BASIC CONCEPTS HW MS

1. $C_{13}H_{28}$

[1]

2. (i) 120–130 **(1)** 1

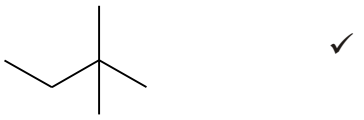
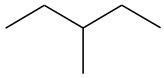
(ii) boiling point increases with increase in *M*r/molecular formula/number of carbon atoms/chain length **(1)**
more intermolecular forces/electrons/surface area/
surface interactions/van der Waal forces **(1)** 2

[3]

3. (a) octane, 400 +/- 5 1
hexadecane. 545 +/- 5 1
if °C penalise once.

(b) fractional distillation 1

(c) (i)

✓ ✓

2

(ii) 2-methylpentane 1

(iii) **C**, **B** and **A** 1

(iv) the more branching/the shorter the chain… the lower the boiling point/
less energy needed to separate the molecules 1

long chain have greater surface area/surface interactions/more VdW forces
or converse argument about short/branched chains. 1

(d) (i) M_r of $(CH_3)_3COH = 74$ 1

% oxygen = $(16/74) \times 100 = 21.6$ % 1

(ii) $(CH_3)_3COH + 6O_2 \rightarrow 4CO_2 + 5H_2O$

1 mark for CO_2 and H_2O only 2

[16]

4. (a) C_6H_{14} 1

(b) (i) boiling point increases with increase in M_R/molecular formula/N° of carbon atoms/chain length 1

(ii) more intermolecular forces/electrons/surface area/
surface interactions/van der Waal forces 1

(iii) 120 – 130 °C 1

[4]

5. (i) C_6H_{10} 1

(ii) C_3H_5 / ecf to (i) 1

(iii) M_r of cyclohexene = 82 1

% C = (72/82) × 100 = 88% 1

87.8% gets 1 mark

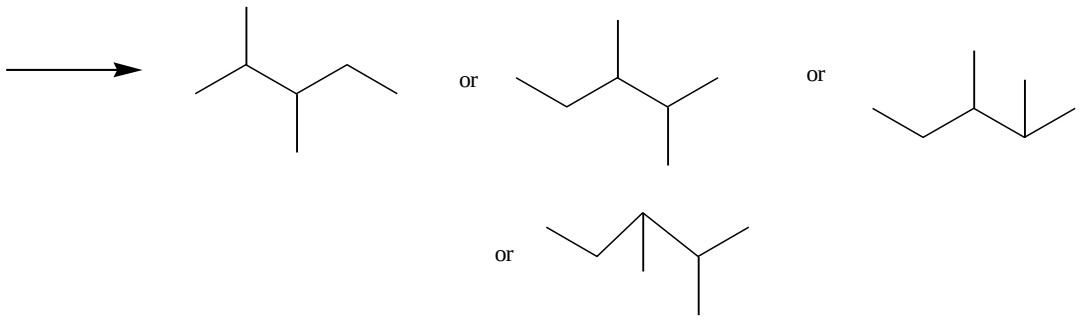
ecf to (i) and (ii) for both marks

Alternative calculation based on empirical formula:

Mass of empirical unit = 41, % C = (36/41) × 100 = 88%

[4]

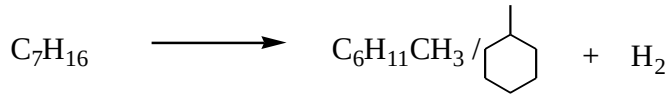
6. (a) (i) 1

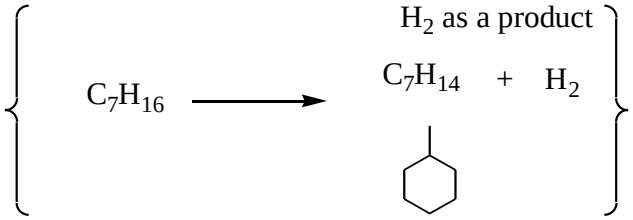


(ii) 85 –98 °C 1

2

(b)



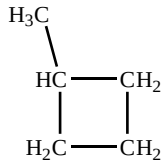


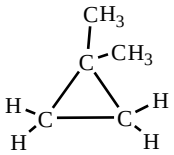
either of these scores 1 mark

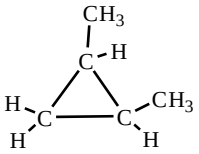
(c) more efficient fuel/better fuel/ higher octane number/reduces knocking/more volatile/lower boiling points/burn better/burn more easily/quicker ✓ 1

[5]

7. (i) any two from methylcyclobutane, 1,1-dimethylcyclopropane and 1,2-dimethylcyclopropane







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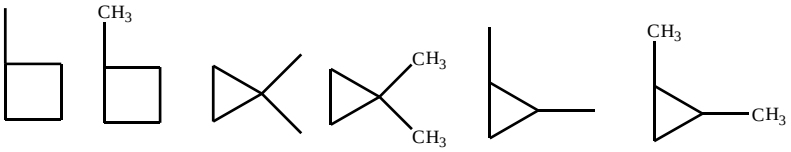
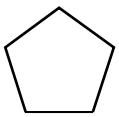


✓✓ 2

(ii) cyclopentane ✓ 1

(iii) ✓ 1



[4]

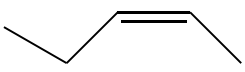
8. (a) Same <u>molecular formula</u>, different structure /displayed formula/ arrangement of atoms/bonds ✓✓ 2

(Same <u>formula</u>, 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

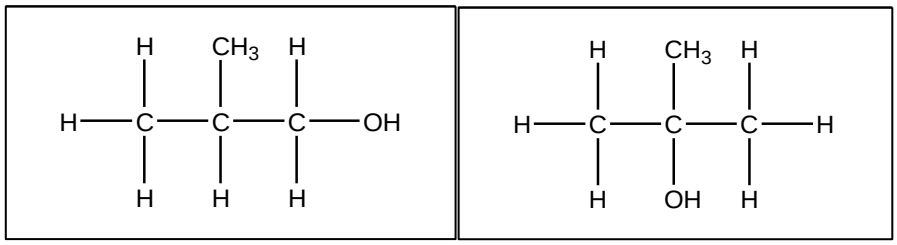
(ii) 2-methylbut-1-ene/2-methyl-1-butene ✓ 1

(iii) ✓ 1



[6]

9. (i) 2



(ii) either (2-)methylpropan-1-ol or (2-)methylpropan-2-ol 1

[3]