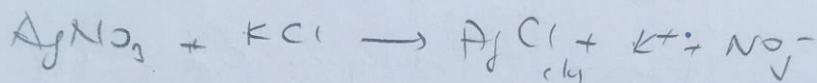


# # SORULAR #

(4)

1) Saf olmayan 0,250 g'lık KCl numunesi  $\text{AgNO}_3$  çözeltisi ile muamele edildiğinde 0,2312 g  $\text{AgCl}$  oluşmaktadır. Numunedeki KCl'in  $\%$  değerini hesaplayınız ( $\text{KCl}$ : 74,55 g/mol  $\text{AgCl}$ : 143,32 g/mol)



$$n_{\text{AgCl}} = \frac{0,2312 \text{ g}}{143,32} = 2,03 \times 10^{-3} \text{ mol}$$

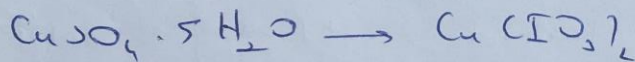
$$n_{\text{AgCl}} = n_{\text{KCl}} = 2,03 \times 10^{-3} \text{ mol}$$

$$m_{\text{KCl}} = n \times M_x = 2,03 \times 10^{-3} \text{ mol} \times 74,55 \text{ g/mol}$$

$$\rightarrow m_{\text{KCl}} = 0,151 \text{ g}$$

$$\% \text{ KCl} = \frac{m_{\text{KCl}}}{m_{\text{num}}} \times 100 = \frac{0,151}{0,250 \text{ g}} \times 100 = 60,4\%$$

2) 0,5 g  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ 'dan oluşan  $\text{Cu}(\text{IO}_3)_2$ 'in katlılığı nedir? ( $243,6 \text{ g/mol} = \text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ )



$$n_{\text{CuSO}_4 \cdot 5\text{H}_2\text{O}} = n_{\text{Cu}(\text{IO}_3)_2}$$

$$n_{\text{CuSO}_4 \cdot 5\text{H}_2\text{O}} = \frac{m}{M_x} = \frac{0,5 \text{ g}}{243,6 \text{ g/mol}} = 2,0 \times 10^{-3} \text{ mol}$$

$$m_{\text{Cu}(\text{IO}_3)_2} = n \times M_x = 2,0 \times 10^{-3} \text{ mol} \times 411,3 \text{ g/mol} = 0,82 \text{ g}$$

$$\Rightarrow Z = \frac{0,07341}{5} \times 100$$

$$= 7,1,588$$

① Bir organik madde numunesinin 0,2121 g'ının  $O_2$  gazı ile yakılması sonucu oluşan  $CO_2$  g,  $BaCO_3$  çözeltisinde tutuluyor. 0,6006 g  $BaCO_3$  oluştuğuna göre numunedeki karbon yüzdesini bulunuz ( $BaCO_3$ : 197,34 g/mol, C: 12,011 g/mol)

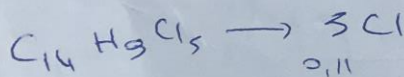
$$n_{BaCO_3} = \frac{m}{M_A} = \frac{0,6006 \text{ g}}{197,34 \text{ g/mol}} = 3,04 \times 10^{-3} \text{ mol}$$

$$n_{BaCO_3} = n_C = 3,04 \times 10^{-3} \text{ mol}$$

$$m_C = n \times M_A = 3,04 \times 10^{-3} \times 12,01 \text{ g/mol} = 0,0366 \text{ g C}$$

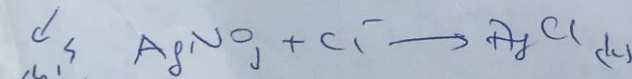
$$\% C = \frac{m}{\text{numune}} \times 100 = \frac{0,0366 \text{ g}}{0,2121 \text{ g}} \times 100 = \% 17,23 \text{ C}$$

④ Bir pestisit numunesinin 5,0 g'ı alkol içinde metalele sodyum ile reas. çözülüyor ve asige çıkan klorür iyon  $AgCl$  halinde çöktürülüyor. 0,1606 g  $AgCl$  oluştuğuna göre bu analizin sonucu. DDT ( $C_{14}H_9Cl_5$ ) güdüdesi üzerinden verilir.



$$n_{C_{14}H_9Cl_5} = \frac{n_{AgCl}}{5} =$$

$$= 2,24 \times 10^{-4} \text{ mol}$$

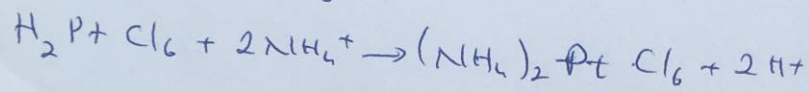


$$n_{AgCl} = \frac{m}{M_A} = \frac{0,1606 \text{ g}}{143,32 \text{ g/mol}} = 0,112 \times 10^{-3} \text{ mol}$$

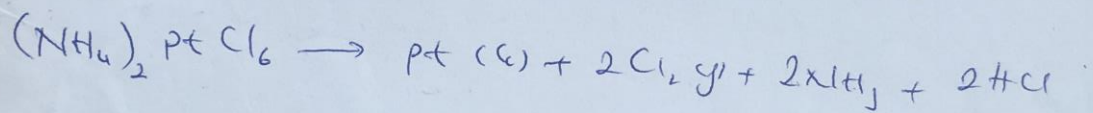
$$m_{C_{14}H_9Cl_5} = n \times M_A = 0,07341 \text{ g}$$



(5) Bir numune deki  $\text{NH}_3$  azotu, numunen kloroplatinik asitle muamelesi sonucunda tayin edilebilir. Ürün at gözlenen amonyum kloroplatinattır.



Olusan çözelti yakılarak parçalandığı zaman aşağıdaki rea göre platin meteline ve pot iyonlarına döner.



0,2115 g numunedan 0,4633 g Pt metali elde edildi.  
göre göre numune deki  $\text{NH}_3$  jüttesini hesaplayınız  
( $\text{NH}_3 = 17,0306 \text{ g/mol}$ ) ( $\text{Pt} = 195,08 \text{ g/mol}$ )

$$n_{\text{Pt}} = \frac{m}{M_A} = \frac{0,4633 \text{ g}}{195,08 \text{ g/mol}} = 2,41 \times 10^{-3} \text{ mol Pt}$$

$$n_{\text{NH}_3} = 2 \times n_{\text{Pt}} = 2,41 \times 10^{-3} \times 2 = 4,81 \times 10^{-3} \text{ mol NH}_3$$

$$m_{\text{NH}_3} = n \times M_A = 4,81 \times 10^{-3} \text{ mol} \times 17,0306 \text{ g/mol} = 0,08194 \text{ g NH}_3$$

$$\% \text{ NH}_3 = \frac{0,08194}{0,2115 \text{ g}} \times 100 = \% 38,74 \text{ NH}_3$$

(NH<sub>3</sub> + 3H)

# # SORULAR #

(C)

1) Aşağıdaki bileşimlerin iyonik siddetlerini hesaplayınız.

a) 0,04 M  $\text{FeSO}_4$

$$\mu = \frac{1}{2} ( [\text{Fe}^{2+}] \cdot 2^2 + [\text{SO}_4^{2-}] \cdot 2^2 ) = \frac{1}{2} [ (0,04) \cdot (2)^2 + (0,04) \cdot (2)^2 ]$$

$$= 0,16$$

b) 0,1 M  $\text{FeCl}_3$  + 0,2 M  $\text{FeCl}_2$

$$\mu = \frac{1}{2} [ [\text{Fe}^{3+}] \cdot 3^2 + [\text{Cl}^-] \cdot (-1)^2 + [\text{Fe}^{2+}] \cdot 2^2 + [\text{Cl}^-] \cdot (-1)^2 ]$$



$$\mu = \frac{1}{2} ( (0,1) \cdot 3^2 + (0,3) \cdot (-1)^2 + (0,2) \cdot (2)^2 + (0,4) \cdot (-1)^2 ) = 1,2$$

2) Aşağıdaki iyonların verilen iyonik siddetleri aktivite katsayılarını hesaplayınız

a)  ~~$\text{Fe}^{3+}$~~   $\mu = 0,225$

2)  $\text{Pb}^{2+}$ ,  $\mu = 0,012$   $\alpha = 0,45$

$$-\log \gamma_{\text{Pb}^{2+}} = \frac{0,51 \cdot 2^2 \cdot \sqrt{\mu}}{1 + 2,3 \cdot 0,45 \cdot \sqrt{\mu}} = \frac{0,51 \cdot 2^2 \cdot \sqrt{0,012}}{1 + 2,3 \cdot 0,45 \cdot \sqrt{0,012}}$$

$$\text{antilog}(-\log \gamma_{\text{Pb}^{2+}}) = (0,193)_{\text{antilog}} \Rightarrow \gamma_{\text{Pb}^{2+}} = 0,164$$



b)  $S_{n4+}$ ,  $\rho = 0,06$   $\alpha = 1,1$

$$-\log \gamma_{S_{n4+}} = \frac{0,51 \cdot 4^2 \cdot \sqrt{0,06}}{1 + 3,3 \cdot 1,1 \cdot \sqrt{0,06}} = 1,058 \Rightarrow \boxed{\gamma_{S_{n4+}} = 0,087}$$

① İyonik eşitlik  $\rho = 5,0 \times 10^{-2}$  olan bir elektrolit çözeltisinde verilen bileşenlerin  $K_{cc}$  (termodinamik) hesaplarını



$$K'_{cc} = a_{Ag^+} \cdot a_{SCN^-} = \gamma_{Ag^+} [Ag^+] \cdot \gamma_{SCN^-} [SCN^-]$$

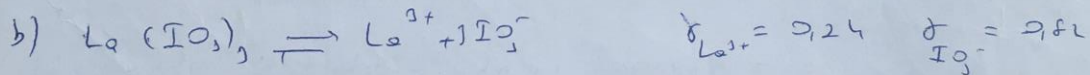
$$K_{cc} = 1,1 \times 10^{-12}$$

$$= [Ag^+] \cdot [SCN^-] \cdot \gamma_{Ag^+} \cdot \gamma_{SCN^-}$$

$$\gamma_{Ag^+} = 0,8$$

$$K'_{cc} = \frac{K_{cc}}{\gamma_{Ag^+} \cdot \gamma_{SCN^-}} = \frac{1,1 \times 10^{-12}}{(0,8) \cdot (0,81)} = 1,7 \times 10^{-12}$$

$$\gamma_{SCN^-} = 0,81$$



$$K'_{cc} = a_{La^{3+}} \cdot a_{IO_3^-}^3 = [La^{3+}] \cdot [IO_3^-]^3 \cdot \gamma_{La^{3+}} \cdot \gamma_{IO_3^-}^3$$

$$K_{cc} = 1,0 \times 10^{-11}$$

$$K'_{cc} = \frac{K_{cc}}{\gamma_{La^{3+}} \cdot \gamma_{IO_3^-}^3} = \frac{1,0 \times 10^{-11}}{(0,24) \cdot (0,82)^3} = 7,6 \times 10^{-11}$$

$$-\log \gamma_{Fe^{3+}} = \frac{0,51 \cdot 3^2 \cdot \sqrt{0,075}}{1 + 3,3 \times 0,3 \cdot \sqrt{0,075}} = \frac{1,257}{1,813} = 0,693$$

$$\boxed{\gamma_{Fe^{3+}} = 0,203}$$