

Name of the Student: _____

Max. Marks : 28 Marks

Time : 28 Minutes

Mark Schemes

Q1.

- (a) (i) (Compounds with the) same molecular formula
Allow same number and type of atom for M1
Ignore same general formula.

1

But different structural formula / different displayed formula / different structures / different skeletal formula

M2 dependent on M1

Not different positions of atoms / bonds in space.

1

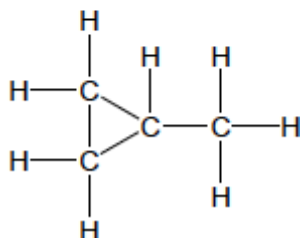
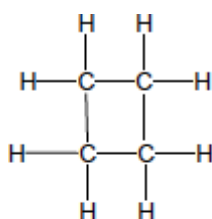
- (ii) But-2-ene
Allow but-2-ene.
Allow but 2 ene.
Ignore punctuation.

1

- (iii) (2)-methylprop-(1)-ene
Do not allow 2-methyleprop-1-ene.

1

(iv)



Do not allow skeletal formulae.

Penalise missing H and missing C

1

- (b) (i) $C_4H_8 + 2O_2 \rightarrow 4C + 4H_2O$

Accept multiples.

1

- (ii) Exacerbates asthma / breathing problems / damages lungs / smog / smoke / global dimming

Ignore toxic / pollutant / soot / carcinogen.

Do not allow greenhouse effect / global warming / acid rain / ozone.

1

- (c) (i) $C_{16}H_{34}$

Allow $H_{34}C_{16}$

C and H must be upper case.

1

- (ii) Jet fuel / diesel / (motor) fuel / lubricant / petrochemicals / kerosene / paraffin / central heating fuel / fuel oil

Ignore oil alone.

Not petrol / bitumen / wax / LPG / camping fuel.

1

- (d) (i) $C_8H_{18} + 25NO \rightarrow 8CO_2 + 12.5 N_2 + 9H_2O$

Accept multiples.

1

- (ii) Ir / iridium

OR

Pt / platinum

OR

Pd / palladium

OR

Rh / rhodium

1

[11]

Q2.

- (a) Fractional distillation / fractionation / GLC / gas liquid chromatography 1
- (b) C_4H_{10}
*Need C_4H_{10} **and** the reason for the mark*
Because it has a higher bp / has stronger IMF / larger molecule / longer chain / larger surface (area) 1
- (c) $C_4H_{10} + 6\frac{1}{2} O_2 \longrightarrow 4CO_2 + 5H_2O$
Accept multiples
Ignore state symbols 1
- (d) CO_2 or H_2O evolved is a greenhouse gas / CO_2 or H_2O evolved contribute to global warming / the products are greenhouse gases
Ignore climate change 1
- (e) $CH_3CH_2CH_2CH_3 + 3.5O_2 \longrightarrow C_2H_2(CO)_2O + 4H_2O$
Accept multiples
Allow with or without a number 1 before the organic molecules 1
- (f) (i) $C_2H_5SH + 4.5O_2 \longrightarrow 2CO_2 + 3H_2O + SO_2$
Accept multiples 1
- (ii) Calcium oxide / calcium carbonate
Allow any base or alkali
Allow correct formulae 1
- Neutralises the SO_2 / acid base reaction / it is a base
Can only score M2 if base or alkali used in M1
Allow M2 if blank in M1 1
- (iii) Ethanol contains hydrogen bonding
Breaking covalent bonds CE = 0 / 2
Which is stronger than IMF (VDW / dipole-dipole forces) in ethanethiol / (H bonding) is the strongest IMF
Only award M2 if M1 given, but allow IMF in ethanol are stronger than in ethanethiol for maximum 1 mark 1
- (g) (i) (2,2-)dimethylpropane
Ignore punctuation 1
- (ii) Because molecule is smaller / less polarisable / has less surface (area) / is more spherical / molecules can't get as close to one another (to feel the vdW forces)
Allow converse answers referring to straight chain isomers CE = 0 / 2 if breaking bonds 1

vdW intermolecular forces or vdW force between molecules are weaker or fewer

Need vdW rather than just IMF

1

(iii) 1 or one

1

(h) (i) C_9H_{20}

$H_{20}C_9$

1

(ii) Thermal (cracking)

If not thermal cracking CE = 0 / 2

1

High pressure AND high temperature

If blank mark on

Allow high P and T

1

OR

Pressure of $\geq 10 \text{ atm}$, $\geq 1 \text{ MPa}$ $\geq 1000 \text{ kPa}$

AND temp of $400^\circ\text{C} \leq T \leq 1000^\circ\text{C}$ or $650 \text{ K} \leq T \leq 1300 \text{ K}$

Do not allow high heat

If no units for T, then range must be 650 – 1000

1

[17]