

Energetics of a reaction

Question Paper 2

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Chemical energetics
Sub-Topic	Energetics of a reaction
Booklet	Question Paper 2

Time Allowed: 17 minutes

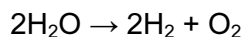
Score: /14

Percentage: /100

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

1 Water can be used to produce hydrogen gas.



Which row describes bond breaking in the reactant?

A	endothermic	heat absorbed
B	endothermic	heat released
C	exothermic	heat absorbed
D	exothermic	heat released

2 Two chemical processes are described.

- During the combustion of gasoline, energy is1..... .
- During the electrolysis of sulfuric acid, energy is2..... .

Which words complete gaps 1 and 2?

	1	2
A	given out	given out
B	given out	taken in
C	taken in	given out
D	taken in	taken in

3 When dilute sulfuric acid reacts with aqueous sodium hydroxide, the temperature of the solution increases.

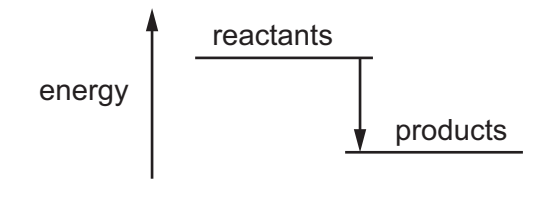
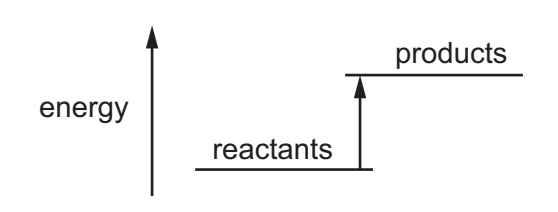
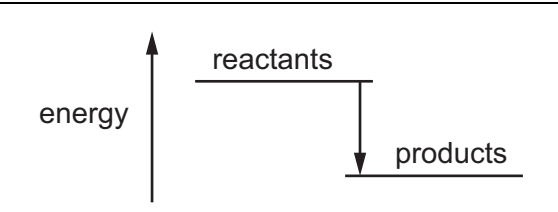
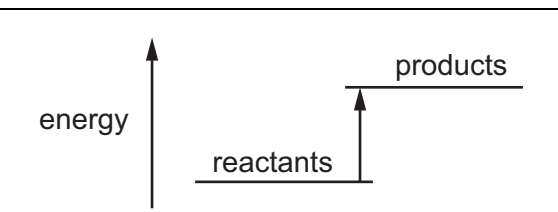
Which words describe this reaction?

- A** endothermic and neutralisation
- B** endothermic and redox
- C** exothermic and neutralisation
- D** exothermic and redox

4 Water is added to anhydrous copper(II) sulfate in a test-tube.

The mixture becomes hot.

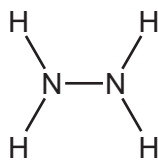
Which type of reaction and energy level diagram apply to this reaction?

	type of reaction	energy level diagram
A	endothermic	
B	endothermic	
C	exothermic	
D	exothermic	

5 Which reaction is endothermic?

- A** neutralisation of an acid by an alkali
- B** reaction of hydrogen with oxygen
- C** reaction of sodium with water
- D** thermal decomposition of limestone

- 6 The compound hydrazine is used as a rocket fuel. It has the structural formula shown.



One of the reactions of hydrazine is shown. This reaction is exothermic.



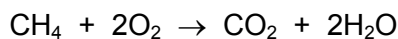
The bond energies are shown in the table.

	bond energy in kJ/mol
H-H	+436
N-H	+390
N-N	+160
N≡N	+945

What is the energy change for this reaction?

- A** -339 kJ/mol **B** -97 kJ/mol **C** +97 kJ/mol **D** +339 kJ/mol
- 7 Which statement describes an exothermic reaction?
- A** The energy absorbed for bond breaking is greater than the energy released by bond formation.
- B** The energy absorbed for bond breaking is less than the energy released by bond formation.
- C** The energy released by bond breaking is greater than the energy absorbed for bond formation.
- D** The energy released by bond breaking is less than the energy absorbed for bond formation.

8 The equation for the combustion of methane is shown.



The energy change for the combustion of methane is -890 kJ/mol .

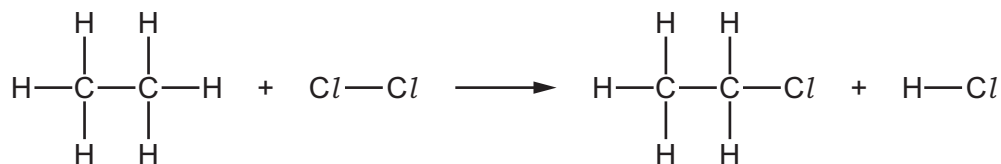
The bond energies are shown in the table.

bond	bond energy in kJ/mol
C-H	+410
O=O	+496
H-O	+460

What is the bond energy of the C=O bond?

- A** +49 kJ/mol **B** +841 kJ/mol **C** +1301 kJ/mol **D** +1335 kJ/mol

9 Chlorine reacts with ethane to produce chloroethane and hydrogen chloride.



The reaction is exothermic.

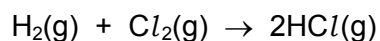
The bond energies are shown in the table.

bond	bond energy in kJ/mol
C-Cl	+340
C-C	+350
C-H	+410
Cl-Cl	+240
H-Cl	+430

What is the energy change for the reaction?

- A** -1420 kJ/mol
B -120 kJ/mol
C $+120 \text{ kJ/mol}$
D $+1420 \text{ kJ/mol}$

- 10 The equation for the reaction between hydrogen and chlorine is shown.



The reaction is exothermic.

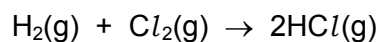
The bond energies are shown in the table.

bond	bond energy in kJ/mol
Cl-Cl	+240
H-Cl	+430
H-H	+436

What is the energy change for the reaction?

- A -1536 kJ/mol
 - B -184 kJ/mol
 - C +184 kJ/mol
 - D +246 kJ/mol
- 11 Hydrogen and chlorine react to form hydrogen chloride

The reaction is exothermic.



The overall energy change for this reaction is -184 kJ/mol.

The table gives some of the bond energies involved.

bond	bond energy in kJ/mol
H-Cl	+430
H-H	+436

What is the energy of the Cl-Cl bond?

- A -240 kJ/mol
- B -190 kJ/mol
- C +190 kJ/mol
- D +240 kJ/mol

12 Ammonium chloride is added to 100 cm^3 of water. The temperature changes from 25°C to 20°C .

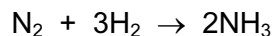
Which type of reaction occurs?

- A** endothermic
- B** exothermic
- C** freezing
- D** neutralisation

13 Ammonia is made by reacting nitrogen with hydrogen in the presence of an iron catalyst.

The reaction is exothermic.

The equation for the reaction is shown.



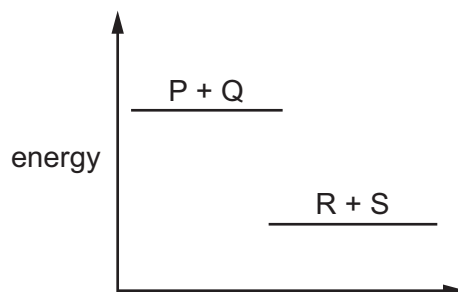
The bond energies are shown in the table.

bond	bond energy in kJ/mol
H-H	436
N-H	390
N≡N	945

What is the energy given out during this reaction?

- A** -4593 kJ/mol **B** -1083 kJ/mol **C** -959 kJ/mol **D** -87 kJ/mol

14 The energy level diagram for the reaction between P and Q to form R and S is shown.



Which row describes the energy changes involved and the type of reaction?

	energy changes involved	type of reaction
A	more energy is given out when the bonds in the products are formed than is needed to break the bonds in the reactants	endothermic
B	more energy is given out when the bonds in the products are formed than is needed to break the bonds in the reactants	exothermic
C	more energy is needed to break the bonds in the reactants than is given out when the bonds in the products are formed	endothermic
D	more energy is needed to break the bonds in the reactants than is given out when the bonds in the products are formed	exothermic