

MARK SCHEME

GCSE

CHEMISTRY

AQA - TRIPLE SCIENCE

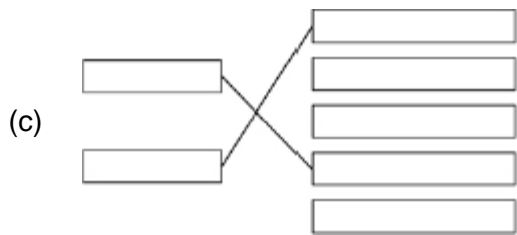
C6 - TEST 2

RATE OF REACTION

Beginner

Mark schemes

- 1.** (a) $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$ 1
- (b) catalyst 1
- (c) as pressure increases percentage yield increases 1
- (d) 32-23
both readings correct 1
- = 9 (%) 1
- [5]**
- 2.** (a) natural gas
allow correct answer shown in box if answer line blank 1
- (b) (i) 450
allow correct answer shown in box if answer line blank 1
- (ii) iron
allow correct answer shown in box if answer line blank 1
- (iii) The catalyst lowers the activation energy. 1
- (c) (the gases are) cooled 1
- ammonia condenses
allow ammonia liquefies 1
- nitrogen and hydrogen are recycled
if no other mark awarded allow ammonia is separated for 1 mark 1
- [7]**
- 3.** (a) S(s) 1
- (b) measuring cylinder 1



1

allow for 1 mark an answer of dependent variable --- concentration of sodium thiosulfate solution and independent variable --- time for cross to become no longer visible

1

(d) cross might be darker or paler

allow cross may not be the same size / shape

1

(e)
$$\frac{43 + 41}{2}$$

an answer of 42 (s) scores 2 marks

1

= 42 (s)

an answer of 54 (s) scores 1 mark

1

(f) smooth curve through all points

must touch all crosses

*do **not** allow straight lines between points*

ignore attempt to plot X

1

(g) reproducible

1

(h) particles collide more frequently

1

there are more particles in a fixed volume

1

[11]

4.

use a more concentrated solution of sulfuric acid

1

grind the phosphate rock into a powder before adding the acid

1

increase the temperature of the sulfuric acid

1

[3]

- 5.** (a) water
accept H₂O or 5H₂O
 2 must be below halfway
 1
- (b) the cold water / ice / cubes (owtte)
accept 'cooled down' or references to cold
 1
- (c) reversible reaction
 1
- (d) (i) 0.87g
 1
- (ii) the student made errors in weighing during
 the experiments
 1
- the student did not heat the copper sulfate for long enough in one of the experiments
 1
- (e) white
 1
- blue
allow 1 mark for blue to white
 1

[8]

- 6.** (a) any **two** from:
- increases
owtte allow 'goes up'
 - until reaches maximum / levels off
owtte
 - quickly at first
owtte
 - then more slowly / rate decreases
allow reaction finished
ignore rate increases
- 2
- (b) use a more concentrated acid
list principle applies
 use zinc powder
 2

[4]

- 7.** (a) 83 (cm³)
allow 83.0 / 83.00 1
- (b) mass of magnesium powder 1
temperature of hydrochloric acid 1
- (c) $\frac{(46 + 47 + 49)}{3}$
allow 47.3(333) (cm³) for 1 mark 1

= 47 (cm³) (2 sf)
an answer of 43 (cm³) scores 1 mark 1
an answer of 47 (cm³) scores 2 marks
- (d) all points plotted correctly
(inc 0,0)
allow a tolerance of $\pm\frac{1}{2}$ a square
allow ecf from question (c)
ignore line
allow 1 mark for four points plotted correctly 2
- (e) $\frac{80}{50}$
allow 80 \pm 2 1

= 1.6 (cm³/s)
allow 1.60 \pm 0.04 1
an answer of 1.6 (cm³/s) scores 2 marks
- (f) rate is greatest at start
allow rate is faster at start 1

(then) rate decreases
allow (then) rate slows down 1

reaction stops 1

- (g) there are more particle collisions each second 1
 there are more particles in the same volume 1
- (h) (gas is) not carbon dioxide 1
ignore does not react with limewater
- (i) hydrogen 1
allow H₂
 pop sound 1
- [17]**

- 8.** (a) reversible 1
- (b) catalyst 1
- (c) recycled 1
allow re-used
- (d) (Q) S R P 2
allow 1 mark if one letter in correct place.
- [5]**

- 9.** (a) cotton wool 1
- (b) all points correct 2
± ½ small square
allow 1 mark if 5 or 6 of the points are correct
 best fit line 1
must not deviate towards anomalous point
- (c) (mass) 1
 2.1 (g)
allow ecf from drawn best fit line
- (time) 1
 100 (s)

- (d) a gas is produced 1
- which escapes from the flask 1
- (e) $\frac{9.85}{150} = 0.0656$ 1
- 0.07 (g / s) 1
- allow ecf answer correctly calculated to 2 decimal places*
- (f) collect the gas in a gas syringe 1
- measured the volume of gas 1
- allow carbon dioxide for gas*
- allow for 1 mark*
- collected gas*
- or**
- counted bubbles*
- (g) The particles have more energy 1
- The particles move faster 1

[14]

10.

- (a) (i) mix (owtte) 1
- accept to allow more collisions / helps particles to collide (owtte)*
- idea of more efficient heat transfer*
- do **not** allow heat is a catalyst*
- (ii) higher **and** more 1
- powder **and** big 1
- concentrated **and** more 1
- (b) electrons 1
- (c) H⁺ 1

[6]