

**Keemiaülesaanete lahendamise lahtise võistluse
vanema astme (11. ja 12. kl.) ülesannete lahendused
11. novembril 1995. a.
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1. 1. $\text{Fe}_2\text{O}_3 + 3 \text{CO} \xrightarrow{\text{kõrgahjus}} 2 \text{Fe} + 3 \text{CO}_2$
 2. $2 \text{Fe} + 3 \text{Cl}_2 \rightarrow 2 \text{FeCl}_3$
 3. $2 \text{FeCl}_3 + \text{Cu} \rightarrow \text{FeCl}_2 + \text{CuCl}_2$
 4. $\text{Fe} + 4 \text{HNO}_3 \text{ (konts.)} \xrightarrow{t^0} \text{Fe}(\text{NO}_3)_3 + \text{NO} + 2 \text{H}_2\text{O}$
 5. $\text{Fe} + 10 \text{HNO}_3 \text{ (tug. lahj.)} \rightarrow 4 \text{Fe}(\text{NO}_3)_2 + \text{NH}_4\text{NO}_3 + 3 \text{H}_2\text{O}$
 6. $\text{Fe}(\text{NO}_3)_2 + 2 \text{HNO}_3 \rightarrow \text{Fe}(\text{NO}_3)_3 + \text{NO}_2 + \text{H}_2\text{O}$
 7. $2 \text{Fe}(\text{NO}_3)_3 + 3 \text{Na}_2\text{S} \rightarrow 2 \text{FeS} + 6 \text{NaNO}_3 + \text{S}$
 8. $\text{FeS} + \text{H}_2\text{SO}_4 \text{ (lahj.)} \rightarrow \text{FeSO}_4 + \text{H}_2\text{S}$
 9. $\text{FeSO}_4 + \text{Zn} \rightarrow \text{Fe} + \text{ZnSO}_4$

2. Reaktsiooni käigus ei muutu plii oksüdatsiooniaste. Seetõttu on temas 1,750 g pliioksiidi ja $5,016 - 1,750 = 3,266$ g pliioksiidi.

$$n(\text{PbO}_2) = 1,750 \text{g} \cdot \frac{1 \text{mol}}{239,2 \text{g}} = 0,007316 \text{mol}$$

$$n(\text{PbO}) = 3,266 \text{g} \cdot \frac{1 \text{mol}}{223,2 \text{g}} = 0,014632 \text{mol}$$

Seega on Pb(II) pliiimennikus Pb(IV)-st kaks korda rohkem, mis annab selle ühendi valemiks $2 (\text{PbO}) \cdot 1 (\text{PbO}_2) = \text{Pb}_3\text{O}_4 = \text{Pb}_2\text{PbO}_4$ (plii(II)ortoplumbaat).



- 3.

$$\begin{array}{r} \text{m g} \\ 2 \text{KMnO}_4 \quad \div \quad 0,700 \text{ cm}^3 \\ 158 \text{g/mol} \quad \quad \quad 10 \text{CO}_2 \\ \quad \quad \quad \quad \quad \quad 22,4 \text{ dm}^3/\text{mol} \end{array}$$

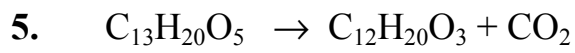
$$m (\text{KMnO}_4) = \frac{2}{10} \cdot \frac{0,700 \text{ dm}^3}{22,4 \text{ dm}^3 / \text{mol}} \cdot 158 \text{g/mol} = 0,988 \text{g}$$

$$\% (\text{KMnO}_4) = \frac{0,988}{100} \cdot 100 = 0,988\%$$

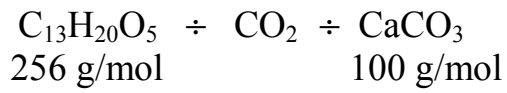
$$\begin{array}{r} 0,988 \text{ g} \quad \quad \quad \text{V cm}^3 \cdot \frac{0,500 \text{ mol}}{1000 \text{ cm}^3} \\ 2 \text{KMnO}_4 \quad - \quad 5 (\text{COOH})_2 \\ 158 \text{ g/mol} \end{array}$$

$$\text{V}((\text{COOH})_2) = \frac{5}{2} \cdot \frac{0,988 \text{g}}{158 \text{g/mol}} \cdot \frac{1000 \text{cm}^3}{0,500 \text{mol}} = 31,3 \text{cm}^3$$

4. a) 6 isomeeri b) 10 isomeeri



$$5,12g \cdot \frac{p}{100} \qquad 1,80g$$



$$p_1 = \frac{1}{1} \cdot \frac{1,80g}{100g/mol} \cdot 256g/mol \cdot \frac{1}{5,12g} \cdot 100 = 90\%$$

6. Vaheaaduse nimetus on nitrobenseen.

$$p = \frac{1}{1} \cdot 0,036dm^3 \cdot 0,1mol/dm^3 \cdot \frac{1}{0,05} \cdot 78g/mol \cdot \frac{1}{10,0} \cdot 100 = 56,1\%$$