M1.(a) 36 cm^3

1

(b) all points correct

± ½ small square

2

*allow **1** mark if 6 or 7 of the points are correct*

2 best fit lines drawn

must not deviate towards anomalous point

2

*allow **1** mark if 1 line correct*

(c) The bung was not pushed in firmly enough.

1

The measuring cylinder was not completely over the delivery tube.

1

(d) as mass of lithium carbonate increases volume of gas produced increases

1

linear / (directly) proportional

1

(e) A gas / carbon dioxide is produced.

allow because the air in the tube expands

1

(f) any **one** from:

- Potassium carbonate does not decompose to produce carbon dioxide / a gas.
- Potassium carbonate does not decompose at the temperature of the Bunsen burner **or** the Bunsen burner is not hot enough to decompose potassium carbonate.
- When potassium carbonate decomposes a gas is not formed.

1

[11]

M2.(a) cotton wool

1

(b) all points correct

± ½ small square

2

*allow **1** mark if 5 or 6 of the points are correct*

best fit line

must not deviate towards anomalous point

1

(c) (mass)
2.1 (g)

allow ecf from drawn best fit line

1

(time)
100 (s)

1

(d) a gas is produced

1

which escapes from the flask

1

(e) $\frac{9.85}{150} = 0.0656$

1

0.07 (g / s)

allow ecf answer correctly calculated to 2 decimal places

1

(f) collect the gas in a gas syringe

1

measured the volume of gas

allow carbon dioxide for gas

1

*allow for **1** mark*

collected gas

or

counted bubbles

(g) The particles have more energy

1

The particles move faster

1

[14]

M3.(a) (i) oxygen, sulfur trioxide

both needed for mark

1

(ii) compound

1

(b) increases

accept (goes) higher / (goes) up / (is) faster) / (are) more frequent

1

(c) activation

1

(d) catalyst **or** increase temperature

1

[5]

M4.(a) heat / energy

1

given out / transfers to surroundings

the mark for given out / transfers to cannot be awarded without heat / energy

allow given off

1

(b) (i) decreases

1

increases

1

(ii) it gives the particles more energy

1

it makes the particles move faster

1

[6]

M5.(a) (i) In suntan creams

1

(ii) Much smaller

1

(b) (i) have a high surface area to volume ratio

1

(ii) because a catalyst provides an alternative / different pathway / mechanism / reaction route

accept adsorption or 'increases concentration <u>at the surface</u>'
ignore absorption

1

(that has) <u>lower</u> <u>activation energy</u>

allow weakens bonds

allow idea of increased successful collisions

*max **1** mark for incorrect chemistry eg increased energy of particles*

1

[5]

M6. (a) (i) 10

1

(ii) OH^-

1

(b) (i) air

1

(ii) particles move faster

1

particles collide more often

1

(iii) catalyst(s)

1

(c) liquid

1

[7]