

MARK SCHEME

GCSE

CHEMISTRY

AQA - COMBINED SCIENCE

C5 - TEST 4

ENERGY CHANGES

Intermediate

Mark schemes

1.

(a) A = energy / enthalpy change / difference

*allow heat change **or** ΔH*

allow energy released

1

B = activation energy / EA

allow definition of activation energy

1

C = carbon dioxide and water

accept products

1

(b) exothermic

allow combustion / redox / oxidation

ignore reduction / burning

1

[4]

2.

(a) exothermic (reaction)

1

(b) smaller lumps react faster

or larger lumps react slower

*accept smaller lumps cause a more rapid rise in temperature **or**
vice versa*

*do **not** accept higher temperature*

***or** more heat unless linked to time*

1

smaller lumps have a larger surface (area) or larger lumps have a smaller surface (area)

more water can react at the same time

***or** so less water can react at the same time*

1

(c) heats up (too) rapidly

accept temperature (too) high

1

burning the food **or** the hands

*accept danger of container exploding **or** splitting **or** food
overheating*

do not accept reference to handling of powder

*do **not** accept a lot of powder needed **or** powder getting into food*

***or** too hot to eat **or** food would not cook properly **or** heat through
properly*

1

[5]

3.

- (a) energy released from making (new) bonds is greater than the energy needed to break (existing) bonds

accept the energy needed to break (existing) bonds is less than the energy released in making (new) bonds

*do **not** accept energy needed to make bonds*

1

- (b) (i) energy / heat of products less than energy of reactants

accept products are lower than reactants

***or** reactants higher than products*

accept more energy / heat given out than taken in

***or** less energy / heat taken in than given out*

accept energy / heat is given out / lost (to the surroundings)

allow produce heat

ignore produce energy

accept ΔH is negative

***or** energy change / **A** is negative*

or B** is less than **C

1

- (ii) **B** is (very) high / large

*it = **B***

*ignore energy change **C** is high*

1

- (iii) *it = MnO_2*

(MnO_2) catalyst (is added)

accept it is a catalyst

or reaction catalysed (by MnO_2)

*do **not** accept MgO / magnesium oxide*

1

which lowers activation energy

accept provides alternative / lower energy pathway

or which lowers (energy change) **B**

if hydrogen peroxide is given as a catalyst instead of MnO_2 penalise once only in question

1

(c) any **two** from:

- (chemicals) not mixed / stirred
- heat / energy lost (from apparatus)
- (apparatus) not insulated **or** no lid
- low amount / mass / not enough MnO_2 **or** low concentration H_2O_2
- thermometer read incorrectly

ignore other experimental error

2

[7]

4.

(a) (i) sulphuric acid / H_2SO_4 (accept sulfuric)

for one mark

1

(ii) Na_2SO_4 / $(\text{Na})_2\text{SO}_4$ / $\text{Na}_2(\text{SO}_4)$ / $(\text{Na}_+)_2\text{SO}_4^{2-}$

for one mark

lower case O (Na_2So_4) not accepted/tops of subscripted numbers should be in line with or lower than lower case letters of symbols / upper case 'a' not accepted

1

(b) (i) exothermic

for one mark

1

(ii) 60 KJ

for one mark

1

(iii) energy given out when bonds form
energy taken in when bonds break
energy given out is greater than energy taken in (owtte)

for 1 mark each

3

(iv) activation energy is low / many molecules have enough energy to react
for one mark

1

[8]