

KEEMIAÜLESANNETE LAHENDAMISE LAHTINE VÕISTLUS

Noorem rühm (9. ja 10. klass)

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Ülesannete lahendused

1. a) i) $4\text{FeS}_2 + 11\text{O}_2 = 2\text{Fe}_2\text{O}_3 + 8\text{SO}_2$
 ii) $\text{Fe}_2\text{O}_3 + \text{CO} = 2\text{FeO} + \text{CO}_2$
 iii) $\text{FeO} + \text{H}_2\text{SO}_4 = \text{FeSO}_4 + \text{H}_2\text{O}$
 iv) $\text{FeSO}_4 + \text{Zn} = \text{ZnSO}_4 + \text{Fe}\downarrow$
 v) $2\text{Fe} + 3\text{Cl}_2 = 2\text{FeCl}_3$
 vi) $\text{FeCl}_3 + 3\text{NaOH} = \text{Fe}(\text{OH})_3\downarrow + 3\text{NaCl}$
 vii) $2\text{Fe}(\text{OH})_3 = \text{Fe}_2\text{O}_3 + 3\text{H}_2\text{O}$
 viii) $\text{Fe}_2(\text{SO}_4)_3 + 3\text{BaCl}_2 = 3\text{BaSO}_4\downarrow + 2\text{FeCl}_3$
- b) Binaarne ühend on XCl_n
 $35,5n / (A_r(\text{X}) + 35,5n) = 0,247 \quad A_r(\text{X}) = 35,5n / 0,247 - 35,5n = 108n$
 $\text{X} - \text{Ag}$, hõbe $\quad \text{XCl}_n - \text{AgCl}$, hõbekloriid
- c) nõrgalt happeline
- d) x) $10\text{FeSO}_4 + 2\text{KMnO}_4 + 8\text{H}_2\text{SO}_4 = 5\text{Fe}_2(\text{SO}_4)_3 + \text{K}_2\text{SO}_4 + 2\text{MnSO}_4 + 8\text{H}_2\text{O}$
 $2\text{Fe}^{\text{II}} - 2e^- = 2\text{Fe}^{\text{III}} \quad | \times 5$
 $\text{Mn}^{\text{VII}} + 5e^- = \text{Mn}^{\text{II}} \quad | \times 2$

2. a) $m(\text{HCl}) = 36,03 \text{ dm}^3 \cdot \frac{1000 \text{ cm}^3}{1 \text{ dm}^3} \cdot \frac{1,629 \cdot 10^{-3} \text{ g}}{1 \text{ cm}^3} = 58,69 \text{ g}$

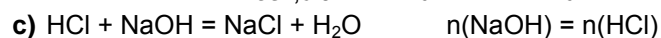
$m(\text{lahus}) = 58,69 \text{ g} + 500 \text{ cm}^3 \cdot \frac{0,999 \text{ g}}{1 \text{ cm}^3} = 558,2 \text{ g}$

$V(\text{lahus}) = 558,2 \text{ g} \cdot \frac{1 \text{ cm}^3}{1,050 \text{ g}} = 531,6 \text{ cm}^3 \approx 532 \text{ cm}^3$

$\%(\text{HCl}) = \frac{58,69 \text{ g}}{558,2 \text{ g}} \cdot 100 = 10,5$

b) $n(\text{HCl}) = 58,69 \text{ g} \cdot \frac{1 \text{ mol}}{36,46 \text{ g}} = 1,61 \text{ mol}$

$c(\text{HCl}) = 1,61 \text{ mol} \cdot \frac{1}{531,6 \text{ cm}^3} \cdot \frac{1000 \text{ cm}^3}{1 \text{ dm}^3} = 3,03 \frac{\text{mol}}{\text{dm}^3} = 3,03 \text{ M}$



$m(\text{NaOH}) = 1,61 \text{ mol} \cdot \frac{40,00 \text{ g}}{1 \text{ mol}} = 64,4 \text{ g}$

3. a) **M** – Cu, vask **Q** – CO, süsinikmonooksiid
G – H₂, vesinik **M₂O** – Cu₂O, vask(I)oksiid
K – H₂O, vesi **MO** – CuO, vask(II)oksiid
L – C, süsinik

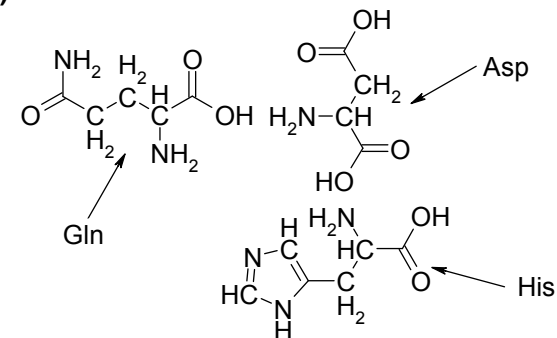
- b) i) $4\text{CuO} = 2\text{Cu}_2\text{O} + \text{O}_2$ iv) $\text{CO} + \text{H}_2 + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O}$
 ii) $\text{Cu}_2\text{O} + \text{H}_2 = 2\text{Cu} + \text{H}_2\text{O}$ v) $\text{CO}_2 + \text{Ca}(\text{OH})_2 = \text{CaCO}_3\downarrow + \text{H}_2\text{O}$
 iii) $\text{H}_2\text{O} (\text{gaas}) + \text{C} = \text{CO} + \text{H}_2$

4. a) Summaarne valem on $\text{C}_{15}\text{H}_{22}\text{N}_6\text{O}_7$

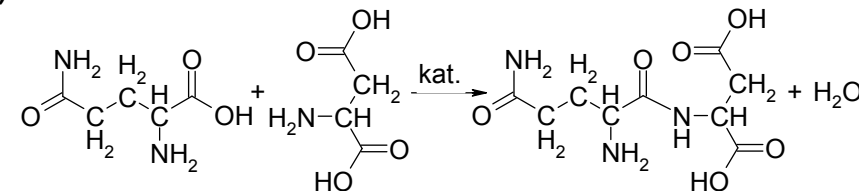
$\%_{\text{aatom}}(\text{N}) = \frac{6}{15 + 22 + 6 + 7} \cdot 100 = 12$

$\%_{\text{mass}}(\text{N}) = \frac{6 \cdot 14}{15 \cdot 12 + 22 \cdot 1 + 6 \cdot 14 + 7 \cdot 16} \cdot 100 = 21$

b)



c)



5. a) $n(\text{C}_2\text{H}_5\text{OH}) = n(\text{CO}_2) = 972 \text{ dm}^3 \cdot \frac{1 \text{ mol}}{24 \text{ dm}^3} = 40,5 \text{ mol} = 41 \text{ mol}$

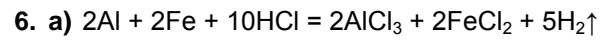
b) $V(\text{e tanool}) = 40,5 \text{ mol} \cdot \frac{46 \text{ g}}{1 \text{ mol}} \cdot \frac{1 \text{ cm}^3}{0,792 \text{ g}} \cdot \frac{1 \text{ dm}^3}{1000 \text{ cm}^3} = 2,35 \text{ dm}^3$

$\% \text{vol}(\text{etanool}) = \frac{2,35 \text{ dm}^3}{30 \text{ dm}^3} \cdot 100 = 7,8$

c) $n(\text{glükoos}) = \frac{40,5 \text{ mol}}{2} \cdot \frac{1}{0,95} \cdot \frac{1,5}{1} = 32 \text{ mol}$

$m(\text{glükoos}) = 32 \text{ mol} \cdot \frac{180 \text{ g}}{1 \text{ mol}} \cdot \frac{1 \text{ kg}}{1000 \text{ g}} = 5,76 \text{ kg}$

$m(\text{oder}) = 5,76 \text{ kg} \cdot \frac{1}{0,3} = 19 \text{ kg}$



b) $c(\text{Fe, lahus B}) = \frac{0,247 \text{ mmol}}{1 \text{ dm}^3} \cdot \frac{1 \text{ dm}^3}{1000 \text{ cm}^3} \cdot \frac{5,00 \text{ cm}^3}{50,0 \text{ cm}^3} \cdot \frac{55,85 \text{ mg}}{1 \text{ mmol}} = 0,00138 \frac{\text{mg}}{\text{cm}^3}$

$c(\text{Fe, lahus A}) = \frac{0,148}{0,320} \cdot 0,00138 \frac{\text{mg}}{\text{cm}^3} = 0,000638 \frac{\text{mg}}{\text{cm}^3}$

c) $\%(\text{Fe, sulam}) = 0,000638 \frac{\text{mg}}{\text{cm}^3} \cdot \frac{50 \text{ cm}^3}{5 \text{ cm}^3} \cdot \frac{100 \text{ cm}^3}{0,250 \text{ g}} \cdot \frac{1 \text{ g}}{1000 \text{ mg}} \cdot 100 = 0,255$