Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Alkanes

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Name of the Student:_____
Max. Marks : 28 Marks **Time : 28 Minutes**

Mark Schemes

Q1.

(a) (mixture of) compounds/substances with similar boiling points

Allow similar number of carbon atoms / chain length / M_r / size
Ignore same boiling point / number of C atoms / chain length / M_r / size
Ignore reference to similar melting points
Ignore reference to similar chemical properties

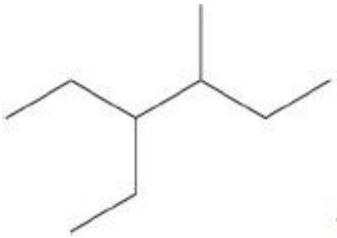
1

(b) zeolites / aluminosilicates

Ignore aluminium oxide

1

(c)



1

Must be skeletal formula
Ignore working, including other forms of structure of this compound.

1

(d) **M1** C_9H_{20}

M2 $C_9H_{20} + 14\ O_2 \rightarrow 9\ CO_2 + 10\ H_2O$

*For **M2** allow ECF from their molecular formula, providing it is an attempt at the molecular formula of a hydrocarbon*
*Penalise **M1** only for not using molecular formula*
Allow multiples and fractions

2

(e) (C=O) bonds vibrate (at IR frequency) / (IR/it makes) bonds vibrate **or**

net change in dipole moment of molecule during (asymmetric) vibration **or**

(C=O) bonds are polar

Do not allow that CO_2 is a polar molecule / has a dipole

1

(f) **M1** acid rain / respiratory problems

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***M1** Allow direct consequences of acid rain; allow smog; allow production of ground level ozone*

M2 catalytic converters

***M2** allow description of process that occurs in catalytic converter but must include reference to a (named) catalyst*

2

(g) no net emissions of carbon dioxide/CO_2 to the atmosphere

Allow explanation showing that same amount of CO_2 taken in and released to the atmosphere

Answer needs to refer to carbon dioxide (not just carbon)

1

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Q2.

(a) M1 3 $CH_3(CH_2)_{14}COOH$

M2 $CH_2(OH)CH(OH)CH_2OH$

Penalise additional product(s) once

2

(b) M1 $M_r = 256$

M2 $n(CH_3(CH_2)_{14}COOH) = \frac{0.387}{M1} = 1.51 \times 10^{-3}$

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

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

M5 $\Delta H = -5640$ 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 37.08	H 5.15	O 24.72	S M1 = 33.05
M2	$\div A_r$	= 3.09	= 5.15	= 1.55	= 1.030
	÷ smallest	= 3	= 5	= 1.50	= 1
M3	Empirical formula = $C_6H_{10}O_3S_2$				

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 $C_6H_{10}O_3$

3

(e) M1 Acid rain

Allow smog

M2 SO_2

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}

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(2C-C + 10C-H + 2C-O + 2O-H + 4C=O)

M2 4456

M3 ΔH = M1 - M2 = -223 kJ mol^{-1}

M3 can be awarded as ecf from their M1 and M2

3

(g) M1 ΔH = -235 - (2 × -394) - (3 × -242)

M2 = +1279 kJ mol^{-1}

If no sign assume positive

2

[19]

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