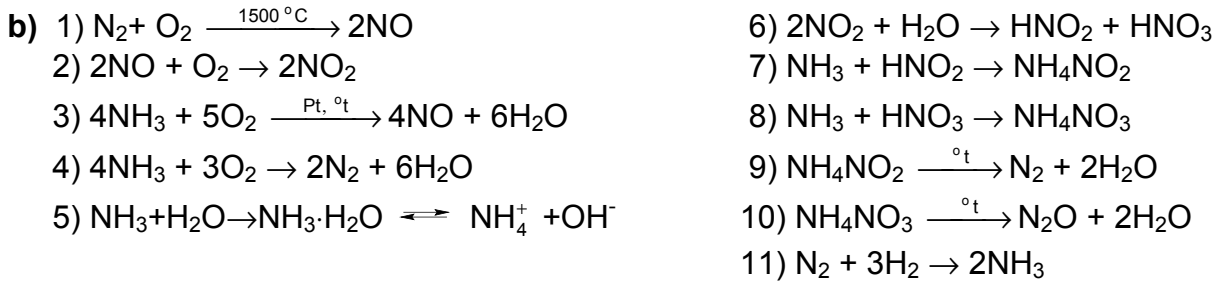
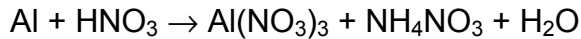


1997/98 õa keemiaolümpiaadi piirkondliku vooru ülesannete lahendused
10. klass

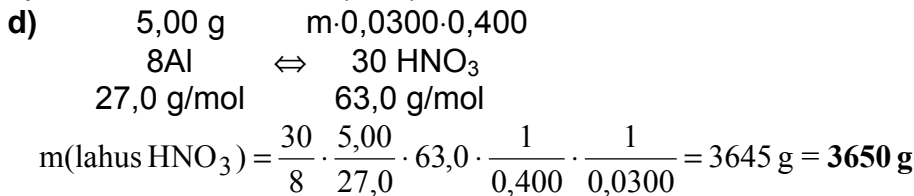
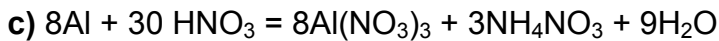
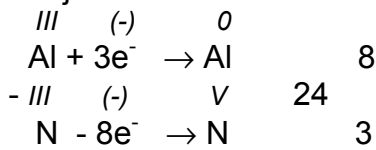
1. a) **A** - N₂; **B** - O₂; **C** - NO₂; **D** - NO; **E** - NH₃; **F** - NH₄NO₂; **G** - NH₄NO₃; **H** - N₂O



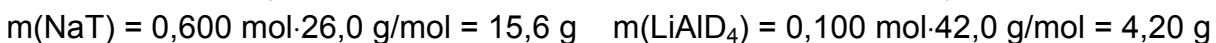
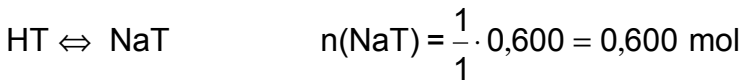
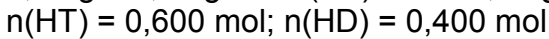
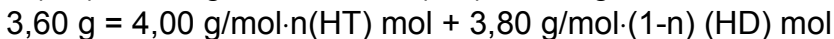
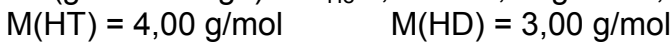
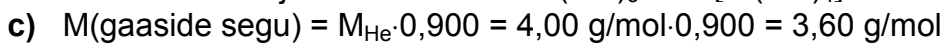
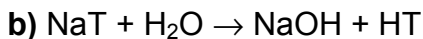
2. a) Tekivad Al(NO₃)₃, NH₃, mis reageerides HNO₃-ga annab NH₄NO₃ ja H₂O



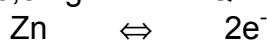
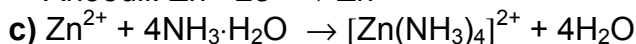
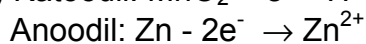
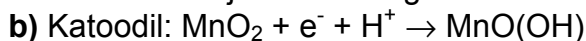
b) Elektronide ülemineku võrrandi algolekuks on ratsionaalne võtta võrrandi parem pool, sest kordajad tulevad vastavate molekulide ette



3. a) I-I I III -I
NaT LiAlD₄



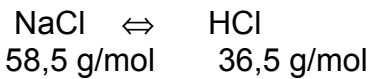
4. a) **Katoodiks** on söepulk, mille laeng on positiivne, **anoodiks** on tsinksilinder, kus toimub oksüdeerumine ja tema laeng katoodi suhtes on negatiivne.



$$Q = \frac{2}{1} \cdot \frac{6,54 \text{ g}}{65,4 \text{ g/mol}} \cdot 96500 \text{ A} \cdot \text{s/mol} = 19300 \text{ A} \cdot \text{s}$$

$$Q = 19300 \text{ A} \cdot \text{s} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = \mathbf{5,36 \text{ A} \cdot \text{h}}$$

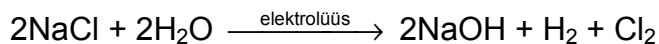
5. a) m tonn 1 tonn · 0,365



$$m(\text{NaCl}) = \frac{1}{1} \cdot \frac{1 \text{ tonn} \cdot 0,365}{36,5 \text{ g/mol}} \cdot 58,5 \text{ g/mol} = \mathbf{0,585 \text{ tonni}}$$

b,c) $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$ katoodprotsess (-)

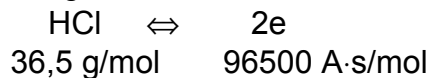
$2\text{Cl}^- - 2\text{e}^- \rightarrow \text{Cl}_2$ anoodprotsess (+)



d) Eralduv kloor disproportsieerub: $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{HClO}$

e) $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

f) $10^6 \text{ g} \cdot 0,365$ Q · A · s



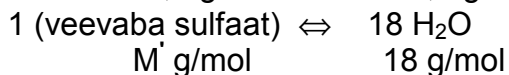
$$Q = \frac{2}{1} \cdot \frac{10^6 \cdot 0,365}{36,5} \cdot 96500 = 9,65 \cdot 10^8 \text{ A} \cdot \text{s}$$

$$n(\text{kW} \cdot \text{h}) = 9,65 \cdot 10^8 \text{ A} \cdot \text{s} \cdot \frac{1 \text{ h}}{3600 \text{ s}} \cdot 3 \text{ V} \cdot \frac{1 \text{ kW}}{1000 \text{ A} \cdot \text{V}} = \mathbf{804}$$

6. a) $m(\text{veevaba sulfaat}) = 111 \cdot 0,154 = 17,1 \text{ g}$

$$m(\text{H}_2\text{O}) = 33,3 - 17,1 = \mathbf{16,2 \text{ g}}$$

b) 17,1 g 16,2 g



Avaldame kas veevaba sulfaadi või vee massi

$$m(\text{veevaba sulfaat}) \Rightarrow 17,1 = \frac{1}{18} \cdot \frac{16,2}{18} \cdot M'$$

$$M' = 17,1 \text{ g} \cdot \frac{18 \text{ g/mol}}{16,2 \text{ g}} \cdot \frac{18}{1} = \mathbf{342 \text{ g/mol}}$$

Alternatiiv

$$m(\text{H}_2\text{O}) \Rightarrow 16,2 \text{ g} = \frac{18}{1} \cdot \frac{17,1 \text{ g}}{M' \text{ g/mol}} \cdot 18 \text{ g/mol, millest } M' = \mathbf{342 \text{ g/mol}}$$

c) Olgu sulfaadi valem $\text{X}_2(\text{SO}_4)_n$

$$342 = 2X + n \cdot 96$$

$$X = \frac{342 - n \cdot 96}{2}$$

Kui $n=1$, siis $X=123$;

kui $n=2$, siis $X=75$;

kui $n=3$, siis $X=27$ Element X on alumiinium

d) $\text{Al}_2(\text{SO}_4)_3 + 3\text{K}_2\text{S} + 6\text{H}_2\text{O} \rightarrow 3\text{H}_2\text{S} + 2\text{Al}(\text{OH})_3 + 3\text{K}_2\text{SO}_4$

e) $2\text{Al}_2\text{S}_3 + 9\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3 + 6\text{SO}_2$