BASIC CONCEPTS, ALKANES AND ALKENES TEST MS

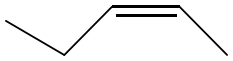
1. (a) Same molecular formula, different structure /displayed formula/ arrangement of atoms/bonds ✓✓ 2

(Same formula, different structure/displayed formula/arrangement of atoms ✓

(b) (i) 3-methylbut-1-ene and 2-methylbut-2-ene
(any unambiguous structure/formula is acceptable) ✓✓ 2

(ii) 2-methylbut-1-ene/2-methyl-1-butene ✓ 1

(iii) ✓ 1



[6]

2. (i) $Cl_2 \rightarrow 2Cl\bullet$ 1

(ii) uv (light)/high temperature/min of 400 C/sunlight 1

(iii) $Cl\bullet + C_6H_{12} \rightarrow C_6H_{11}\bullet + HCl$

$C_6H_{11}\bullet + Cl_2 \rightarrow C_6H_{11}Cl + Cl\bullet$ 2

(iv) react with each other/suitable equation

1

[5]

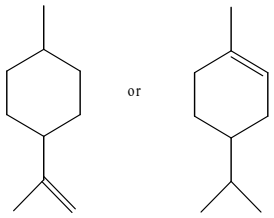
3. (a) (i) C_5H_8 1

(ii) C_5H_8 1

(b) (i) Ni/Pt/Pd 1

(ii) 1 mark for C_5H_{12} 1
1 mark for correct balancing 1

(iii)

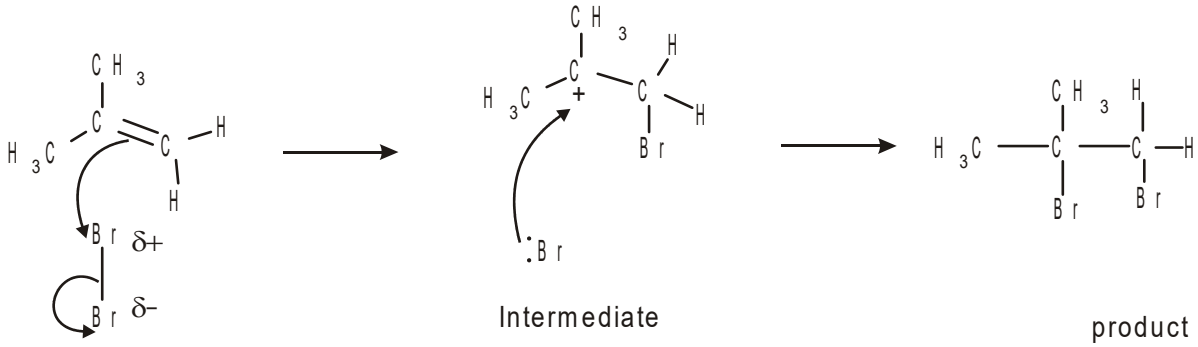


1

[6]

4. (i) *electrophile*: lone pair (of electrons) acceptor. ✓ 1

(ii)



essential mark intermediate carbocation/carbonium ion, accept primary /"triangular"/ ✓
essential mark product ✓

curly arrow from double bond to Br_2 ✓
curly arrow showing movement of electrons in the Br-Br bond **or** the dipole in the Br-Br ✓

curly arrow from lone pair of electrons in Br^- to intermediate ✓
mark any errors first

5 max

[5]

5. structural isomerism:
structural isomers: same molecular formula, different structural formula **(1)**
structural isomers of but-1-ene: but-2-ene **(1)** and methylpropene **(1)**

geometric isomerism
C=C prevents rotation of the double bond **(1)**
each C in the C=C double bond bonded to 2 different atoms or groups **(1)**

a clear statement that links non-rotation of the double bond to the idea of groups being trapped on one side of the double bond **(1)**

cis but-2-ene clearly identified **(1)**
trans but-2-ene clearly identified **(1)**

[7]

6. Recognises that either a catalyst or high temperature (heat is not sufficient) is required 1

cracking suitable balanced equation 1

reforming equation or statement indicating formation of a ring/cyclic compound

suitable balanced equation with H_2 1

(balanced equation showing formation of a ring scores both marks) 1

isomerisation suitable balanced equation

The **processed products** are: 1

- used in fuels/used in petrol
- better /more efficient fuels/increase octane number/rating
- alkenes (from cracking) produce polymers/alcohols
- H_2 used for Haber process/fuels/hydrogenation of oils 3

QWC SPAG – look for two complete sentence that present a coherent argument 1

[9]

7. **1st bullet**

product: $CH_3CH_2CHBrCH_2Br$ **(1)**

equation: $CH_3CH_2CH{=}CH_2 + Br_2 \rightarrow CH_3CH_2CHBrCH_2Br$ **(1)**

products: $CH_3CH_2CHBrCH_3$ **and** $CH_3CH_2CH_2CH_2Br$ **(1)**

(or statement that 2-bromo- is formed)

equation: $CH_3CH{=}CHCH_3 + HBr \rightarrow CH_3CH_2CHBrCH_3$ **(1)**

(*i.e.* for one product)

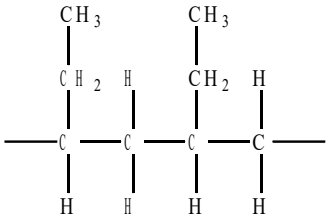
products: $CH_3CH_2CHOHCH_3$ **and** CH3CH2CH2CH2OH **(1)**

(or statement that 2-ol is formed)

equation: $CH_3CH{=}CHCH_3 + H_2O \rightarrow CH_3CH_2CHOHCH_3$ **(1)**

(*i.e.* for one product) 6

2nd bullet



1 mark for skeleton with two repeat units **(1)**

1 mark for correct groups on side chains **(1)** 2

3rd bullet

two **(1) (1)** from
energy from incineration
development of biodegradable polymers
cracking of waste polymers 2

[10]