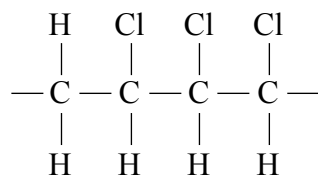
Which of these structures represents part of a poly(chloroethene) molecule?



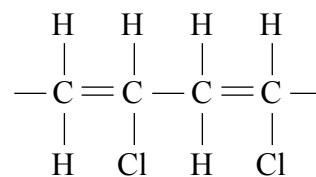
A



B



C



D

36. 24.6 g of a compound of chromium and chlorine contains 10.4 g of chromium.
(Relative atomic masses: Cl = 35.5, Cr = 52)

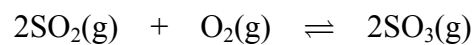
The empirical formula of the compound is

- A CrCl
- B CrCl₂
- C CrCl₃
- D Cr₂Cl₇

Industrial processes

Sulphuric acid is manufactured by the Contact process.

In the process, sulphur dioxide is converted into sulphur trioxide. This is an exothermic reaction.
The equation for the reaction is



37. The use of a higher temperature for this reaction would
- A increase the equilibrium yield of sulphur trioxide
 - B have no effect on the position of equilibrium
 - C decrease the pressure of the reaction mixture
 - D increase the equilibrium concentration of oxygen

38. In the reaction, sulphur dioxide and air are passed over a catalyst.
The catalyst is vanadium(V) oxide.

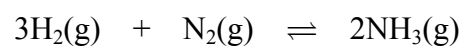
Which row of the table shows the change in mass of the vanadium(V) oxide at the end of the reaction and the reason for its use?

	the mass of the vanadium(V) oxide	the reason for using vanadium(V) oxide is to increase the
A	unchanged	equilibrium yield of sulphur trioxide
B	decreases	equilibrium yield of sulphur trioxide
C	unchanged	rate of reaction
D	decreases	rate of reaction

Use the following information to answer questions 39 and 40.

Ammonia is manufactured by the Haber process.

The equation for the reaction is



The forward reaction is exothermic.

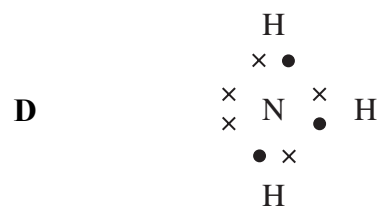
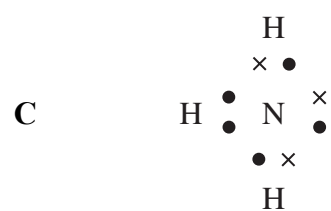
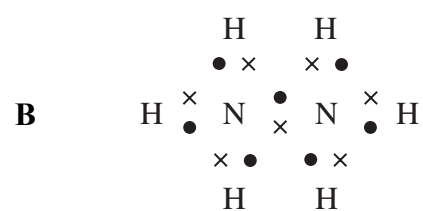
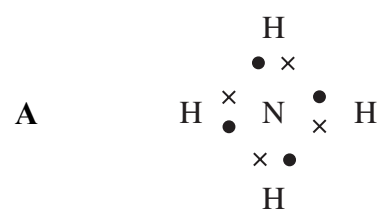
- 39.** Which row of the table shows how the temperature and pressure of the reaction should be changed to improve the equilibrium yield of ammonia?

	temperature should be	pressure should be
A	decreased	decreased
B	increased	increased
C	decreased	increased
D	increased	decreased

40. The electronic configuration of a nitrogen atom is 2.5
The electronic configuration of a hydrogen atom is 1

Which of the dot and cross diagrams correctly represents the outer shell electrons in a molecule of ammonia?

- × represents outer shell electron of nitrogen atom
- represents outer shell electron of hydrogen atom



TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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