a) 7

b) calculez le montant de $AgCl$ qu'on peut produire assumant chaque réactif est limitant

$AgNO_3$: $\frac{300.0}{169.87} = 1.7661 \xrightarrow{\times 3/3} 1.7661$ mol $AgCl$

$AlCl_3$: $\frac{160.0}{133.34} = 1.1999 \xrightarrow{\times 3/1} 3.5997$ mol $AgCl$

$\Rightarrow AgNO_3$ limitant $\Rightarrow (1.7661)(143.32) = \underline{\underline{253.1\ g}}$ de $AgCl$

montant de $AlCl_3$ qui a réagi :

$$3\,AgNO_3 \longrightarrow 1\,AlCl_3$$

$$1.7661 \text{ mol } AgNO_3 \rightarrow x$$

$$x = 0.5887 \text{ mol}$$

$AlCl_3$ (excès) = mols $AlCl_3$ initial − mols $AlCl_3$ qui a réagi

$= 1.1999 - 0.5887 = 0.6112$ mol

$\Rightarrow$ masse $AlCl_3$ (excès) $= (0.6112)(133.34) = \underline{\underline{81.5\ g}}$

Page 2

a) 60%

b) C: $35.29/\quad = 2.9384/1.6788 = 1.75 \times 4 = 7$

O: $33.58/16.00 = 2.0988/1.6788 = 1.25 \times 4 = 5$

N: $23.52/14.01 = 1.6788/1.6788 = 1.00 \times 4 = 4$

H: $7.62/1.008 = 7.5595/1.6788 = 4.50 \times 4 = 18$

$\Rightarrow$ Formule empirique = $\underline{C_7 O_5 N_4 H_{18}}$

$$M = \frac{\rho RT}{P} = \frac{(11.21)(0.082056)(777)}{(1.000)} = 714.7 \text{ g/mol}$$

$\Rightarrow$ la masse molaire de $C_7 O_5 N_4 H_{18}$ est 238.3 g/mol

$\Rightarrow$ exactement 3 fois plus petit que 714.7 g/mol

$\Rightarrow$ formule moléculaire = $\underline{C_{21} O_{15} N_{12} H_{54}}$

Page 3

a) IO_3^-

b) $n_T = \frac{P_T V}{RT} = \frac{(3.333)(30.00)}{(0.082056)(298.15)} = 4.0871 \text{ mol}$

$n_T = n_{CO_2} + n_{N_2} + n_{Cl_2}$

$n_{Cl_2} = n_T - n_{CO_2} - n_{N_2}$

$n_{Cl_2} = 4.0871 - \frac{55.5}{44.01} - \frac{66.6}{28.02} = 0.4491 \text{ mol}$

masse $Cl_2 = (0.4491)(70.90) = \underline{\underline{31.8 \text{ g}}}$

$v = \sqrt{\frac{3RT}{M}} = \sqrt{\frac{(3)(8.3145)(298.15)}{(0.07090)}} = \underline{\underline{323.9 \text{ m/s}}}$

a) $C_5H_{12}O_5 + 11/2\ O_2 \rightarrow 5\ CO_2 + 6\ H_2O$

ou

$2\ C_5H_{12}O_5 + 11\ O_2 \rightarrow 10\ CO_2 + 12\ H_2O$

b) $C_2H_6(g) + 7/2\ O_2(g) \rightarrow 2\ CO_2(g) + 3\ H_2O(l)$

$\Delta H = (2)(-393.5) + (3)(-285.8) - (1)(-83.8) - (7/2)(0)$

$\Delta H = \underline{-1560.6\ kJ}$

$Q = \Delta H = \underline{-1560.6\ kJ}$ (P constante)

$\Delta U = \Delta H - RT\Delta n_{gaz} = -1560\,600 - (8.3145)(298.15)(2 - 9/2)$

$\Delta U = -1\,554\,403\ J = \underline{-1554.4\ kJ}$

$\Delta U = Q + W \Rightarrow W = \Delta U - Q = -1554.4 - (-1560.6) = \underline{6.2\ kJ}$

$\Rightarrow$ à V constant, $Q = \Delta U$

$\Rightarrow Q = (4.444)(-1554.4) = \underline{-6908\ kJ}$

a) Millikan

b) $-Q_M = Q_{eau} + Q_{bécher}$

$$-m_M s_M \Delta T_M = m_{eau} s_{eau} \Delta T_{eau} + C_{bécher} \Delta T_{bécher}$$

$$\Delta T_M = \frac{m_{eau} s_{eau} \Delta T_{eau} + C_{bécher} \Delta T_{bécher}}{-m_M s_M}$$

$$\Delta T_M = \frac{(333.3)(4.184)(2.00) + (1111)(2.00)}{-(100.0)(0.5555)} = -90.2$$

$$\Delta T = T_F - T_i \Rightarrow T_i = T_F - \Delta T = 22.00 - (-90.2)$$

$$= \underline{\underline{112.2\,^\circ C}}$$

c) $Q = +30.00\ kJ$ à P constante $\Rightarrow \Delta H = \underline{\underline{+30.00\ kJ}}$

$$\Delta U = \Delta H - RT\Delta n_{gaz}$$

$$\Delta U = 30000 - (8.3145)(298.15)(2-1) = 27521\ J$$

$$\Delta U = \underline{\underline{+27.52\ kJ}}$$

à V constant : $W = \underline{\underline{0\ kJ}}$; $Q = \Delta U = \underline{\underline{27.52\ kJ}}$