

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 19 November 2008 – 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.

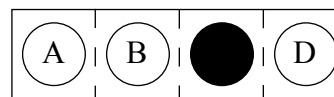
**Before the test begins:**

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.**

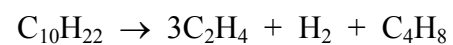
### **Metals**

Many elements are metals.

1. Which of these elements is a metal?  
**A** helium  
**B** silicon  
**C** sodium  
**D** chlorine
  
2. All metals  
**A** are brittle  
**B** have low boiling points  
**C** are good conductors of heat  
**D** have low melting points
  
3. Bronze is a solid.  
It is a mixture of copper and tin.  
Bronze is  
**A** an isotope  
**B** an alloy  
**C** an alkane  
**D** a polymer
  
4. Metals conduct electricity.  
The particles in metals which move to conduct electricity are  
**A** catalysts  
**B** protons  
**C** ions  
**D** electrons

### Organic chemistry

Decane is an organic compound. It is an alkane.  
Decane can be cracked by using heat.  
An equation for the reaction is

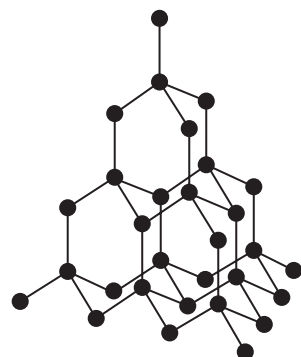


5. All organic compounds contain
- A nitrogen
  - B carbon
  - C oxygen
  - D sulphur
6. The cracking process
- A breaks down large molecules
  - B occurs at room temperature
  - C is electrolysis
  - D produces no useful molecules
7. Ethene is one of the products shown in the equation.  
The formula of ethene is
- A  $\text{C}_{10}\text{H}_{22}$
  - B  $\text{C}_2\text{H}_4$
  - C  $\text{H}_2$
  - D  $\text{C}_4\text{H}_8$
8. Ethene and decane are hydrocarbons.  
Hydrocarbons can be saturated or unsaturated.  
Which row of the table describes ethene and decane?

	ethene	decane
A	saturated	saturated
B	saturated	unsaturated
C	unsaturated	unsaturated
D	unsaturated	saturated

## Carbon

The diagram shows the structure of diamond.  
Diamond is a form of carbon.



9. The symbol for an atom of carbon is
- A Ca
  - B c
  - C cA
  - D C
10. The bonds in diamond are
- A covalent
  - B positive
  - C ionic
  - D negative
11. Which of these substances is **not** a form of carbon?
- A carbon nanotubes
  - B graphite
  - C sand
  - D Buckminsterfullerene
12. Diamonds are used to cut glass because diamonds are very
- A smooth
  - B attractive
  - C poor conductors of heat
  - D hard

### Handwarmers

Some hand warmers contain reactants and a catalyst.  
When the substances react, heat is produced.

13. All reactions which produce heat are
- A endothermic reactions
  - B exothermic reactions
  - C neutralisation reactions
  - D polymerisation reactions
14. The reactants causing the hand warmer to produce heat are iron and oxygen.  
After several hours the hand warmer no longer produces heat because
- A the hand is warm enough
  - B more solid is forming
  - C the catalyst is used up
  - D the reaction has stopped
15. The catalyst in the hand warmer
- A acts as an insulator
  - B reverses the reaction
  - C speeds up the reaction
  - D increases the pressure

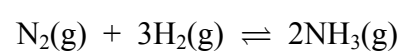
16. The iron in the hand warmer is a powder.  
Which row of the table shows the changes caused by using the iron as powder rather than as large lumps?

<b>when iron powder is used</b>		
	<b>the surface area of the iron is</b>	<b>the speed of the reaction is</b>
<b>A</b>	smaller	decreased
<b>B</b>	larger	increased
<b>C</b>	smaller	increased
<b>D</b>	larger	decreased

**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**

**Ammonia**

Ammonia is made by the Haber process.  
The equation is



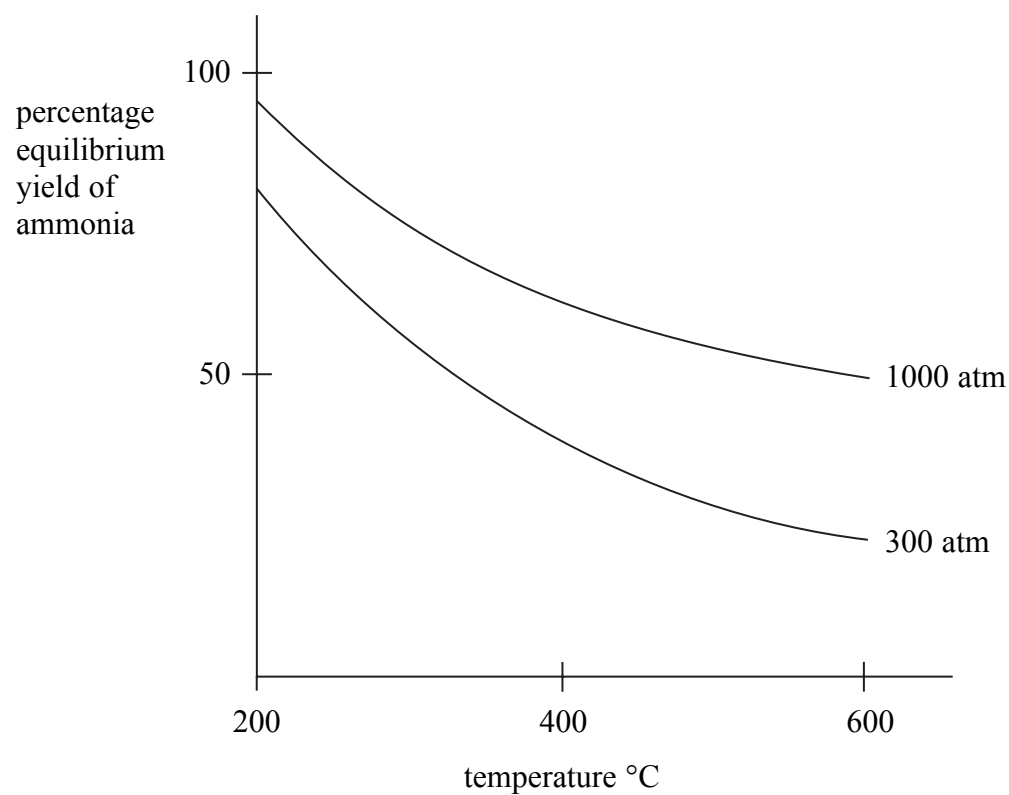
17. If the process reaches equilibrium, which of these statements is correct?

- A only ammonia is present
- B reactions continue to take place
- C only nitrogen and hydrogen are present
- D the reverse reaction starts

18. Ammonia consists of simple, covalent molecules.  
Which row of the table describes the physical properties of ammonia?

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

19. The graph shows how the equilibrium yield of ammonia changes with temperature at two different pressures.



Use the graph to decide which of these conditions would produce the highest percentage equilibrium yield of ammonia?

- A 200° C and 1000 atmospheres
  - B 600° C and 300 atmospheres
  - C 200° C and 300 atmospheres
  - D 400° C and 1000 atmospheres
20. Ammonia is used to make ammonium nitrate, which is used as an artificial fertiliser. Ammonium nitrate
- A is produced by reacting ammonia with sulphuric acid
  - B is the only known artificial fertiliser
  - C can cause problems in drinking water supplies
  - D has completely replaced natural fertilisers such as manure

### Ionic compounds

Potassium fluoride, KF, and magnesium bromide, MgBr<sub>2</sub>, are ionic compounds.

21. The electronic configurations of potassium and fluorine atoms are shown.

K 2.8.8.1  
F 2.7

When potassium reacts with fluorine to form potassium fluoride, KF,

- A** electrons are transferred from fluorine atoms to potassium atoms  
**B** electrons are shared between the atoms  
**C** each potassium atom transfers two electrons to each fluorine atom  
**D** cations and anions are formed
22. Which row of the table correctly describes the appearance and electrical conductivity of solid potassium fluoride?

	appearance	electrical conductivity
<b>A</b>	crystalline	poor
<b>B</b>	non-crystalline	poor
<b>C</b>	crystalline	good
<b>D</b>	non-crystalline	good

23. What is the relative formula mass of magnesium bromide, MgBr<sub>2</sub>?  
(Relative atomic masses: Mg = 24, Br = 80)

**A** 104  
**B** 128  
**C** 184  
**D** 208

24. The symbol for a sodium ion is Na<sup>+</sup> and the symbol for an oxide ion is O<sup>2-</sup>.  
The formula for sodium oxide is

**A** NaO<sub>2</sub>  
**B** Na<sub>2</sub>O  
**C** NaO  
**D** Na<sub>2</sub>O<sub>2</sub>

**TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS**

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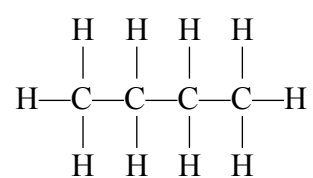
**Foundation tier candidates do not answer any more questions after question 24.**

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

**Organic compounds**

*Use the following information to answer questions 25 and 26.*

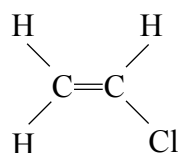
The structure of an organic compound is



25. This compound is called
- A butene
  - B butane
  - C propane
  - D ethane
26. This compound has a melting point of  $-138^{\circ}\text{C}$  and a boiling point of  $0^{\circ}\text{C}$ .  
The structure and bonding of the molecules in the compound is
- A giant ionic
  - B simple molecular covalent
  - C giant molecular covalent
  - D simple ionic

Use the following information to answer questions 27 and 28.

The structure of a chloroethene molecule is



27. Which row of the table correctly describes a chloroethene molecule?

	unsaturated	hydrocarbon
A	no	no
B	no	yes
C	yes	no
D	yes	yes

28. Bromine water was added to chloroethene and the mixture was shaken thoroughly. Which colour change occurred?

- A orange to colourless
- B purple to colourless
- C purple to orange
- D orange to green

### Non-metals

The halogens are non-metals.

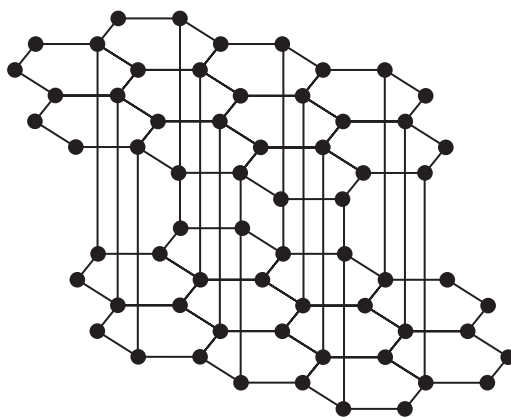
The table shows some information about the first four of the halogens in group 7 in the periodic table.

element	atomic symbol	appearance at room temperature and pressure
fluorine	F	yellow gas
chlorine	Cl	green-yellow gas
bromine	Br	red liquid
iodine	I	grey solid

29. Which of these statements about the halogens is correct?

- A halogen molecules are monatomic at room temperature and pressure
- B the attractive forces between fluorine molecules are weaker than the attractive forces between iodine molecules
- C the melting point of bromine is lower than the melting point of fluorine
- D halogens are good conductors of electricity

30. A fluorine atom is more reactive than an iodine atom.  
One reason for this is
- A the relative atomic mass of iodine is smaller than the relative atomic mass of fluorine
  - B each of the atoms has a different number of electrons in its outer shell
  - C the atomic number of fluorine is larger than the atomic number of iodine
  - D a fluorine atom attracts electrons more strongly than an iodine atom attracts electrons
31. The diagram shows the structure of graphite.



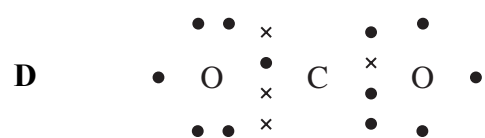
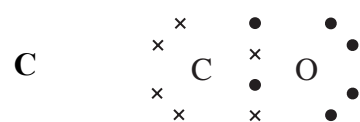
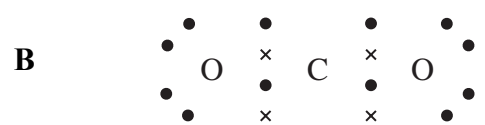
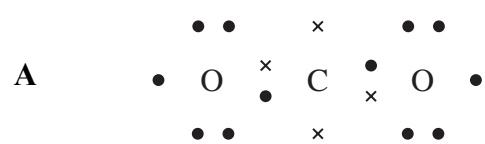
Which row of the table describes two physical properties and a use of graphite?

	melting point	electrical conductivity	use
A	low	good	to cut glass
B	high	good	as a lubricant
C	low	poor	as a lubricant
D	high	poor	to cut glass

32. Graphite burns to form carbon dioxide.  
Which of these dot and cross diagrams correctly represents a molecule of carbon dioxide?

× represents outer shell electron of carbon atom  
• represents outer shell electron of oxygen atom

(atomic numbers: carbon = 6, oxygen = 8)



Use the following information to answer questions 33 and 34.

Naturally occurring boron is a mixture of two isotopes.  
20% of the atoms are boron-10 and 80% are boron-11.

33. Atoms of the two isotopes of boron have
- A the same atomic numbers but different mass numbers
  - B different numbers of protons
  - C the same number of neutrons
  - D different numbers of electrons
34. The relative atomic mass of boron is
- A 10.2
  - B 10.5
  - C 10.8
  - D 11.2

#### Chemical reactions

The table gives the conditions in six experiments used to investigate the speed of the reaction between zinc and dilute sulphuric acid.

All experiments used 0.5 g of zinc and 50 cm<sup>3</sup> of the dilute sulphuric acid.

experiment	concentration of acid (mol dm <sup>-3</sup> )	temperature of acid (°C)	form of zinc
1	2	35	granules
2	2	25	powder
3	1	25	granules
4	3	50	powder
5	2	50	powder
6	2	35	powder

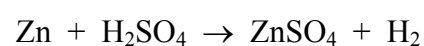
35. In which experiment is the reaction fastest and in which experiment is the reaction slowest?

	fastest reaction	slowest reaction
A	experiment 5	experiment 3
B	experiment 4	experiment 1
C	experiment 4	experiment 3
D	experiment 5	experiment 2

36. Which three of these experiments can be used to measure how the rate of this reaction changes with temperature?

- A 1, 3 and 4
- B 2, 3 and 4
- C 2, 5 and 6
- D 2, 4 and 6

37. The equation for the reaction of zinc and dilute sulphuric acid is



The equation can be used to calculate that 3.23 g of zinc produce 8.00 g of zinc sulphate. In an experiment 3.23 g of zinc produce 2.00 g of zinc sulphate.

The percentage yield of zinc sulphate in this experiment is

- A 75%
- B 62%
- C 40%
- D 25%

*Use the following information to answer questions 38 to 40.*

Hydrogen peroxide solution decomposes to form water and oxygen.

The formation of oxygen is very slow at room temperature.

The addition of a small quantity of manganese(IV) oxide, as a catalyst, speeds up the decomposition.

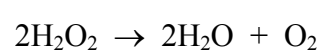
At the end of the reaction, the manganese(IV) oxide can be recovered by filtration.

38. Which of these statements is true?

- A if the experiment were repeated under the same conditions but using the recovered sample of catalyst, the reaction would be faster
- B the mass of the manganese(IV) oxide recovered will be more than the mass of manganese(IV) oxide at the start of the reaction
- C the manganese(IV) oxide recovered will be chemically the same as the original manganese(IV) oxide
- D if the experiment were repeated under the same conditions but less manganese(IV) oxide was used, the rate of decomposition would be the same

39. Which of these changes in the conditions of the reaction increases **both** the frequency and the energy of the collisions between the reacting particles?
- A increasing the concentration of the hydrogen peroxide solution
  - B adding more manganese(IV) oxide
  - C increasing the surface area of the manganese(IV) oxide
  - D increasing the temperature of the hydrogen peroxide solution

40. The equation for the decomposition of hydrogen peroxide is



Calculate the mass of water formed by the complete decomposition of 3.4 g of hydrogen peroxide.

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

- A 1.6 g
- B 1.8 g
- C 3.2 g
- D 3.6 g

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**TOTAL FOR HIGHER TIER PAPER: 24 MARKS**

**END**