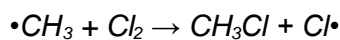


Mark schemes

Q1.

D



[1]

Q2.

A

It can be removed from car exhaust gases by a catalytic converter.

[1]

Q3.

C

C-C bonds are broken

[1]

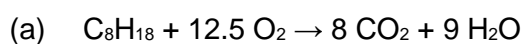
Q4.

D

CH₃Cl and HCl

[1]

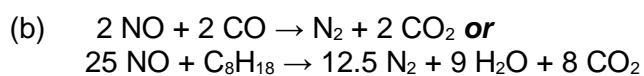
Q5.



Allow multiples

Ignore state symbols

1



Allow multiples

Ignore state symbols

Allow $2\text{NO} \rightarrow \text{N}_2 + \text{O}_2$ (or multiples)

1

(c)

M1 $\text{moles SO}_2 = \frac{6\,490\,000 \times 10^6}{64.1} (= \frac{6.49 \times 10^{12}}{64.1} = 1.012 \times 10^{11})$

1

M2 $\text{mass CaO} = \left(\frac{1.012 \times 10^{11} \times 56.1}{1000} \right) = 5.68 \times 10^9 \text{ (kg)}$

1

M2 must be in standard form

Correct answer in standard form scores 2 marks (allow $5.6 - 5.7 \times 10^9$). Answer to at least 2sf.

Correct answer in non-standard form scores 1 mark

Answers that are $5.6 - 5.7 \times 10^n$ score 1 mark

For other answers, allow ECF from **M1** to **M2** (but answer must be in standard form for **M2** to score)

Alternative

$$\text{M1} \quad \text{mass CaO} = \frac{6\,490\,000 \times 10^6}{64.1} \times 56.1$$

= 5.68 million tonnes

M2 5.68×10^9 (kg)

(7.4×10^9 would score 1 mark due to use of $\frac{64.1}{56.1}$)

[4]

Q6.

D



[1]

Q7.

B

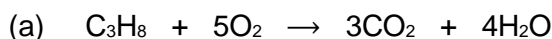
[1]

Q8.

D

[1]

Q9.



allow fractions / multiples

allow any correct structural representation of molecules

ignore state symbols

1

(b) **M1** working that leads to $n = 13$

e.g. $-6650 = -(496n + 202)$

and/or $496n = 6650 - 202$

and/or $496n = 6448$

$(n = 13)$

1

M2 C₁₃H₂₈*C₁₃H₂₈ scores M1 and M2 if some correct working shown**C₁₃H₂₈ with no working scores M2 only**allow error carried forward for M2 for a correct formula of an alkane from the value of n worked out for M1 (but there must be some working shown leading to this incorrect value of n); for example, allow C₁₄H₃₀ if error in M1 stemming from error in rearranging equation*

1

(c) Idea that

- alkane is not gaseous or
- equation relates to gaseous alkanes or
- it takes energy to convert it into a gas or
- that water / alkane / substances are gaseous in calculations using bond enthalpies

ignore references to heat loss, incomplete combustion, loss of evaporation, not being in standard conditions or that it is not standard state

1

(d) **M1** plotting the four values correctly (allow one error where point is ± 1 square out)*If plotted points for wrong number of C atoms for two or more compounds, cannot score M1 or M2, but could score M3 if read value off for 3C atoms*

1

M2 smooth best fit curve*M2 best fit curve for their four points for the correct number of C atoms*

1

M3 value from their best fit line for 3 C atoms (allow ± 1 square)*M3 need – sign (but ignore units); cannot score M3 unless there is a line on the graph*

1

(e) **M1** mass of isooctane = 692 (g)*correct answer scores M1 and M2*

1

M2 3.31×10^4 or 33100 (kJ) (3sf only)*M2 correct value to incorrect number of sig figs is 1 mark;**ignore sign ;**no error carried forward for M2*

1

[9]

Q10.
D

[1]

Q11.
C

[1]

Q12.
D

[1]

Q13.
C

[1]

Q14.
C

[1]

Q15.
D

[1]

Q16.
C

[1]