# MARK SCHEME

# GCSE

## CHEMISTRY

## AQA - COMBINED SCIENCE

## C5 - TEST 3

### ENERGY CHANGES

### Intermediate

## Mark schemes

**1.**

(a) heat
light
an exothermic

*in any order for 1 mark each*

**3**

(b) oxygen / $O_2$

*for 1 mark*

**1**

**[4]**

**2.**

(i) the energy needed by reactants before reaction can occur

*accept energy required for particles to collide successfully*

*accept energy required to break bonds*

*accept energy needed to start reaction*

**1**

(ii) reference to reactants 'energy' higher than products 'energy'

*accept exothermic reaction*

*accept heat (energy) released*

**1**

melting point of iron is exceeded

*accept temperature is above melting point of iron*

**1**

**[3]**

**3.**

(a) any **one** from:

- solution becomes colourless or colour fades
- zinc becomes bronze / copper coloured

  *allow copper (forms) or a solid (forms)*
- zinc gets smaller

  *allow zinc dissolves*
- bubbles or fizzing.

  *ignore precipitate*

**1**

(b) improvement:
use a plastic / polystyrene cup or add a lid

*accept use lagging / insulation*

**1**

reason - must be linked
reduce / stop heat loss
**OR**
improvement:
use a digital thermometer

*allow use a data logger*

reason - must be linked
more accurate or easy to read or stores data

*allow more precise or more sensitive*

*ignore more reliable*

*ignore improvements to method, eg take more readings*

**1**

(c) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best–fit' approach to the marking.

**0 marks**
No relevant content

**Level 1 (1−2 marks)**
There is a statement about the results.

**Level 2 (3−4 marks)**
There are statements about the results. These statements may be linked or may include data.

**Level 3 (5−6 marks)**
There are statements about the results with at least one link and an attempt at an explanation.

Examples of chemistry points made in the response:
**Description:**
**Statements**
Concentration of copper sulfate increases
Temperature change increases
There is an anomalous result
The temperature change levels off
Reaction is exothermic

**Linked Statements**
Temperature change increases as concentration of copper sulfate increases
The temperature change increases, and then remains constant
After experiment 7 the temperature change remains constant

**Statements including data**
The trend changes at experiment 7
Experiment 3 is anomalous

**Attempted Explanation**
Temperature change increases because rate increases
Temperature change levels off because the reaction is complete

**Explanation**
As more copper sulfate reacts, more heat energy is given off
Once copper sulfate is in excess, no further heat energy produced

**6**

**[9]**

**4.** (a) (i) 5.75 **or** 5.8

*correct answer with or without working gains **2** marks*

*correct working showing addition of any four results and division by 4 gains **1** mark*

***OR***

*6(.04) for **1** mark*

**2**

(ii) use a polystyrene cup **or** lid

*accept insulate the beaker*

**1**

to prevent energy/heat gain

*accept to prevent energy/heat transfer*

*do **not** accept energy/heat loss*

**OR**

use a digital thermometer

*allow use a data logger*

easier to read (to 0.1°C)

**1**

(b) (as mass increases) the final temperature increases

**1**

then stays constant

**1**

correct reference to a value above 8 g up to and including 10 g as mass when the trend changes

**1**

**[7]**