AQA – Amount of substance – AS Chemistry P2

1. June/ 2020/Paper_2/No.16

What is the empirical formula of a hydrocarbon that contains 90% carbon by mass?

[1 mark]

A C_2H_3 ⬭

B C_3H_2 ⬭

C C_3H_4 ⬭

D C_4H_3 ⬭

2. June/ 2020/Paper_2/No.17

Which compound has the lowest relative molecular mass?

[1 mark]

A ethanoic acid ⬭

B 1-fluoropropane ⬭

C propanenitrile ⬭

D propylamine ⬭

3. June/ 2020/Paper_2/No.19

What is the minimum volume of 0.0500 mol dm^{-3} aqueous bromine needed to react completely with 0.0200 g of buta-1,3-diene?

(M_r of buta-1,3-diene = 54.0)

[1 mark]

A 7.40 cm^3 ⬭

B 14.8 cm^3 ⬭

C 29.6 cm^3 ⬭

D 67.5 cm^3 ⬭

4. June/ 2019/Paper_2/No.10

A 'drink-driving' offence is committed if the blood alcohol level of a driver is over 80 mg of ethanol per 100 cm^3 of blood.

What is the concentration, in mol dm^{-3}, of ethanol if there are 80 mg of ethanol (M_r = 46.0) per 100 cm^3 of blood?

[1 mark]

A 0.00017 ⬭

B 0.0017 ⬭

C 0.017 ⬭

D 1.7 ⬭

5. June/ 2019/Paper_2/No.24

The heat released when 1.00 g of ethanol (M_r = 46.0) undergoes complete combustion is 29.8 kJ

What is the heat released by each molecule, in joules, when ethanol undergoes complete combustion?

(the Avogadro constant $L = 6.022 \times 10^{23}$ mol^{-1})

[1 mark]

A 2.28×10^{-18} J ⬭

B 4.95×10^{-20} J ⬭

C 2.28×10^{-21} J ⬭

D 4.95×10^{-23} J ⬭

6. June/ 2021/Paper_2/No.2

0 2 A student has samples of these four compounds but does not know which is which:

- butanoic acid
- 2-methylpropanal
- 2-methylpropanoic acid
- 2-methylpropan-1-ol

Step 1: Two of these compounds can be identified by simple chemical tests.

Step 2: The other two compounds, that contain the same functional group as each other, can then be distinguished using a spectroscopic technique.

Describe how these two steps could be used to identify which compound is which.

[6 marks]

7. June/ 2021/Paper_2/No.4

0 4 This question is about gas volumes.

0 4 . 1 TNT ($C_7H_5N_3O_6$) is an explosive because it can decompose very quickly and exothermically to form a large volume of gas. An equation for this decomposition is

$$2\,C_7H_5N_3O_6(s) \rightarrow 3\,N_2(g) + 5\,H_2(g) + 12\,CO(g) + 2\,C(s)$$

Calculate the volume of gas, in m^3, measured at 1250 °C and 101 000 Pa, produced by the decomposition of 1.00 kg of TNT (M_r = 227.0).

The gas constant, R = 8.31 J mol^{-1} K^{-1}

[5 marks]

Volume of gas _____ m^3

0 4 . 2 Alkenes have the general formula C_nH_{2n}

When alkenes undergo complete combustion, 1.0 mol of C_nH_{2n} reacts with $\frac{3n}{2}$ mol of oxygen.

Calculate the volume of oxygen needed for the complete combustion of 200 cm^3 of but-1-ene.

The volumes of all gases are measured at the same temperature and pressure.

[1 mark]

Volume of oxygen _____ cm^3

0 4 . 3 Alkanes have the general formula C_nH_{2n+2}

Alkanes undergo complete combustion in a plentiful supply of oxygen.

$$C_nH_{2n+2} + x\,O_2 \rightarrow n\,CO_2 + (n+1)\,H_2O$$

Determine x in terms of n

[1 mark]

x _____

8. June/ 2021/Paper_2/No.19

2.0 mol of carbon monoxide is mixed with 3.0 mol of hydrogen and allowed to reach equilibrium.

The equilibrium mixture contains 0.6 mol of methanol.

What is the total amount, in mol, of gas at equilibrium?

[1 mark]

A 3.2 ⬭

B 3.8 ⬭

C 4.4 ⬭

D 5.0 ⬭