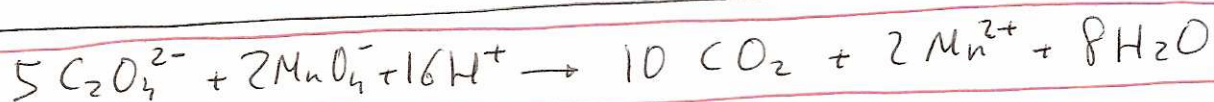
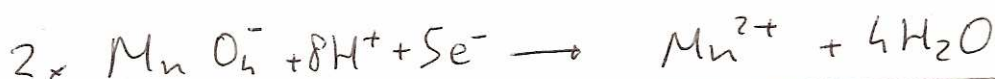
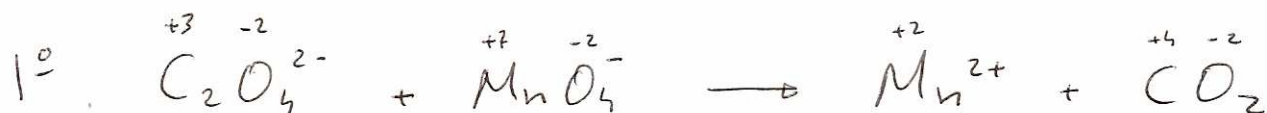


PROBLEMAS P.AU. REDOX

1



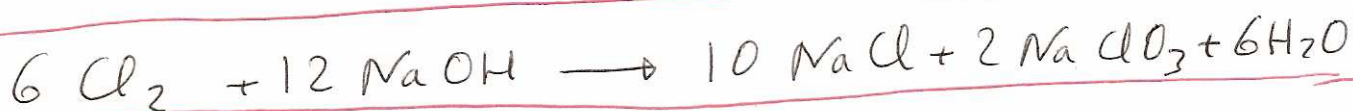
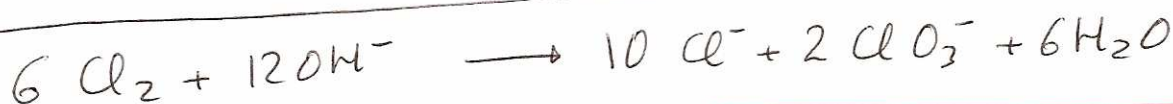
25 mL

15 mL, 0.120 M

$$\downarrow n = M \cdot V$$

$$4.5 \times 10^{-3} \text{ mol } \text{C}_2\text{O}_4^{2-} \xleftarrow[5:2]{\div 2 \times 5} 1.8 \times 10^{-3} \text{ mol } \text{MnO}_4^-$$

$$\boxed{M(\text{C}_2\text{O}_4^{2-}) = \frac{n}{V} = 0.180 \text{ M}}$$

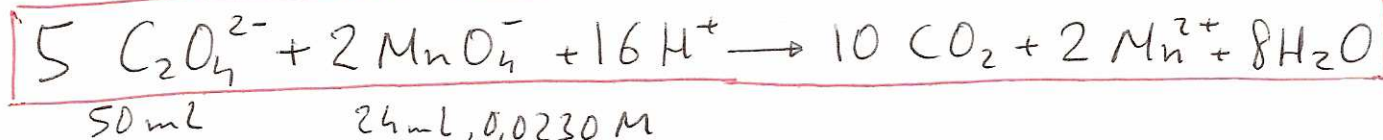


28 NaOH

$$\downarrow \div M = 40 \text{ g} \cdot \text{mol}^{-1}$$

$$\boxed{0.025 \text{ mol } \text{Cl}_2 \xleftarrow[\div 2]{1:2} 0.05 \text{ mol NaOH}}$$

3° Se ajusta como en el problema 1.



50 mL

24 mL, 0,0230 M

$$\downarrow n = M \cdot V$$

$$1,38 \times 10^{-3} \text{ mol C}_2\text{O}_4^{2-} \xleftarrow[5:2]{\times 5 \div 2} 5,52 \times 10^{-4} \text{ mol MnO}_4^-$$

$$M(\text{C}_2\text{O}_4^{2-}) = \frac{n}{V} = 0,0276 \frac{\text{mol}}{\text{L}}$$

$$\text{Masa molar del Na}_2\text{C}_2\text{O}_4 = 2 \times 23 + 2 \times 12 + 4 \times 16 = 134 \text{ g.mol}^{-1}$$

$$\text{En 1 L hay } 0,0276 \text{ mola} \xrightarrow[\times M]{\times 134} \boxed{3,70 \frac{\text{g Na}_2\text{C}_2\text{O}_4}{\text{L}}}$$



Simplificando H_2O y H^+ queda:

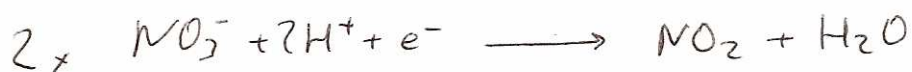


50 mL, 0,1 M

$$\downarrow n = M \cdot V$$

$$1,6 \times 10^{-3} \text{ mol Cr}_2\text{O}_7^{2-} \xleftarrow[\div 3]{\times 1:3} 5 \times 10^{-3} \text{ mol SO}_3^{2-}$$

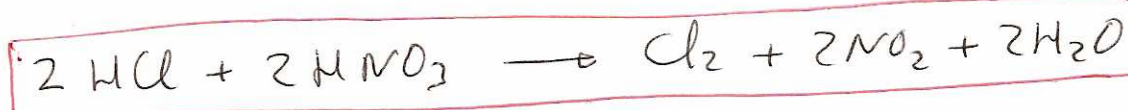
$$\boxed{V_{\text{dicromato}} = \frac{n}{M} = 1,39 \times 10^{-2} \text{ L} = 13,9 \text{ mL}}$$



200 mL, 12 M

$$\downarrow n = M \cdot V$$

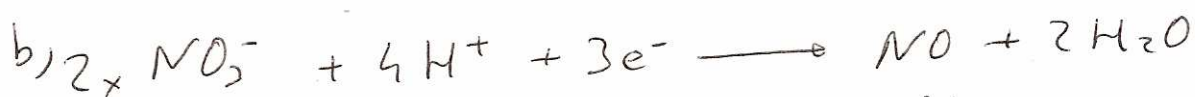
$$2.4 \text{ mol HCl} \xrightarrow[1:2]{\div 2} 1.2 \text{ mol Cl}_2 \Rightarrow \boxed{V = \frac{nRT}{P} = 24.47 \text{ L}}$$



$$6^\circ \quad a) \quad \mathcal{E}^\circ (\text{NO}_3^- / \text{NO}) = +0.97 \text{ V}$$

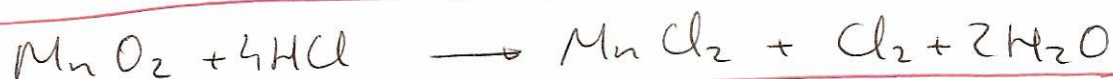
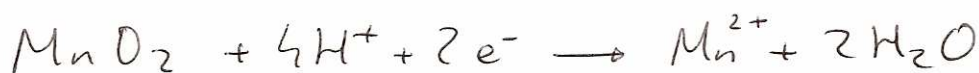
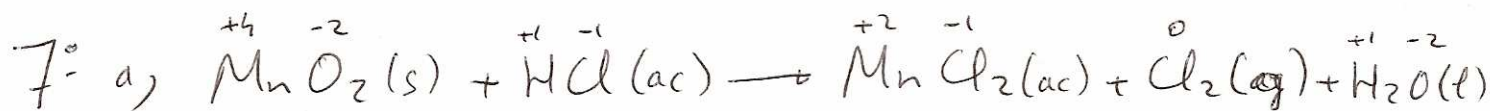
$$\mathcal{E}^\circ (\text{Cu}^{2+} / \text{Cu}) = +0.34 \text{ V}$$

Si reacciona. El NO_3^- tiene un potencial normal de reducción mayor que el Cu^{2+} y por tanto es más oxidante que el Cu^{2+} y es capaz de oxidar al cobre.



El agente oxidante ha sido el NO_3^- (el número de oxidación del nitrógeno ha pasado de +5 a +4, luego se ha reducido).

El agente reductor ha sido el cobre (su número de oxidación ha pasado de 0 a +2, luego se ha oxidado).

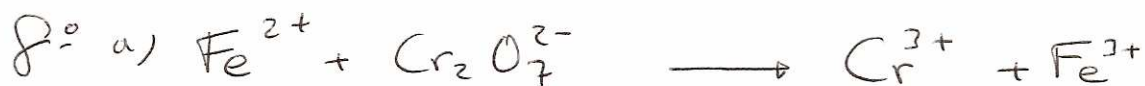


$$\text{b) } M(\text{Cl}_2) = 2 \times 35.5 = 71 \text{ g/mol}$$

Se quieren obtener 42,6 g de $\text{Cl}_2 \stackrel{\div 71}{=} 0,6 \text{ moles } \text{Cl}_2$

Se necesitan 0,6 moles $\text{MnO}_2 = 0,6 \times (55 + 16 \times 2) = 52,7 \text{ g MnO}_2$
 $M_{\text{MnO}_2} = 87 \text{ g/mol}$

Se necesitan $0,6 \times 4 = 2,4 \text{ moles HCl} \Rightarrow V = \frac{n}{M} = 0,48 \text{ L HCl}$



$$\text{b) } \text{moles } \text{Cr}_2\text{O}_7^{2-} = M \cdot V = 3,5 \times 10^{-3} \text{ moles } \text{Cr}_2\text{O}_7^{2-}$$

$$\text{moles } \text{Fe}^{2+} = 6 \times \text{moles } \text{Cr}_2\text{O}_7^{2-} = 2,1 \times 10^{-2} \text{ moles}$$

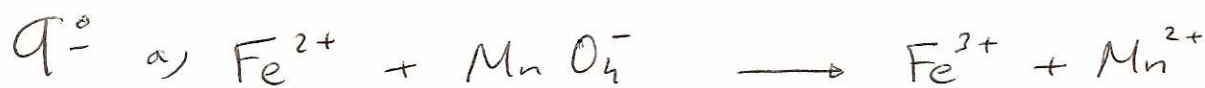
$$\boxed{[\text{Fe}^{2+}] = \frac{n}{V} = 0,42 \text{ M}}$$

$$\text{c) } m(\text{Fe}^{2+}) = n \cdot M(\text{Fe}) = 2,1 \times 10^{-2} \times 55,85 = 1,173 \text{ g Fe}$$

$$\boxed{\% \text{ Fe} = \frac{1,173}{2} \times 100 = 58,65\%}$$

Problemas PAU. Redox

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b) Se oxida el hierro y se reduce el manganeso.

c) moles $\text{MnO}_4^- = M \cdot V = 0.022$ moles

moles $\text{Fe}^{2+} = 5 \times \text{moles } \text{MnO}_4^- = 0.11$ moles Fe^{2+}

$$[\text{Fe}^{2+}] = \frac{n}{V} = 2.2 \text{ M}$$

10º a) Ajuste como en el ejercicio 1.



moles $\text{MnO}_4^- = M \cdot V = 5.52 \times 10^{-4}$ moles MnO_4^-

moles $\text{C}_2\text{O}_4^{2-} = \frac{5}{2} \times \text{moles } \text{MnO}_4^- = 1.38 \times 10^{-3}$ mol

$$[\text{C}_2\text{O}_4^{2-}] = \frac{n}{V} = 0.0276 \text{ M}$$

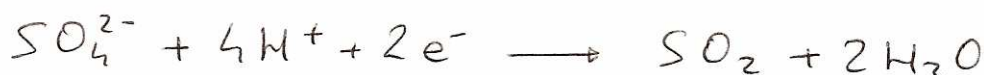
$$M_{\text{Na}_2\text{C}_2\text{O}_4} = 2 \times 23 + 2 \times 12 + 16 \times 4 = 134 \frac{\text{g}}{\text{mol}}$$

En 1L de disolución saturada de $\text{Na}_2\text{C}_2\text{O}_4$ hay 0.0276 moles de $\text{Na}_2\text{C}_2\text{O}_4$ $\frac{3.698 \text{ g}}{\text{L}}$ $\text{Na}_2\text{C}_2\text{O}_4$ en una disolución saturada

b) Por cada mol de MnO_4^- se produce 5 de CO_2 .

$$n_{\text{CO}_2} = 5 \times \text{moles } \text{MnO}_4^- = 2.76 \times 10^{-3} \text{ mol } \text{CO}_2$$

$$V = \frac{nRT}{P} = 6.74 \times 10^{-2} \text{ L} = 67.4 \text{ mL}$$



$$3 \text{ g } 96\% \text{ H}_2\text{SO}_4 = 2.88 \text{ g H}_2\text{SO}_4 \xrightarrow[\div M]{\div 98 \text{ g/mol}} 2.939 \times 10^{-2} \text{ mol H}_2\text{SO}_4$$

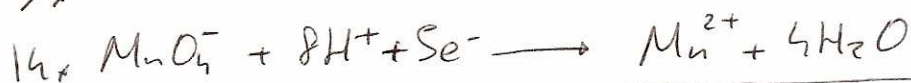
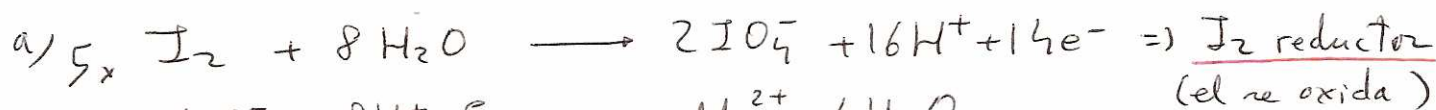
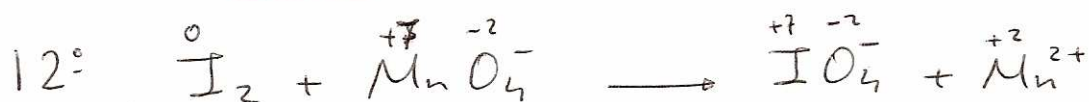
$$0.8 \text{ g Cu} \xrightarrow[\div M]{=} 1.26 \times 10^{-2} \text{ mol Cu}$$

Hay más de el doble de H_2SO_4 que de Cu , por lo que el cobre es el reactivo limitante.

Se consumen $1.26 \times 10^{-2} \text{ mol Cu} \Rightarrow$ se forman $1.26 \times 10^{-2} \text{ mol CuSO}_4$

$$M_{\text{CuSO}_4} = 159.5 \text{ g/mol}$$

Se forman $1.26 \times 10^{-2} \times 159.5 = 2.01 \text{ g de Cu}$



b) $M_{\text{I}_2} = 2 \times 126.9 = 253.8 \text{ g/mol} \Rightarrow 5 \text{ g I}_2 \xrightarrow[\div M]{=} 1.97 \times 10^{-2} \text{ mol I}_2$

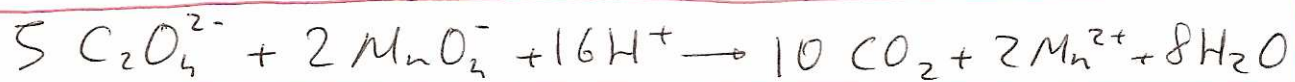
Se necesitan: $1.97 \times 10^{-2} \text{ mol I}_2 \times \frac{14 \text{ mol MnO}_4^-}{5 \text{ mol I}_2} = 5.516 \times 10^{-2} \text{ mol}$

$V = \frac{n}{M} = 0.110 \text{ L} = 110 \text{ mL}$

Problemas PAU. Redox

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13° a) Ajuste como en el ejercicio 1.



b) $M_{\text{Na}_2\text{C}_2\text{O}_4} = 134 \text{ g/mol}$

$$0,188 \text{ g oxalato sódico} \stackrel{\div 134}{=} 1,40 \times 10^{-3} \text{ mol oxalato}$$

$$\text{moles } \text{MnO}_4^- = 1,40 \times 10^{-3} \text{ mol oxalato} \cdot \frac{2 \text{ mol MnO}_4^-}{5 \text{ mol oxalato}} = 5,61 \times 10^{-4} \text{ mol}$$

$$[\text{MnO}_4^-] = \frac{n}{V} = 3,21 \times 10^{-2} \text{ M}$$