

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Mark Schemes

Q1.

(a) M1 3 CH₃(CH₂)₁₄COOHM2 CH₂(OH)CH(OH)CH₂OH*Penalise additional product(s) once*

2

(b) M1 M_r = 256

$$M2 \ n(\text{CH}_3(\text{CH}_2)_{14}\text{COOH}) = \frac{0.387}{M1} = 1.51 \times 10^{-3}$$

$$M3 \ Q = 150 \times 4.18 \times 13.6 = 8527.2 \text{ (J)}$$

$$M4 \ \Delta H = \frac{M3}{M2} \div 1000 = (-)5641$$

$$M5 \ \Delta H = -5640 \text{ kJ mol}^{-1}$$

Must be negative and 3sf (allow ecf on M4)

5

(c) M1 Less exothermic

Allow Less negative (value) / Lower

M2 Incomplete combustion

Allow products of incomplete combustion

2

(d)

		C	H	O	S
		37.08	5.15	24.72	M1 = 33.05
M2	÷ A _r	= 3.09	= 5.15	= 1.55	= 1.030
	÷ smallest	= 3	= 5	= 1.50	= 1
M3	Empirical formula = C ₆ H ₁₀ O ₃ S ₂				

*M1 % S = 33.05**M2 Calculation of moles**M3 Ratio of moles AND Empirical Formula**If no Sulfur used ecf for M2 and M3**M2 3.09 : 5.15 : 1.55**M3 C₆H₁₀O₃*

3

(e) M1 Acid rain
Allow smog

M2 SO₂
Allow NO_x

2

(f) M1 Bonds broken = 9459 kJ mol⁻¹
(5C-C + 7C-O + 7C-H + 5O-H)
Allow if they cancel the common bonds
M1 4233

M2 Bonds formed = 9682 kJ mol⁻¹
(2C-C + 10C-H + 2C-O + 2O-H + 4C=O)
M2 4456

M3 $\Delta H = M1 - M2 = -223 \text{ kJ mol}^{-1}$
M3 can be awarded as ecf from their M1 and M2

3

(g) M1 $\Delta H = -235 - (2 \times -394) - (3 \times -242)$
M2 = +1279 kJ mol⁻¹
If no sign assume positive

2

[19]