

# Reactions of Acids

## Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.4 Chemical Changes
Sub-Topic	Reactions of Acids
Difficulty Level	Silver Level
Booklet	Mark Scheme 1

Time Allowed: 56 minutes

Score: /56

Percentage: /100

Grade Boundaries:

<b>M1.(a)</b>	A base	1
	(b) forces	1
	(c) calcium loses electrons and oxygen gains electrons <i>max 3 for incorrect reference to atom / ion or to oxygen / oxide</i>	1
	two electrons are transferred	1
	calcium has a $2^+$ charge	1
	oxide has a $2^-$ charge	1
		<b>[6]</b>
<b>M2.(a)</b>	(i) neutrons <i>this order only</i>	1
	electrons	1
	protons	1
	(ii) box on the left ticked	1

- (b) (i) effervescence / bubbling / fizzing / bubbles of gas  
*do **not** accept just gas alone*

1

magnesium gets smaller / disappears  
*allow magnesium dissolves*  
*allow gets hotter **or** steam produced*  
*ignore references to magnesium moving and floating /*  
*sinking and incorrectly named gases.*

1

- (ii) Marks awarded for this answer will be determined by the Quality of Communication (QC) 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 are simple statements of some of the steps in a procedure for obtaining magnesium chloride.

### **Level 2 (3–4 marks)**

There is a description of a laboratory procedure for obtaining magnesium chloride from dilute hydrochloric acid and magnesium.

The answer must include a way of ensuring the hydrochloric acid is fully reacted **or** a method of obtaining magnesium chloride crystals.

### **Level 3 (5–6 marks)**

There is a well organised description of a laboratory procedure for obtaining magnesium chloride that can be followed by another person.

The answer must include a way of ensuring the hydrochloric acid is fully reacted **and** a method of obtaining magnesium chloride crystals.

### **examples of the points made in the response:**

- hydrochloric acid in beaker (or similar)
- add small pieces of magnesium ribbon
- until magnesium is in excess or until no more effervescence occurs \*
- filter using filter paper and funnel
- filter excess magnesium
- pour solution into evaporating basin / dish
- heat using Bunsen burner
- leave to crystallise / leave for water to evaporate / boil off water
- decant solution
- pat dry (using filter paper).

\*Student may choose to use a named indicator until it turns a neutral colour, record the number of pieces of magnesium added then repeat without the indicator.

6  
[12]

M3.(a) (i) precipitation

1

(ii) (aq) on left hand side

1

(s) on right hand side

1

(iii) potassium iodide

1

potassium nitrate

1

(iv) filtration

1

(b) (i) diffusion

1

(ii) iodide ions move / diffuse faster than lead ions **or** travel further in the same time

*Must be a comparison*

*Accept converse*

1

because the lead iodide forms much closer to the lead nitrate (or **X**) than the potassium iodide (or **Y**).

*allow because iodide ions are smaller than lead ions*  
*allow references to potassium iodide and lead nitrate*

1

(iii) the particles / ions move / diffuse faster

*ignore which particles / ions the student refers to*

1

because they have more energy **or** will collide / meet sooner

*ignore reference to frequency of collisions*

1

[11]

**M4.(a)** (i) copper is less reactive than hydrogen **or** copper is unreactive

1

(ii) Zinc and dilute hydrochloric acid

1

(b) (gas) syringe

1

(c) (i) 35

*allow 3*

1

because not close to others

*accept it is much lower than the others*  
*ignore references to trends or patterns*  
*dependent on the first mark*

1

(ii)  $(49 + 50 + 48) / 3$

$= 49$

*correct answer with or without working gains 2 marks*

1

*allow ecf from anomaly identified in (i) for 2 marks:*

- *Exp 1 anomalous gives 43.3*
- *Exp. 2 anomalous gives 44*
- *Exp. 4 anomalous gives 44.7*

*answer of 45.5 or 46 (anomaly not excluded) gains 1 mark*

*correct working **excluding anomaly** but with wrong answer gains 1 mark*

1

(iii) so that a mean can be calculated

*accept improves accuracy of the mean **or** so anomalies can be identified / discarded **or** to reduce effect of random errors*

*ignore makes it a fair test*

*ignore reliability, validity, repeatability, reproducibility*

1

(d) (i) idea of mixing with oxygen / air, letting air / oxygen in  
*accept converse*

1

(ii)  $\text{H}_2\text{O}$

*do not accept incorrect additional products*

1

balancing 2 ... (1) ... 2

*allow fractions or multiples*

*dependent on first mark*

1

[11]

- M5.(a)** (i) (phosphoric) acid  
*allow phosphoric* 1
- (ii)  $\text{H}^+$  / hydrogen (ion)  
*if ion symbol given, charge must be correct* 1
- (b) (i) pencil  
so it will not run / smudge / *dissolve*  
*ignore pencil will not interfere with / affect the results*  
**or**  
because ink would run / smudge / *dissolve*  
*ignore ink will interfere with / affect the results* 1
- (ii) any **three** from:  
*reference to spots / dots = max 2*  
*allow colouring for colour*
  - 3 colours in Cola  
*allow more colours in cola or fewer colours in fruit drink*
  - 2 colours in Fruit drink
  - one of the colours is the same
  - two of the colours in Cola are different
  - one of the colours in Fruit drink is different  
*allow some of the colours in the drinks are different*
  - one of the colours in Cola is the most soluble  
*accept one of the colours in Cola has the highest  $R_f$  value* 3
- (c) different substances travel at different speeds **or** have different retention times  
*accept different attraction to solid*  
*ignore properties of compounds* 1
- (d) (i) Is there caffeine in a certain brand of drink? 1
- (ii) any **two** from:
  - cannot be done by experiment
  - based on opinion / *lifestyle choice*
  - ethical, *social* or economic issue  
*accept caffeine has different effects on different people*

**M6.(a)** he made urea / organic compound / he made another organic compound  
*ignore he made it unless qualified eg accept he made it from non-living material / not made from animals / plants*

1

(b) any **one** from:

sensible ideas eg

- famous scientists / eminent scientists / high status scientists accepted the life-force theory
- sensible references to lack of status of Wöhler
- was not in line with accepted ideas of time / religious beliefs etc  
*eg it was a new idea*
- other sensible answers eg fake / anomalous results

**or** lack of evidence / proof

*accept only made 1 compound ignore no evidence*

**or** not reliable / reproduced

**or** not repeated

1

(c) sensible ideas such as:

*accept 'other scientists repeated his experiment / made other organic compounds'*

Wöhler made another organic compound **or** more evidence **or** repeated it

*allow more proof*

*ignore he proved it*

1

(d) (i) nitric (acid)

*spelling must be correct*



*accept HNO<sub>3</sub> correctly written*  
*ignore hydrogen nitrate*

1

(ii) evaporate  
*allow heat / boil / cool*

**or**

allow to crystallise  
*do not allow freeze*  
*ignore filtration unless as an alternative*  
*ignore distillation*  
*ignore solidify*

1

[5]