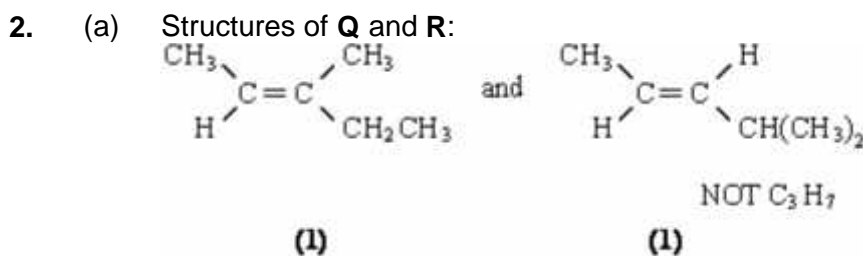


TOPIC 7 TEST MARK SCHEME

1. (a) (i) fractional distillation or fractionation 1
- (ii)  $C_9H_{20}$  only  $\rightarrow$  1
- (iii)  $C_{11}H_{24} + 17O_2 \rightarrow 11CO_2 + 12H_2O$  1
- (iv)  $C_{11}H_{24} + 6O_2 \rightarrow 11C + 12H_2O$  1
- (b) (i)  $C_{10}H_{22} = C_3H_6 + C_7H_{16}$  1
- (ii) correctly drawn structure of methylpropene  
(insist on clearly drawn C-C and C=C bonds) 1
- (c) Any two from
- o chemically similar or chemically the same or react in the same way
  - o same functional group
  - o same general formula
  - o differ by  $CH_2$   
(penalise same molecular formula or same empirical formula) 2
- [8]**



Q and R in any order

2  
**[2]**



3.

Isomer	Name
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	butan-1-ol
$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3 - \text{C} - \text{CH}_3 \\   \\ \text{OH} \end{array}$	2-methylpropan-2-ol
$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2\text{OH} \\   \\ \text{CH}_3 \end{array}$	(2-)methyl propan-1-ol (1) NOT prop-1-ol
$\begin{array}{c} \text{CH}_3\text{CH}_2 - \text{CH} - \text{CH}_3 \\   \\ \text{OH} \end{array}$	butan-2-ol (1) OR 2-butanol NOT but-2-ol NOT hydroxy No RE

*Allow e in the names*

(ii) Structural (1)  
OR chain and position(al)

2

3

[3]

4.

M1 credit a correct structure for either geometrical E-Z isomer and its designation as either *cis* or *trans*.

OR credit two correct geometrical E-Z isomer structures (ignore the names)

OR credit two correct names for *cis* pent-2-ene and *trans* pent-2-ene (ignore the structures)

1

M2 credit a second mark if all four parts of the required structures and names are correct.

*(credit "linear" structures)*

*(insist on the alkyl groups being attached clearly by C-C bonds)*

1





5. (a) • (Same) General formula/allow a named homologous series with its general formula
- Chemically similar/same (chemical) reactions
  - Same functional group
  - Trend in physical properties/eg inc bp as  $M_r$  increases
  - (Molecules) increase by  $\text{CH}_2/M_r = 14$   
*Any two points* 2
- (b) Fractional distillation/fractionation/chromatography  
*Allow GLC* 1
- (c) (Molecules/compounds/substances) with the same molecular formula/same number and type of atoms  
*Allow alkanes with same molecular formula*  
*Allow same chemical formula in  $M_1 = 0$  but can allow  $M_2$*  1
- but different structural formula/different displayed formula/different arrangement of atoms/different structures  
*Not different positions in space* 1
- 2,4-dimethylhexane  
 *$M_2$  dependent on  $M_1$*  1
- $\text{C}_4\text{H}_9$   
*Ignore the absence of dash and/or commas* 1
- (d) less surface contact/less surface area/less polarisable molecule 1
- so fewer/weaker/less Van der Waals'/vdw forces  
*Allow more spherical or fewer points of contact*  
*Not smaller molecule/not more compact molecule/not shorter chain*  
*Allow converse arguments*  
*Must be comparative answer ie not just few VDW forces*

MEGA LECTURE

QoL

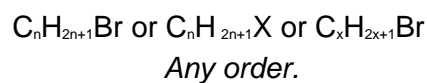
Assume 'it' refers to the branched isomer

1

[9]

6. (a) 2-bromo-2,3-dimethylbutane  
Ignore punctuation.

1



1

Stronger / more vdw (forces) between molecules (of 1-bromohexane)

QoL

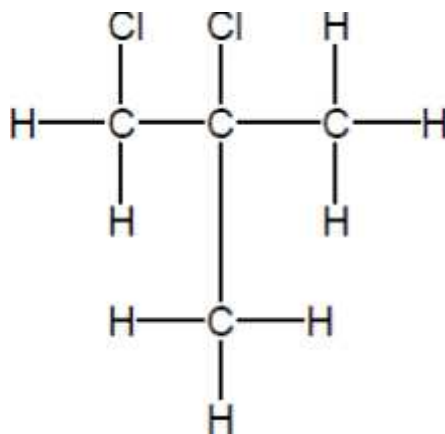
Allow converse arguments for Z

Not just more IMF.

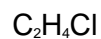
Ignore size of molecule.

1

(b)



1



Any order

1

[5]

**MEGA LECTURE**

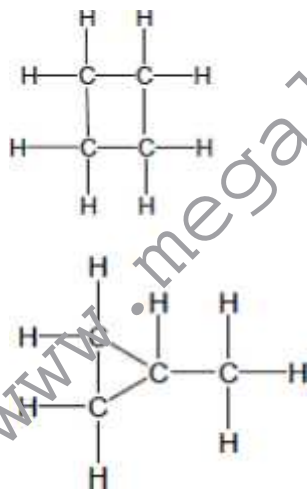
7. (a) (i) (Compounds with the) same molecular formula  
*Allow same number and type of atom for M1*  
*Ignore same general formula.* 1

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]**
8. (i) **M1:** compounds with the same structural formula 1  
**M2:** but the bonds/groups/atoms have different spatial arrangements or orientation or configuration/are arranged differently in space/3D  
 (ignore reference to the same molecular formula for M1) 1
- (ii) **M1:** correct structural representation for cis-but-2-ene and its name or its identification as the cis isomer 1  
**M2:** correct structural representation for trans-but-2-ene and its name or its identification as the trans isomer



*(accept representations which are 90° to linear)*  
*(award one mark for two correct structures but*  
*either wrong/no names)*  
*(maximum 1 mark for an incorrect alkene)*

		1	
	(iii) geometric(al) or cis-trans	1	
9.	B		[5]
10.	B		[1]
11.	C		[1]
12.	C		[1]
13.	C		[1]