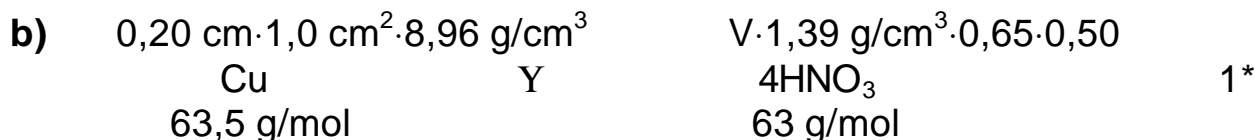
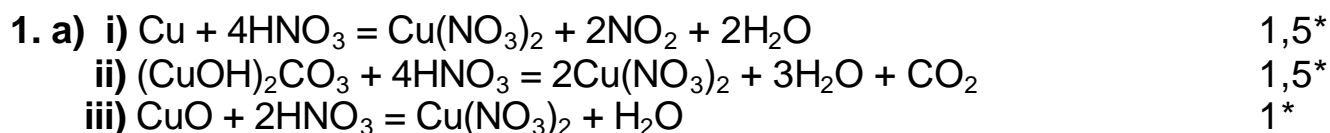
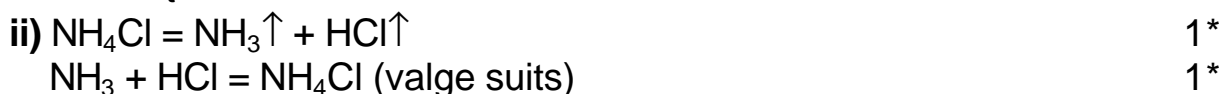
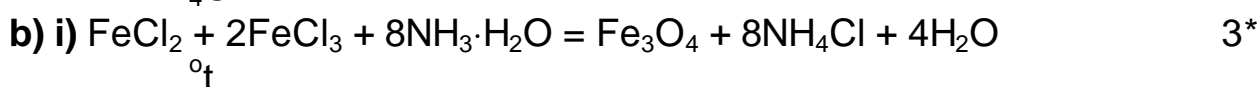


1999/2000 õa keemiaolümpiaadi piirkondliku vooru ülesannete lahendused
10. klass



$$V(\text{HNO}_3 \text{ lahus}) = \frac{4}{1} \cdot 0,20 \text{ cm} \cdot 1,0 \text{ cm}^2 \cdot 8,96 \text{ g/cm}^3 \cdot \frac{1 \text{ mol}}{63,5 \text{ g}} \cdot 63 \frac{\text{g}}{\text{mol}} \cdot \frac{1}{0,50} \cdot \frac{1}{0,65} \cdot \frac{1 \text{ cm}^3}{1,39 \text{ g}} = 15,7 \text{ cm}^3 \approx \mathbf{16 \text{ cm}^3}$$

c) ei ole, sest kuld reageerib ainult kuningveega. 1.
9 p



c) $n(\text{Fe}_3\text{O}_4) = 0,696 \cdot \frac{1 \text{ mol}}{232 \text{ g}} = 0,00300 \text{ mol}$ 1

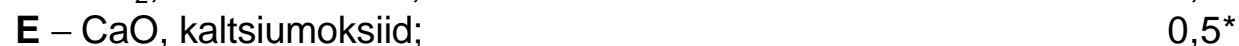
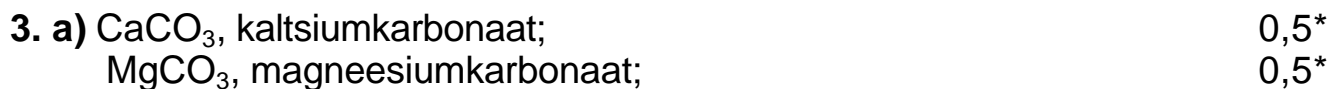
$n(\text{FeCl}_2) = \frac{1}{1} \cdot 0,00300 \text{ mol}$ 1

$n(\text{FeCl}_3) = \frac{2}{1} \cdot 0,00300 \text{ mol}$ 1

$c(\text{FeCl}_2 \text{ lahus}) = \frac{0,00300 \text{ mol}}{0,0100 \text{ dm}^3} = \mathbf{0,300 \text{ mol/dm}^3}$ 1

$c(\text{FeCl}_3 \text{ lahus}) = \frac{0,00600 \text{ mol}}{0,0100 \text{ dm}^3} = \mathbf{0,600 \text{ mol/dm}^3}$ 1.

12 p



CaSO₄ lahustub väga vähe.

- c) $\text{CaCO}_3 \cdot \text{MgCO}_3 \xrightarrow{\circ t} \text{CaO} + \text{MgO} + 2\text{CO}_2$ 1*
- $\text{CaCO}_3 \cdot 3\text{MgCO}_3 \xrightarrow{\circ t} \text{CaO} + 3\text{MgO} + 4\text{CO}_2$ 1*
- $\text{MgCO}_3 \cdot 3\text{CaCO}_3 \xrightarrow{\circ t} \text{MgO} + 3\text{CaO} + 4\text{CO}_2$ 1*
- d) $M(\text{CaCO}_3 \cdot \text{MgCO}_3) = 184,4 \text{ g/mol};$ 0,5
- $M(\text{CaO}) = 56,1 \text{ g/mol};$ 0,5
- $M(\text{MgO}) = 40,3 \text{ g/mol}$ 0,5
- $\%(\text{jääk, mineraalist A}) = \frac{56,1 + 40,3}{184,4} \cdot 100 = 52,27 \text{ CaCO}_3 \times \text{MgCO}_3$ 1
- $M(\text{CaCO}_3 \cdot 3\text{MgCO}_3) = 353,0 \text{ g/mol}$ 0,5
- $\%(\text{jääk, mineraalist B}) = \frac{56,1 + 3 \cdot 40,3}{353,0} \cdot 100 = 50,14\% \text{ CaCO}_3 \times 3\text{MgCO}_3$ 1
- $\text{MgCO}_3 \cdot 3\text{CaCO}_3$ ei sobi, sest suurema Ca sisalduse tõttu annab ta suurema põletusjäägi protsendi, kui see oli dolomiidil. **13 p**
4. a) **A** – NH_4HCO_3 , ammooniumvesinikkarbonaat 1
- B** – NH_4NO_2 , ammooniumnitrit 1
- b) $\text{NH}_4\text{HCO}_3 \xrightarrow{\circ t} \text{NH}_3 \uparrow + \text{CO}_2 \uparrow + \text{H}_2\text{O}$ 2*
- $\text{NH}_4\text{NO}_2 \xrightarrow{\circ t} \text{N}_2 \uparrow + 2\text{H}_2\text{O}$ 2*
- 6 p**
5. a) $m(\text{H}_2\text{SO}_4) = 0,05448 \text{ dm}^3 \cdot 17,97 \text{ mol/dm}^3 \cdot 98,06 \text{ g/mol} = \mathbf{96,00 \text{ g}}$ 2
- b) $m(\text{H}_2\text{SO}_4, \text{lahus}) = 54,48 \text{ cm}^3 \cdot 1,8355 \text{ g/cm}^3 = 100,0 \text{ g}$ 1
- $0,660 = \frac{96,0 \text{ g}}{100,0 \text{ g} + m'(\text{H}_2\text{O})}$ 1
- $66,0 \text{ g} + 0,660 m'(\text{H}_2\text{O}) = 96,0 \text{ g}$
- $m'(\text{H}_2\text{O}) = 45,5 \text{ g}$** 2
- c) $m'(\text{H}_2\text{SO}_4, \text{lahus}) = 100,0 \text{ g} + 45,5 \text{ g} = 145,5 \text{ g}$ 1
- $V'(\text{H}_2\text{SO}_4, \text{lahus}) = 145,5 \text{ g} \cdot \frac{1 \text{ cm}^3}{1,571 \text{ g}} = \mathbf{92,62 \text{ cm}^3}$** 1
- d) Ei või, sest vett ei tohi kontsentreeritud väävelhappe lahusesse valada. 1
- 9 p**
6. a) **M** – O_2 , dihapnik; (0,5*) **N** – O_3 , osoon; (0,5*) **B** – C, süsinik; (0,5*) 1,5
- E** – H_2 , vesinik (0,5*); **G** – Na, naatrium(0,5*); **X** – CO_2 , süsinikdioksiid(0,5*); 1,5
- Y** – H_2O , vesi(0,5*); **Z** – Na_2O , naatriumoksiid(0,5*); 1
- K** – H_2CO_3 , süsihape; 1*
- L** – NaOH, naatriumhüdroksoid; 1*
- R** – NaHCO_3 , naatriumvesinikkarbonaat. 1*
- b) i) $\text{CO}_2 + \text{H}_2\text{O} = \text{H}_2\text{CO}_3$ 1*
- ii) $\text{Na}_2\text{O} + \text{H}_2\text{O} = 2\text{NaOH}$ 1*
- c) $2\text{NaOH} + \text{CO}_2 = \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$ 1*
- $\text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O} = 2\text{NaHCO}_3$ 1*
- 11 p**