



# Vaja

Koliko mililitrov žveplove(VI) kisline z gostoto 1,139 g/mL potrebujete za pripravo 0,25 L 0,5 M raztopine žveplove(VI) kisline? Izračunajte masno koncentracijo 20 % žveplove(VI) kisline.

$$\rho_1(\text{H}_2\text{SO}_4) = 1,139 \frac{\text{g}}{\text{mL}}$$

$$V_2 = 0,25 \text{ L}$$

$$C_2 = 0,5 \frac{\text{mol}}{\text{L}}$$

$$w(\text{H}_2\text{SO}_4) = 0,20$$

$$V_1 = 53,8 \text{ mL}$$

$$\rho = 0,23 \frac{\text{g}}{\text{mL}}$$

1.

$$C_1 = \frac{m_1}{V_1}$$

$$m_1 = m_2$$

$$\rho_1 = \frac{m_1}{V_1}$$

$$m = \frac{m}{M}$$

$$M(\text{H}_2\text{SO}_4) = 98 \frac{\text{g}}{\text{mol}}$$

2.

$$m_1 = m \cdot M$$

$$m_1 = 0,125 \text{ mol} \cdot 98 \frac{\text{g}}{\text{mol}}$$

$$m_1 = 12,25 \text{ g}$$

4.

$$V_1 = \frac{m_1}{\rho_1}$$

$$V_1 = \frac{12,25 \text{ g}}{1,139 \frac{\text{g}}{\text{mL}}}$$

$$V_1 = 10,75 \text{ mL}$$

$$m_2 = C_2 \cdot V_2$$

$$m_2 = 0,5 \frac{\text{mol}}{\text{L}} \cdot 0,25 \text{ L}$$

$$m_2 = 0,125 \text{ mol} = m_1$$

$$\rho = \frac{m_1}{V_1}$$

$$\rho = \frac{12,25 \text{ g}}{53,8 \text{ mL}} = 0,23 \frac{\text{g}}{\text{mL}}$$

$$w = \frac{m_1}{m_1}$$

3.

$$m_1 = \frac{m_1}{w} = \frac{12,25 \text{ g}}{0,20} = 61,25 \text{ g}$$



# Vaja

10 % raztopina neke soli ima pri temperaturi 20 °C gostoto 1,105 g/mL. Pri isti temperaturi je ta raztopina 0,778 M. Določite molsko maso soli.

$$w = 0,10$$

$$T = 293K$$

$$\rho = 1,105 \frac{g}{mL}$$

$$c = 0,778 \frac{mol}{L}$$

$$M = 142 \frac{g}{mol}$$

$$\rho = \frac{m_r}{V_r} \Rightarrow m_r = \rho \cdot V_r \quad (1)$$

$$m_r = 1,105 \frac{g}{mL} \cdot 100 mL$$

$$m_r = 110,5 g$$

$$w = \frac{m_t}{m_r} = m_t = w \cdot m_r \quad (2)$$

$$m_t = 0,10 \cdot 110,5 g$$

$$m_t = 11,05 g$$

priznamemo, da je V = 100 mL

$$c = \frac{n}{V} \Rightarrow n = c \cdot V \quad (3)$$

$$n = 0,778 mol/L \cdot 0,1 L$$

$$n = 0,0778 mol$$

$$n = \frac{m}{M} \Rightarrow M = \frac{m}{n} \quad (4)$$

$$M = \frac{11,05 g}{0,0778 mol}$$

$$M = 142 \frac{g}{mol}$$

di:

$$c = \frac{n}{V}$$

$$n = \frac{m_t}{M_t} = m_r \cdot w$$

$$c = \frac{m_r \cdot w}{M \cdot V_r}$$

$$c = \frac{\rho \cdot w}{M}$$

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# Vaja

Masni delež natrijevega klorida v raztopini je 0,0563. Gostota raztopine pri 18 °C je 1,04 g/mL. Izračunajte molarost raztopine.

$$w(\text{NaCl}) = 0,0563$$

$$c = \frac{n}{V}$$

$$\rho = \frac{m_r}{V_r}$$

$$w = \frac{m_t}{m_r} \Rightarrow m_t = w \cdot m_r$$

$$\rho = 1,04 \frac{\text{g}}{\text{mL}}$$

$$m_r = \rho \cdot V_r$$

$$m_t = 0,0563 \cdot 104 \text{ g}$$

$$c = 1 \frac{\text{mol}}{\text{L}}$$

$$m_r = 1,04 \frac{\text{g}}{\text{mL}} \cdot 100 \text{ mL}$$

$$m_t = 5,85 \text{ g}$$

$$m_r = 104 \text{ g}$$

$$M(\text{NaCl}) = 58,44 \frac{\text{g}}{\text{mol}}$$

priznamemo, da je  $V = 100 \text{ mL}$

$$c = \frac{0,10 \text{ mol}}{0,1 \text{ L}} = 1 \frac{\text{mol}}{\text{L}}$$

$$n = \frac{m_t}{M} = \frac{5,85 \text{ g}}{58,44 \frac{\text{g}}{\text{mol}}} = 0,10 \text{ mol}$$



# Vaja

240,3 g raztopine kalijevega sulfata(VI) z masnim deležem 0,42 zmešamo z 45,9 % raztopine iste soli, v kateri je raztopljeno 246,80 g topljenca. Koliko mililitrov vode moramo odpareti, da bo novonastala raztopina 75 %.

$$\begin{aligned}
 m_1(K_2SO_4) &= 240,3g \\
 w_1(K_2SO_4) &= 0,42 \\
 w_2(K_2SO_4) &= 0,459 \\
 m_2(K_2SO_4) &= 246,80g \\
 w_3(K_2SO_4) &= 0,75 \\
 \hline
 V_3 &= 201,2g
 \end{aligned}$$

$$\begin{aligned}
 m_1 + m_2 &= m_3 \\
 m_3 &= 777,3g \\
 \text{↪ očnične odparimo} \\
 w_3 &= \frac{m_{t3}}{m_n}
 \end{aligned}$$

$$w_3 = \frac{m_t}{m_n}$$

$$\begin{aligned}
 m_{t3} &= m_{t1} + m_{t2} \\
 m_{t3} &= 347,7g \quad (3.)
 \end{aligned}$$

$$\begin{aligned}
 (1.) \quad w_1 &= \frac{m_{t1}}{m_{n1}} \Rightarrow m_{t1} = w_1 \cdot m_{n1} \\
 m_{t1} &= 100,9g
 \end{aligned}$$

$$\begin{aligned}
 (2.) \quad w_2 &= \frac{m_{t2}}{m_{n2}} \Rightarrow m_{n2} = \frac{m_{t2}}{0,459} \\
 m_{n2} &= 537,6g
 \end{aligned}$$

$$(4.) \quad m_n = \frac{m_{t3}}{w_3} = \frac{347,7g}{0,75} = 463,6g$$

↪ m raztopine, da je raztopina 75%

$$m_{\text{odparjene vode}} = 777,3g - 463,6g = 313,7g$$

(6.)

$$\rho_{\text{vode}} = \frac{m_v}{V_v}$$

$$V_v = \frac{313,7g}{1g/mL} = 313,7mL$$

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# Vaja

Topnost kalijevega dikromata(VI) pri 70 °C naša 52 g kalijevega dikromata(VI)/100 g vode. Izračunajte maso topljenca in maso topila, ki ju potrebujemo za pripravo 240 g nasičene raztopine pri 70 °C.

$$\text{topnost } K_2Cr_2O_7 = 52g/100g \text{ vode}$$

$$m_n = 240g$$

$$T = 343K$$

$$\omega = \frac{m_t}{m_n}$$

$$\omega = \frac{52g}{152g}$$

$$\omega = 0,34$$

$$m_t = \omega \cdot m_n$$

$$m_t = 0,34 \cdot 240g$$

$$m_t = 81,6g$$



# Vaja

Koliko mililitrov 0,175 molarne raztopine železovega(III) sulfata(VI) potrebujete za pripravo 100,0 mL raztopine, ki bo vsebovala 5 mg železovih(3+) ionov?

$$c = 0,175 \frac{\text{mol}}{\text{L}}$$

$$V = 100 \text{ mL}$$

$$m(\text{Fe}^{3+}) = 5 \text{ mg}$$

$$V = 0,298 \text{ mL}$$

$$n(\text{Fe}^{3+}) = \frac{m(\text{Fe}^{3+})}{M(\text{Fe})} = \frac{0,005 \text{ g}}{55,85 \text{ g/mol}} = 8,95 \cdot 10^{-5} \text{ mol}$$

$$\frac{n(\text{Fe}^{3+})}{n(\text{Fe}_2(\text{SO}_4)_3)} \cdot \frac{2}{1} \Rightarrow 2 \cdot n(\text{Fe}_2(\text{SO}_4)_3) = n(\text{Fe}^{3+})$$

$$\frac{n(\text{Fe}^{3+})}{2} = n(\text{Fe}_2(\text{SO}_4)_3) = 4,48 \cdot 10^{-5} \text{ mol}$$

$$c = \frac{m}{V}$$

$$\hookrightarrow V(\text{Fe}_2(\text{SO}_4)_3) = \frac{m}{c} = \frac{4,48 \cdot 10^{-5} \text{ mol}}{0,175 \text{ mol/L}} = 25,6 \cdot 10^{-5} \text{ L} = \underline{\underline{0,256 \text{ mL}}}$$



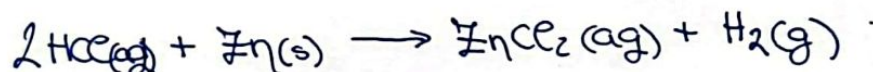
# Vaja

Koliko mililitrov 36 % klorovodikove kisline z gostoto 1,18 g/mL porabimo za reakcijo s 145 g cinka in koliko mililitrov vodika nastane pri tej reakciji, če reakcija poteka pri tlaku 100 kPa in temperaturi 20 °C.

$$\begin{aligned} w(\text{HCl}) &= 0,36 \\ \rho &= 1,18 \text{ g/mL} \\ m(\text{Zn}) &= 145 \text{ g} \\ p &= 100 \text{ kPa} \\ T &= 293 \text{ K} \end{aligned}$$

$$V(\text{H}_2) = 53,6 \text{ L}$$

$$V(\text{HCl}) = 0,3807 \text{ L}$$



$$\frac{m(\text{HCl})}{m(\text{Zn})} \cdot \frac{2}{1} \Rightarrow 2 \cdot m(\text{Zn}) = m(\text{HCl})$$

$$2 \cdot \frac{m(\text{Zn})}{M(\text{Zn})} = \frac{m(\text{HCl})}{M(\text{HCl})}$$

$$m(\text{HCl}) = \frac{2 \cdot m(\text{Zn}) \cdot M(\text{HCl})}{M(\text{Zn})}$$

$$m(\text{HCl}) = \frac{2 \cdot 145 \text{ g} \cdot 36,46 \frac{\text{g}}{\text{mol}}}{65,38 \frac{\text{g}}{\text{mol}}} = 161,7 \text{ g}$$

$$\rho = \frac{m}{V}$$

$$V_n = \frac{m_n}{\rho} = \frac{449 \text{ g}}{1,18 \frac{\text{g}}{\text{mL}}}$$

$$V_n = 380,7 \text{ mL}$$

$$pV = nRT$$

$$n = \frac{pV}{RT}$$

$$V = \frac{nRT}{p} = \frac{2,2 \text{ mol} \cdot 8,314 \frac{\text{J}}{\text{mol} \cdot \text{K}} \cdot 293 \text{ K}}{100 \text{ kPa}} = 53,6 \text{ L}$$

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$$\frac{m(\text{HCl})}{m(\text{H}_2)} = \frac{2}{1} \Rightarrow 2 \cdot m(\text{H}_2) = m(\text{HCl})$$

$$m(\text{H}_2) = \frac{161,7 \text{ g}}{2 \cdot 36,46 \frac{\text{g}}{\text{mol}}}$$

$$m(\text{H}_2) = 2,2 \text{ mol}$$

$$w(\text{HCl}) = \frac{m(\text{HCl})}{m_n}$$

$$m_n = \frac{m(\text{HCl})}{w(\text{HCl})}$$

$$m_n = \frac{161,7 \text{ g}}{0,36}$$

$$m_n = 449 \text{ g}$$