



$$\text{massi\% Y} = \frac{3}{3+5+12} \cdot 100 = 15\% \quad (1)$$

$$\text{massi\% Al} = \frac{5}{3+5+12} \cdot 100 = 25\%$$

Paula kaalutud Y<sub>2</sub>O<sub>3</sub> ja Al<sub>2</sub>O<sub>3</sub> masside leidmine:

$$M(Y_2O_3) = 2 \cdot M(Y) + 3 \cdot M(O) = 2 \cdot 89 \text{ g/mol} + 3 \cdot 16 \text{ g/mol} = 226 \text{ g/mol}$$

$$n(Y_2O_3) = \frac{1}{2} \cdot \frac{m(YAG)}{M(Y)} \cdot \frac{15}{100} = 5,27 \cdot 10^{-3} \text{ mol} \quad (1)$$

$$m(Y_2O_3) = n(Y_2O_3) \cdot M(Y_2O_3) = 5,27 \cdot 10^{-3} \text{ mol} \cdot 226 \text{ g/mol} = 1,19 \text{ g}$$

$$M(Al_2O_3) = 2 \cdot M(Al) + 3 \cdot M(O) = 2 \cdot 27 \text{ g/mol} + 3 \cdot 16 \text{ g/mol} = 102 \text{ g/mol}$$

$$n(Al_2O_3) = \frac{1}{2} \cdot \frac{m(YAG)}{M(Al)} \cdot \frac{25}{100} = 2,89 \cdot 10^{-2} \text{ mol} \quad (1)$$

$$m(Al_2O_3) = n(Al_2O_3) \cdot M(Al_2O_3) = 2,89 \cdot 10^{-2} \text{ mol} \cdot 102 \text{ g/mol} = 2,95 \text{ g}$$

**b)** Paula kaalutud segu Y ja Al suhe erineb YAG stöhhiomeetrisest Y:Al suhtest (3:5). Paula kaalutud segus on Y ja Al suhe:

$$\frac{n(Y)}{n(Al)} = \frac{2 \cdot n(Y_2O_3)}{2 \cdot n(Al_2O_3)} = \frac{2 \cdot 5,27 \cdot 10^{-3} \text{ mol}}{2 \cdot 2,89 \cdot 10^{-2} \text{ mol}} = 0,182 \ll 3/5 = 0,6 \quad (2)$$

Seega tuleb stöhhiomeetriselise segu valmistamiseks segule lisada Y<sub>2</sub>O<sub>3</sub>. Y<sub>2</sub>O<sub>3</sub> stöhhiomeetriseline kogus, mis vastab segus olevale Al<sub>2</sub>O<sub>3</sub>, on:

$$n(Y_2O_3)_{\text{stöh}} = \frac{n(Al_2O_3) \cdot 3}{5}$$

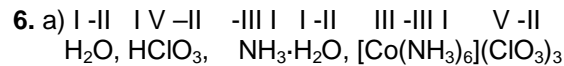
$$m(Y_2O_3)_{\text{lisada}} = M(Y_2O_3) \cdot (n(Y_2O_3)_{\text{stöh}} - n(Y_2O_3))$$

$$m(Y_2O_3)_{\text{lisada}} = 226 \text{ g/mol} \cdot \left( 2,89 \cdot 10^{-2} \cdot \frac{3}{5} - 5,27 \cdot 10^{-3} \right) = 2,73 \text{ g} \quad (2)$$

**c)** Sünteesil saadud YAG mass, arvestades 20% kadusid, on:

$$m(YAG) = (1,19 \text{ g} + 2,95 \text{ g} + 2,73 \text{ g}) \cdot \frac{80}{100} = 5,50 \text{ g} \quad (2)$$

**kokku 10 p**



(4·1) 4



(4·1) 4

**kokku 8 p**