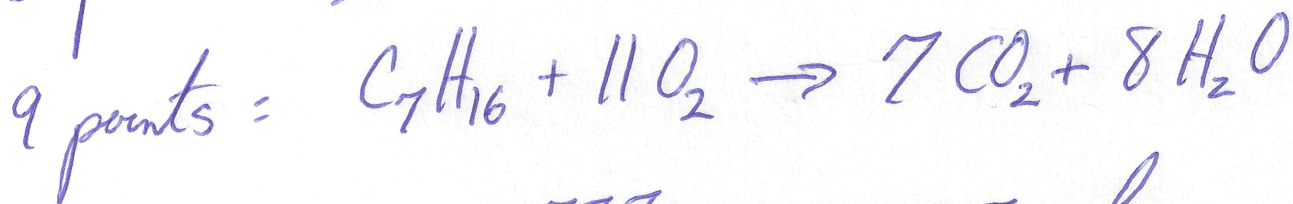


Page 1

1 point : 7



$$n_{C_7H_{16}} = \frac{m}{M} = \frac{77.7}{100.21} = 0.77537 \text{ mol}$$

$$n_{O_2} = \frac{P_{O_2} V}{RT} = \frac{(2.22)(20.0)}{(0.082056)(298.15)} = 1.8148 \text{ mol}$$

$$\Rightarrow \text{si } C_7H_{16} \text{ limitant : } n_{H_2O} = 0.77537 \times \frac{8}{1} = 6.2096 \text{ mol}$$

$$\Rightarrow \text{si } O_2 \text{ limitant : } n_{H_2O} = 1.8148 \times \frac{8}{11} = 1.3199 \text{ mol}$$

$\Rightarrow O_2$  limitant

$$\Rightarrow \text{masse } H_2O = (1.3199)(18.02) = \underline{\underline{23.8 \text{ g}}}$$

$$\Rightarrow \text{mol } C_7H_{16} \text{ qui réagissent avec } O_2 : n_{O_2} \times \frac{1}{11}$$

$$\begin{aligned} n_{C_7H_{16}} (\text{excès}) &= n_{C_7H_{16}} (\text{initial}) - n_{C_7H_{16}} (\text{réagit}) \\ &= 0.77537 - \left(\frac{1}{11}\right)(1.8148) = 0.6104 \text{ mol} \end{aligned}$$

$$\text{masse } C_7H_{16} (\text{excès}) = (0.6104)(100.21) = \underline{\underline{61.2 \text{ g}}}$$

Page 2

1 point: negative

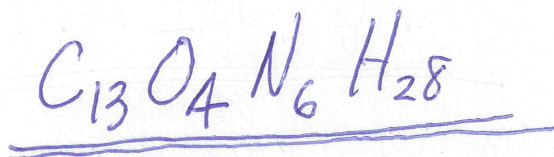
6 points:

$$C: \frac{46.97}{12.01} = 3.911 \frac{1.203}{1.203} = 3.25 \times 4 = 13$$

$$O: \frac{19.25}{16.00} = 1.203 \frac{1.203}{1.203} = 1 \times 4 = 4$$

$$N: \frac{25.28}{14.01} = 1.804 \frac{1.203}{1.203} = 1.50 \times 4 = 6$$

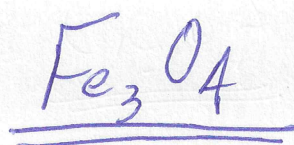
$$H: \frac{8.49}{1.008} = 8.423 \frac{1.203}{1.203} = 7 \times 4 = 28$$



3 points:

$$Fe: \frac{72.36}{55.84} = 1.296 \frac{1.296}{1.296} = 1 \times 3 = 3$$

$$O: \frac{27.64}{16.00} = 1.728 \frac{1.296}{1.296} = 1.333 \times 3 = 4$$



Page 3

1 point :  $\text{IO}_4^-$

5 points :

$$n_T = \frac{P_T V}{RT} = \frac{(7.77)(20.0)}{(0.082056)(298.15)} = 6.3519$$

$$n_T = n_{\text{CO}_2} + n_{\text{O}_2} + n_{\text{CH}_4} \Rightarrow n_{\text{CH}_4} = n_T - n_{\text{CO}_2} - n_{\text{O}_2}$$

$$n_{\text{CH}_4} = 6.3519 - \frac{77.7}{44.01} - \frac{44.4}{32.00} = 3.199 \text{ mol}$$

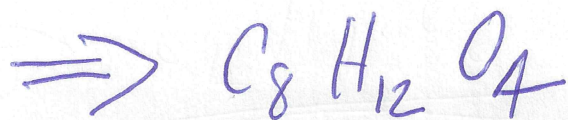
$$\text{masse CH}_4 = (3.199)(16.042) = \underline{\underline{51.3 \text{ g}}}$$

4 points :

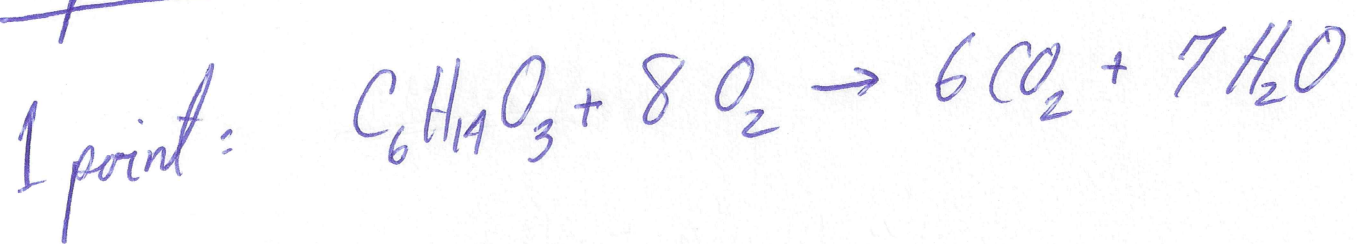
$$M = \frac{\rho RT}{P} = \frac{(2.70)(0.082056)(777)}{(1.00)} = 172.1 \text{ g/mol}$$

$\nearrow \times 4$

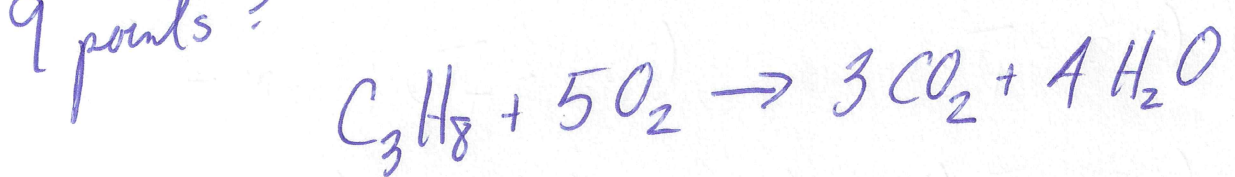
$$\text{masse molaire de } \text{C}_2\text{H}_3\text{O} = 43.04 \text{ g/mol}$$



Page 4



9 points:



$$\Delta H = (3)(-393.5) + (4)(-285.8) - (1)(-103.9) - (5)(0)$$

$$\Delta H = -2219.8 \text{ kJ}$$

$$n_{C_3H_8} = \frac{PV}{RT} = \frac{(1.000)(18.8)}{(0.082056)(298.15)} = 0.76844 \text{ mol}$$

$$1 \text{ mole } C_3H_8 \rightarrow 2219.8 \text{ kJ product}$$

$$0.76844 \text{ mol } C_3H_8 \rightarrow x$$

$$\Rightarrow x = 1705.8 \text{ kJ} = 1705800 \text{ J}$$

$$Q = ms \Delta T \Rightarrow \Delta T = \frac{Q}{ms} = \frac{1705800}{(8888)(4.184)} = 45.9^\circ C$$

$$T_f = T_i + \Delta T = 25.0 + 45.9 = \underline{\underline{70.9^\circ C}}$$

Page 5

1 point: Millikan

6 points:  $-Q_M = Q_{\text{eau}} + Q_{\text{bêcher}}$

$$-m_M s_M (T_f - 110.00) = m_{\text{eau}} s_{\text{eau}} (T_f - 15.00) + C_{\text{bêcher}} (T_f - 15.00)$$

$$-(50.0)(0.666)(T_f - 110.00) = (333.3)(4.184)(T_f - 15.00) + (888)(T_f - 15.00)$$

$$-33.3 T_f + 3663 = 1394.5 T_f - 20918 + 888 T_f - 13320$$

$$37901 = 2315.8 T_f$$

$$T_f = \frac{37901}{2315.8} = \underline{\underline{16.37^\circ\text{C}}} \text{ ou } \underline{\underline{16.4^\circ\text{C}}}$$

3 points:

