

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Mark Schemes

Q1.

(a) 2,2,4-trimethylpentane

1

(b) 5

1

(c) $C_{20}H_{42} \longrightarrow C_8H_{18} + 2C_3H_6 + 3C_2H_4$

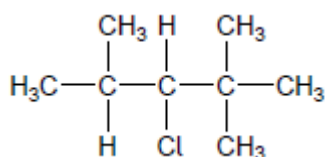
1

(d) Mainly alkenes formed

1

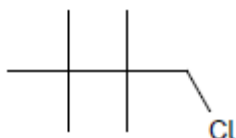
(e) 4 (monochloro isomers)

1



1

(f)



1

(g) $C_8H_{17}^{35}\text{Cl} = 96.0 + 17.0 + 35.0 = 148.0$
and $C_8H_{17}^{37}\text{Cl} = 96.0 + 17.0 + 37.0 = 150.0$

Both required

1

$$M_r \text{ of this } C_8H_{17}\text{Cl} = \frac{(1.5 \times 148.0)}{2.5} + \frac{(1.0 \times 150.0)}{2.5} = 148.8$$

1

(h) $\frac{24.6}{12} \quad \frac{2.56}{1} \quad \frac{72.8}{35.5} = 2.05 : 2.56 : 2.05$

$$\text{Simplest ratio} = \frac{2.05}{2.05} : \frac{2.56}{2.05} : \frac{2.05}{2.05}$$

$$= 1 : 1.25 : 1$$

1

Whole number ratio ($\times 4$) = 4 : 5 : 4

1



1

[12]

Q2.

- (a) 2,2,4-trimethylpentane
This answer only but ignore punctuation
1
- (b) M1 (fractional or simple) distillation
Incorrect process in M1 CE=0
If M1 blank, mark on for M2 and M3 (ignore boiling, condensing)
1
- M2 idea that isooctane / the one with the lower boiling point boils (first)
(or reaches top of column first)
Ignore reference to octane boiling and being collected at higher temperature
If temperature referred to, should be between 99 and 124°C
"it" refers to isooctane
M2 – allow vaporises/evaporates first
1
- M3 idea that isooctane condenses / liquefies and collected
Penalise M2 and M3 if octane boils first
In M2 and M3 – if no specific reference to individual alkanes, could score one mark for M2 + M3 combined if M2 and M3 both otherwise correct
M2 and M3 must refer to a laboratory apparatus (not to an industrial process)
1
- (c) $\text{C}_8\text{H}_{18} + 12\frac{1}{2}\text{O}_2 \rightarrow 8\text{CO}_2 + 9\text{H}_2\text{O}$
Accept multiples; ignore state symbols
Accept any correct structural representation of isooctane
1
- (d) M1 Alternative route/mechanism/pathway
1
- M2 With lower activation energy
Accept E_a for activation energy
1
- (e) $2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$
Accept multiples; ignore state symbols
1
- (f) M1 to reduce amount of metals needed / small amount of metal needed
Relates to low amount of metal
1
- M2 Increase / maximise / produce large surface area or to give catalyst a larger surface area: volume ratio or so that high(er) proportion of atoms/metal is on surface
Is related to large surface area
1

(g) M1 bromine (water or in organic solvent or CCl_4) / Br_2 (aq) / Br_2
No reagent or an incorrect reagent (e.g. bromide), CE=0;
Penalise Br (or incorrect formula of other correct reagent) but mark on for M2
It must be a whole reagent and/or correct formula
If oxidation state given in name, it must be correct
If 'manganate' or 'manganate(IV)' or incorrect formula, penalise M1 but mark on
Ignore 'acidified'

1

M2 (orange/yellow to) colourless / decolourised / loses its colour
Ignore goes clear
Ignore brown/red, but penalise other incorrect colours

1

Alternatives:

M1 = potassium manganate(VII), M2 = colourless

M1 = conc sulfuric acid, M2 = brown

M1 = iodine, M2 = colourless

[12]