

MARK SCHEME

GCSE

CHEMISTRY

AQA - TRIPLE SCIENCE

C5 - TEST 1

ENERGY CHANGES

Beginner

Mark schemes

1.	(a) carbon <u>dioxide</u> <i>must be name</i> <i>do not accept carbon oxide</i>	1	
	(b) (i) the temperature of the solution will decrease <i>(list principle)</i>	1	
	(ii) energy is taken in from the surroundings <i>(list principle)</i>	1	
			[3]
2.	(a) gives out (heat)	1	
	(b) D	1	
	(c) L	1	
	(d) magnesium chloride	1	
			[4]
3.	(a) (i) high and low <i>both needed for mark</i>	1	
	(ii) reversible	1	
	(iii) to prevent ammonium chloride / solid / particles escaping <i>idea of a filter</i> <i>do not accept 'to prevent gases escaping'</i>	1	
	(b) endothermic	1	
			[4]
4.	(a) endothermic and because it takes in heat / energy <i>both for one mark</i>	1	

- (b) (i) reversible reaction (or explanation) 1
- (ii) add water
do not accept cooling or reverse the reaction 1

[3]

5. (a) the bag gets cold because heat energy is taken in from the surroundings 1

(b) endothermic 1

- (c) any **two** from:
- mix / spread (the ammonium nitrate and water)
 - dissolve faster(*)
 - get cold faster **or** so the whole bag gets cold(*)
()allow increase rate or quicker reaction*
 - particles collide more **or** more collisions
- 2

[4]

6. (a) water / H₂O
allow steam or hydrogen oxide 1

(b) (i) A 1

(ii) exothermic 1

products (energy) lower than reactants (energy) 1

(iii) 1860 (kJ) 1

(c) (i) 22.5 1

38.7 1

16.2
allow ecf for correct subtraction 1

(ii) 50 (g) 1

(iii) 20.1 (kJ)

allow propanol

ignore 3

1

(iv) as the number of carbon atoms (in one molecule of alcohol) increases the heat energy given out increases (when the alcohol is burned)

1

(v) any **two** from:

- no lid
- no insulation
- no draught shield

Allow heat / energy loss to surroundings for any one of these marks

- incomplete combustion
- inaccurate measurement
- no repeats (to calculate a mean)

2

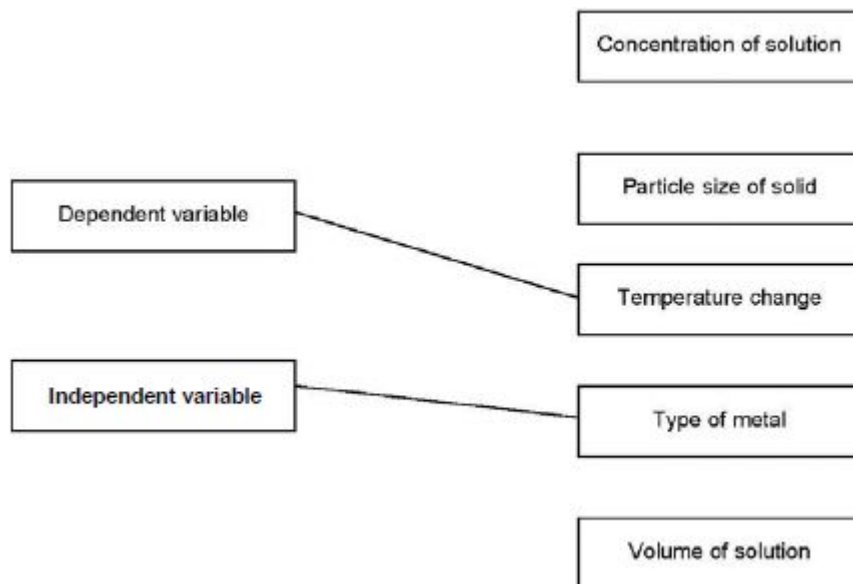
(iv) -O-H

1

[14]

7.

(a)



*allow **one** mark if answers are reversed*

1

1

(b) polystyrene is a better insulator

1

- (c) both bars labelled 1
- both bars correctly plotted
- allow tolerance of $\pm\frac{1}{2}$ small square*
- ignore width and spacing of bars*
- if no other mark scored, allow 1 mark for any one bar correctly plotted and labelled*
- 1
- (d) temperature increases
- allow (because) energy / 'heat' is transferred to the surroundings*
- or**
- temperature does not decrease
- energy / 'heat' is not taken in from the surroundings*
- allow the energy of the products is less than the energy of the reactants*
- 1
- (e) (most reactive)
- magnesium
- (zinc)
- nickel
- this order only*
- 1
- (f) suitable method described 1
- the observations / measurements required to place in order 1
- an indication of how results would be used to place the unknown metal in the reactivity series 1
- approaches that could be used:**
- approach 1:**
- add the unknown metal to copper sulfate solution (1)
- measure temperature change (1)
- place the metals in order of temperature change (1)

approach 2:

add the metal to salt solutions of the other metals

or

heat the metal with oxides of the other metals (1)

measure temperature change (only if salt solutions used)

or

observe whether a chemical change occurs (1)

compare temperature change or whether there is a reaction to place in correct order (1)

approach 3:

add all of the metals to an acid (1)

measure temperature change or means of comparing rate of reaction (1)

place the metals in order of temperature change or rate of reaction (1)

approach 4:

set up electrochemical cells with the unknown metal as one electrode and each of the other metals as the other electrode (1)

measure the voltage of the cell (1)

place the metals in order of voltage (1)

(g) D

1

(h) C

1

[12]

8.

(a) (i) increase

1

(ii) high melting point

1

(b) (i) decreases

1

increases

1

(ii) it gives the particles more energy

1

it makes the particles move faster

1

[6]

9.

(a) goes up

1

- (b) (i) B 1
- (ii) A 1
- (iii) a catalyst 1
- activation energy 1
- (c) (i) eg (ensures) complete reaction
allow spread heat / energy
or even heating
allow mixes properly or mix them together or to get correct temperature
ignore dissolves 1
- (ii) lid (on beaker)
accept cover beaker
or
 insulate (beaker) / use a plastic cup 1

[7]

10.

- (a) (i) 11 1
- (ii) 4620 (J)
correct answer gains 2 marks with or without working
allow 4.62kJ for 2 marks
if answer is incorrect:
100 × 4.2 × 11 gains 1 mark
or
100 × 4.2 × (their temp. rise) gains 1 mark
or
100 × 4.2 × (their temp. rise) correctly calculated gains 2 marks 2
- (b) the temperature increases
allow gets hotter
allow heat / energy is given off 1

- (c) (i) (energy of) products lower than (energy of) reactants
allow converse
allow arrow C points downwards 1
- (ii) A 1

[6]

11.

- (a) (i) 42 000
correct answer gains 2 marks with or without working
allow 42 kJ
if answer incorrect : correct substitution $500 \times 4.2 \times 20$ gains 1 mark 2

- (ii) any **two** from:
- eye protection
 - lab coat
 - heat-proof mat
 - (heat-proof) gloves
 - (long) hair tied back
 - stand up
 - secure the beaker
- 2

- (iii) Stir the water before measuring the temperature. 1

Place a lid on the beaker. 1

- (b) the products → S 1

the activation energy → Q 1

the energy released by the reaction → P 1

- (c) carbon dioxide produced
it = propane
allow converse arguments
allow greenhouse gas / global warming / atmospheric pollution

(crude oil / propane) non-renewable 1

allow crude oil running out

1
[11]