

**2003/2004 õa keemiaolümpiaadi piirkonnavooru
ülesannete lahendused
9. klass**

1. a) Cl_2O_5 , Mn_2O_7 , FeO , SO_3 ja Fe_3O_4

b) $\overset{-II}{\text{C}}_2\text{H}_4$ ja $\overset{0}{\text{C}}$; $\overset{V}{\text{HNO}}_3$ ja $\overset{-III}{\text{NH}}_4^+$; $\overset{V}{\text{HClO}}_3$ ja $\overset{VII}{\text{HClO}}_4$; $\overset{0}{\text{S}}$ ja $\overset{-II}{\text{H}_2\text{S}}$

i) C, HNO_3 , HClO_4 ja S

ii) C_2H_4 , NH_4^+ , HClO_3 ja H_2S

iii) sama, mis i)

iv) sama, mis ii)

c) $\text{H}^+ + \text{OH}^- = \text{H}_2\text{O}$

d) i) Lahustatav aine on CaO , lahustunud aine on $\text{Ca}(\text{OH})_2$

ii) Lahustatav aine on SO_3 , lahustunud aine on H_2SO_4

e) i) CaF_2 ; ii) Al_2S_3 ; iii) BaCl_2 ; iv) $(\text{NH}_4)_2\text{SO}_4$; v) $\text{Ca}_3(\text{PO}_4)_2$

f) $6,02 \cdot 10^{23}$ amü = 1,00 g

g) i) vesinik

ii) lämmastik

2. a) Vesiniksool on XHCO_3

$$A_r(\text{X}) = 84 - 1 - 12 - 3 \cdot 16 = 23$$

X – Na; **NaHCO₃**

b) **A** – Na_2O , naatriumoksiid

B – NaOH , naatriumhüdroksoid

c) i) $\text{Na}_2\text{O} + \text{H}_2\text{O} = 2\text{NaOH}$

ii) $2\text{NaOH} + \text{CO}_2 = \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$

iii) $\text{NaOH} + \text{CO}_2 = \text{NaHCO}_3$

(ka reaktsioon $\text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2 = 2\text{NaHCO}_3$ on õige)

3. a) i)



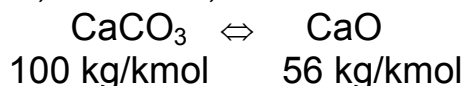
ii) $\text{CaO} + \text{H}_2\text{O} = \text{Ca}(\text{OH})_2$
kaltsiumhüdroksoid

iii) $\text{Ca}(\text{OH})_2 + \text{CO}_2 = \text{CaCO}_3 + \text{H}_2\text{O}$

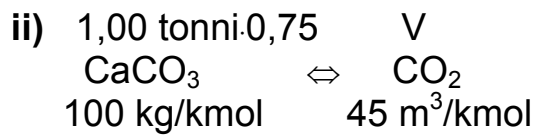
iv) $\text{Ca}(\text{OH})_2 + \text{SiO}_2 = \text{CaSiO}_3 + \text{H}_2\text{O}$
ränidioksiid kaltsiumsilikaat

b) suspensioon

c) i) 1,00 tonni · 0,75 m



$$m(\text{CaO}) = \frac{1}{1} \cdot 1,00 \text{ tonni} \cdot 0,75 \cdot \frac{1000 \text{ kg}}{1 \text{ tonn}} \cdot \frac{1 \text{ kmol}}{100 \text{ kg}} \cdot \frac{56 \text{ kg}}{\text{kmol}} = 420 \text{ kg}$$



$$V(\text{CO}_2) = \frac{1}{1} \cdot 1,00 \text{ tonni} \cdot 0,75 \cdot \frac{1000 \text{ kg}}{1 \text{ tonn}} \cdot \frac{1 \text{ kmol}}{100 \text{ kg}} \cdot \frac{45 \text{ m}^3}{\text{kmol}} = 337,5 \text{ m}^3 \approx \mathbf{340 \text{ m}^3}$$

4. a) X – Cu, vask

Y – Sn, tina

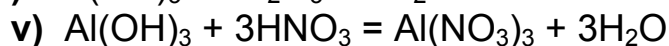
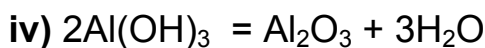
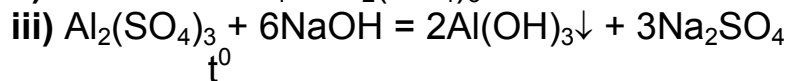
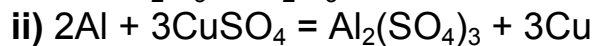
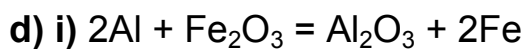
Z – Zn, tsink

Q – Al, alumiinium

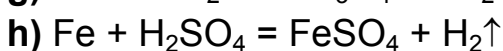
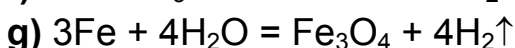
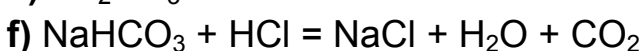
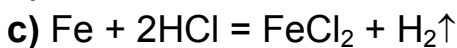
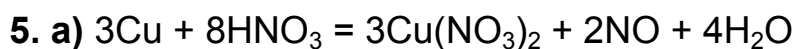
b) $m(\text{sulam}) = 33,3 \text{ g} \cdot \frac{100\%}{86\%} = 38,7 \text{ g} \approx \mathbf{39 \text{ g}}$

c) $\%(\text{Q}) = 100 - 86 - 8 - 4 = 2$

$$m(\text{Q}) = 5 \text{ kg} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} \cdot 0,02 = \mathbf{100 \text{ g}}$$



e) Sulamit võiks pidada pronksiks



6. a) i) $m(\text{lahus}) = 3,00 \text{ dm}^3 \cdot \frac{1000 \text{ cm}^3}{1 \text{ dm}^3} \cdot 1,278 \text{ g/cm}^3 = 3834 \text{ g}$

$$\%(\text{NH}_4\text{NO}_3) = 2,50 \text{ kg} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} \cdot \frac{1}{3834 \text{ g}} \cdot 100 = \mathbf{65,2}$$

$$\text{ii) } L(\text{NH}_4\text{NO}_3) = \frac{2500 \text{ g}}{3834 \text{ g} - 2500 \text{ g}} \cdot 100 = 187,4 \text{ g} \approx \mathbf{187 \text{ g}}$$

b) i) $m(\text{NH}_4\text{NO}_3) = 1000 \text{ g} \cdot 0,652 = \mathbf{652 \text{ g}}$

$$\text{ii) } m(\text{NH}_4\text{NO}_3) = 1000 \text{ g} \cdot \frac{187,4 \text{ g}}{287,4 \text{ g}} = \mathbf{652 \text{ g}}$$

c) i) $m(\text{H}_2\text{O}) = 1000 \text{ g} \cdot \frac{0,348}{0,652} = \mathbf{534 \text{ g}}$

$$\text{ii) } m(\text{H}_2\text{O}) = 1000 \text{ g} \cdot \frac{100 \text{ g}}{187,4 \text{ g}} = \mathbf{534 \text{ g}}$$