

Problema 6.3

	Soluție	Punctaj
a)	<p>Pentru expresia densității aliajului:</p> $\rho = \frac{m_{\text{Ag}} + m_{\text{Fe}} + m_{\text{Au}}}{V_{\text{Ag}} + V_{\text{Fe}} + V_{\text{Au}}} \quad \underline{(0,5 \text{ p.})} \Rightarrow \rho = \frac{\rho_{\text{Ag}} V_{\text{Ag}} + \rho_{\text{Fe}} V_{\text{Fe}} + \rho_{\text{Au}} V_{\text{Au}}}{V_{\text{Ag}} + V_{\text{Fe}} + V_{\text{Au}}} \quad \underline{(1,0 \text{ p.})} \Rightarrow$ $\Rightarrow \rho = \frac{\rho_{\text{Ag}} V_{\text{Ag}} + \rho_{\text{Fe}} \cdot 5V_{\text{Ag}} + \rho_{\text{Au}} \cdot NV_{\text{Ag}}}{V_{\text{Ag}} + 5V_{\text{Ag}} + NV_{\text{Ag}}} = \frac{V_{\text{Ag}} (\rho_{\text{Ag}} + 5\rho_{\text{Fe}} + N\rho_{\text{Au}})}{V_{\text{Ag}} (1+5+N)} \quad \underline{(1,0 \text{ p.})} \Rightarrow$ $\Rightarrow 6\rho + N\rho = \rho_{\text{Ag}} + 5\rho_{\text{Fe}} + N\rho_{\text{Au}} \Rightarrow N(\rho_{\text{Au}} - \rho) = 6\rho - \rho_{\text{Ag}} - 5\rho_{\text{Fe}} \quad \underline{(0,5 \text{ p.})} \Rightarrow$ $\Rightarrow N = \frac{6\rho - \rho_{\text{Ag}} - 5\rho_{\text{Fe}}}{\rho_{\text{Au}} - \rho} \quad \underline{(1,0 \text{ p.})}$ <p>Pentru calcule</p> $N = \frac{6 \cdot 8,712 \frac{\text{g}}{\text{cm}^3} - 10,5 \frac{\text{g}}{\text{cm}^3} - 5 \cdot 7,8 \frac{\text{g}}{\text{cm}^3}}{19,8 \frac{\text{g}}{\text{cm}^3} - 8,712 \frac{\text{g}}{\text{cm}^3}} = \frac{2,772}{11,044} \approx 0,25 = \frac{1}{4} \Rightarrow V_{\text{Au}} = NV_{\text{Ag}} = \frac{1}{4} V_{\text{Ag}} \quad \underline{(1,0 \text{ p.})}$	5.0 p.
b)	<p>Pentru exprimarea volumului aliajului prin volumul argintului:</p> $V = V_{\text{Ag}} + V_{\text{Fe}} + V_{\text{Au}} = V_{\text{Ag}} + 5V_{\text{Ag}} + \frac{1}{4} V_{\text{Ag}} = V_{\text{Ag}} (1+5+0,25) = 6,25 \cdot V_{\text{Ag}} \quad \underline{(0,5 \text{ p.})}$ <p>Pentru determinarea conținutului procentual al volumului fiecărui metal din volumul aliajului:</p> $\frac{V_{\text{Ag}}}{V} = \frac{1}{6,25} = 0,16; \quad \frac{V_{\text{Ag}}}{V} = 16\% \quad \underline{(0,5 \text{ p.})}$ $\frac{V_{\text{Fe}}}{V} = \frac{5 \cdot V_{\text{Ag}}}{V} = 5 \cdot 0,16 = 0,8; \quad \frac{V_{\text{Fe}}}{V} = 80\% \quad \underline{(0,5 \text{ p.})}$ $\frac{V_{\text{Au}}}{V} = \frac{V_{\text{Ag}}}{4 \cdot V} = \frac{0,16}{4} = 0,04; \quad \frac{V_{\text{Au}}}{V} = 4\% \quad \underline{(0,5 \text{ p.})}$	2.0 p.
c)	<p>Pentru determinarea conținutului procentual al masei fiecărui metal din masa aliajului:</p> $\frac{m_{\text{Ag}}}{m} = \frac{\rho_{\text{Ag}} \cdot V_{\text{Ag}}}{\rho \cdot V} = 0,16 \cdot \frac{\rho_{\text{Ag}}}{\rho} = 0,16 \cdot \frac{10,5 \frac{\text{g}}{\text{cm}^3}}{8,712 \frac{\text{g}}{\text{cm}^3}} \approx 0,19; \quad \frac{m_{\text{Ag}}}{m} = 19\% \quad \underline{(1,0 \text{ p.})}$ $\frac{m_{\text{Fe}}}{m} = \frac{\rho_{\text{Fe}} \cdot V_{\text{Fe}}}{\rho \cdot V} = 0,8 \cdot \frac{\rho_{\text{Fe}}}{\rho} = 0,8 \cdot \frac{7,8 \frac{\text{g}}{\text{cm}^3}}{8,712 \frac{\text{g}}{\text{cm}^3}} \approx 0,72; \quad \frac{m_{\text{Fe}}}{m} = 72\% \quad \underline{(1,0 \text{ p.})}$ $\frac{m_{\text{Au}}}{m} = \frac{\rho_{\text{Au}} \cdot V_{\text{Au}}}{\rho \cdot V} = 0,04 \cdot \frac{\rho_{\text{Au}}}{\rho} = 0,04 \cdot \frac{19,8 \frac{\text{g}}{\text{cm}^3}}{8,712 \frac{\text{g}}{\text{cm}^3}} \approx 0,09; \quad \frac{m_{\text{Au}}}{m} = 9\% \quad \underline{(1,0 \text{ p.})}$	3.0 p.
Total max		10.0 p.