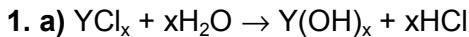
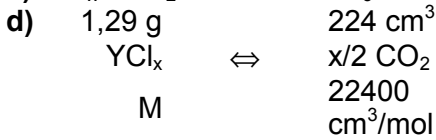
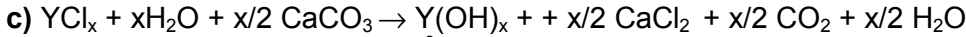


Keemia lahtine võistlus
Ülesannete lahendused
 Vanem aste (11. ja 12. klass)
 28. november 1998. a.



b) $M(\text{gaas}) = 29,0 \text{ g/mol} \cdot 1,52 = 44,08 \text{ g/mol}$

Gaas **C** on **CO₂**



$$1,29 \cdot \frac{1}{M(A)} = \frac{1}{x/2} \cdot \frac{224 \text{ cm}^3}{22400 \text{ cm}^3/\text{mol}}$$

$$M(A) = \frac{x \cdot 22400 \text{ cm}^3}{2 \cdot 224 \text{ cm}^3} \cdot 1,29 \text{ g} = x \cdot 64,5 \text{ g/mol}$$

e) $M(Y) = x \cdot 64,5 \text{ g/mol} - x \cdot 35,5 \text{ g/mol} = 29x$

kui $x = 1$ siis $M(Y) = 29$

g/mol

$x = 2$ siis $M(Y) = 58$

g/mol

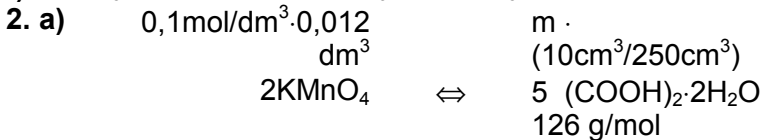
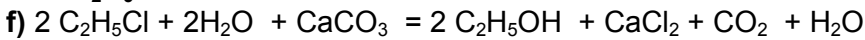
$x = 3$ siis $M(Y) = 87$

g/mol

Ükski metall nendele tingimustele ei vasta, küll aga vastab etüülradikaal:

A - C₂H₅Cl

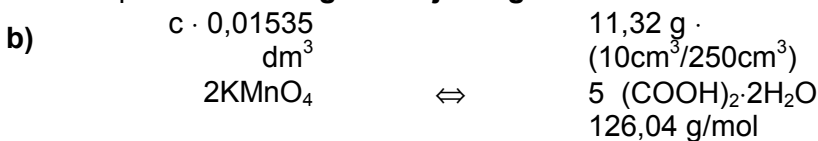
B - C₂H₅OH



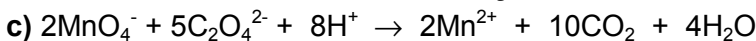
$$m_{\min} [(COOH)_2 \cdot 2H_2O] = \frac{5}{2} \cdot 0,1 \frac{\text{mol}}{\text{dm}^3} \cdot 0,012 \text{ dm}^3 \cdot 126 \frac{\text{g}}{\text{mol}} \cdot \frac{250 \text{ cm}^3}{10 \text{ cm}^3} = 9,45 \text{ g}$$

$$m_{\max} [(COOH)_2 \cdot 2H_2O] = \frac{5}{2} \cdot 0,1 \frac{\text{mol}}{\text{dm}^3} \cdot 0,017 \text{ dm}^3 \cdot 126 \frac{\text{g}}{\text{mol}} \cdot \frac{250 \text{ cm}^3}{10 \text{ cm}^3} = 13,4 \text{ g}$$

Kaalutis peaks olema **9 grammi ja 14 grammi vahel**.



$$c(KMnO_4) = \frac{2}{5} \cdot 11,32 \text{ g} \cdot \frac{10 \text{ cm}^3}{250 \text{ cm}^3} \cdot \frac{1 \text{ mol}}{126,04 \text{ g}} \cdot \frac{1}{0,01535 \text{ dm}^3} = 0,09362 \frac{\text{mol}}{\text{dm}^3}$$

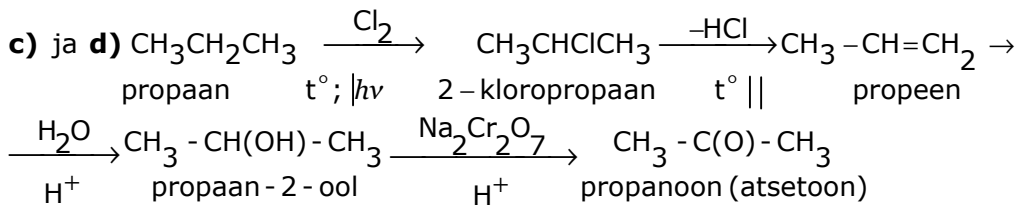


3. a) $M(Z) = 2,0 \text{ g/mol} \cdot 21 = 42 \text{ g/mol}$

b) $n(c) = \frac{22,4 \text{ dm}^3}{0,112 \text{ dm}^3} \cdot 0,66 \text{ g} \cdot \frac{1 \text{ mol}}{44 \text{ g}} = 3 \text{ mol}$

b) $n(H) = (42 \text{ g} - 36 \text{ g}) \cdot \frac{1 \text{ mol}}{1,0 \text{ g}} = 6 \text{ mol}$

Ühend **Z** on **C₃H₆**



4. a) A - $\text{CH}_3\text{CH}_2\text{CN}$; etüülitril

B - $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$; propüülamiin

C - $\text{CH}_3\text{CH}_2\text{COOH}$; propaanhape

D - NH_3 ; ammoniaak

E - $\text{CH}_3\text{CH}_2\text{NC}$; etüülisonitril

F - $\text{CH}_3\text{CH}_2\text{NHCH}_3$; etüülmetüülamiin

G - $\text{CH}_3\text{CH}_2\text{NH}_2$; etüülamiin

H - HCOOH ; metaanhape

b) $\text{CH}_3\text{CH}_2\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH} \rightarrow \text{CH}_3\text{CH}_2\text{NC} + 3\text{KCl} + 3\text{H}_2\text{O}$

5. a) katoodreaktsioon $4\text{H}_2\text{O} + 4\text{e}^- \rightarrow 2\text{H}_2 + 4\text{OH}^-$

anoodreaktsioon $2\text{H}_2\text{O} \rightarrow \text{O}_2 + 4\text{e}^- + 4\text{H}^+$

$$b) V_m = 0,0820 \frac{\text{atm} \cdot \text{dm}^3}{\text{mol} \cdot \text{K}} \cdot 293\text{K} \cdot \frac{1}{750\text{mm Hg}} \cdot \frac{750\text{mm Hg}}{1 \text{atm}} = 24,3 \frac{\text{dm}^3}{\text{mol}}$$

$$\begin{array}{ll} t \cdot 3,50\text{A} & 1,00 \text{dm}^3 \\ 4 \text{e}^- \Leftrightarrow & 3 \text{ (paukgaas)} \\ 96500 & 24,3 \\ \text{A} \cdot \text{s/mol} & \text{dm}^3/\text{mol} \end{array}$$

$$t = \frac{4}{3} \cdot 1,00 \text{dm}^3 \cdot \frac{1 \text{mol}}{24,3 \text{dm}^3} \cdot 96500 \text{A} \cdot (\text{s/mol}) \cdot \frac{1}{3,50 \text{A}} \cdot \frac{1 \text{min}}{60 \text{sek}} = 25,2 \text{ min}$$

$$c) m(\text{lahus}) = \frac{20,00\text{g}}{0,1700} = 117,65 \text{ g}$$

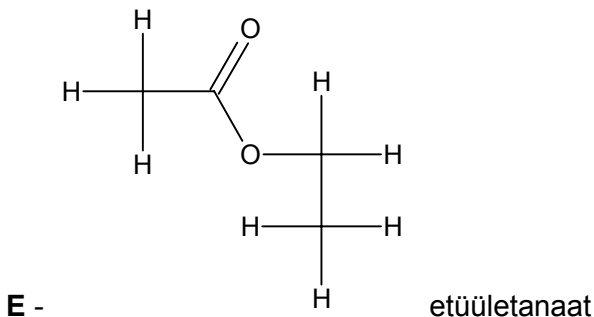
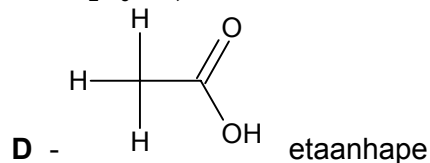
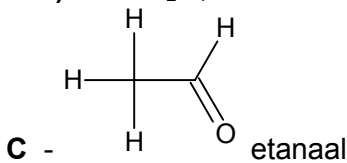
$$m(\text{reageerinud H}_2\text{O}) = 120,00 \text{ g} - 117,65 \text{ g} = 2,35 \text{ g}$$

$$2 \text{e}^- = \frac{t \cdot 3,50\text{A}}{96500 \text{A} \cdot \text{s/mol}} \cdot \frac{2,35 \text{g}}{18,0 \text{g/mol}}$$

$$t = \frac{2}{1} \cdot 2,35\text{g} \cdot \frac{1 \text{mol}}{18,0\text{g}} \cdot 96500 \text{A} \cdot (\text{s/mol}) \cdot \frac{1}{3,50 \text{A}} \cdot \frac{1 \text{h}}{3600 \text{sek}} = 2,00 \text{ h}$$

6. a) A - H_2O , vesi

B - $\text{C}_2\text{H}_5\text{OH}$, etanool



b) 1) $\text{CH}_2=\text{CH}_2 + \text{H}_2\text{O} = \text{CH}_3\text{CH}_2\text{OH}$

2) $\text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{COOH} = \text{CH}_3\text{COOC}_2\text{H}_5$

c) 1) $\text{C}_2\text{H}_5\text{OH} \xrightarrow{-\text{H}_2} \text{CH}_3\text{CHO}$

2) $\text{CH}_3\text{CHO} \xrightarrow{\text{O}} \text{CH}_3\text{COOH}$

d) $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{käärimine}} 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$