

Prirodno-matematički fakultet
Društvo matematičara I fizičara Crne Gore

OLIMPIJADA ZNANJA 2018.

Rješenja zadataka iz HEMIJE
za I razred srednje škole

1. I) D; II) H₂O(s) je na sl B
2. I) D, II) C
3. $\text{Ca(OH)}_2 + 2 \text{HCl} \rightarrow \text{CaCl}_2 + 2 \text{H}_2\text{O}$
 $n(\text{HCl})_{\text{poč.}} = 2,5 \cdot 10^{-3} \text{ mol}$
 $n(\text{HCl})_{\text{neizreag.}} = 2,5 \cdot 10^{-4} \text{ mol}$
 $n(\text{HCl})_{\text{reag.}} = 2,25 \cdot 10^{-3} \text{ mol}$
 $n(\text{Ca(OH)}_2)_{\text{potr.}} = 1,13 \cdot 10^{-3} \text{ mol} = 1,13 \text{ mmol}$

4. $M_r(\text{Na}_2\text{SO}_4) = 142$
 $m(\text{Na}_2\text{SO}_4) = 0,68 \text{ g}; n(\text{Na}_2\text{SO}_4) = 4,8 \cdot 10^{-3} \text{ mol}$
 $m(\text{H}_2\text{O}) = 0,86 \text{ g}; n(\text{H}_2\text{O}) = 0,048 \text{ mol}$

 $n(\text{H}_2\text{O}): n(\text{Na}_2\text{SO}_4) = 0,048:0,0048 = 10:1$

5.
 $M_r(\text{HClO}_4) = 100,5; \rho = 1116,7 \text{ g/dm}^3 = 1,12 \text{ g/cm}^3$

6. $Z(\text{Al}) = 13; A_r(\text{Al}) = 27$
 $Z(\text{O}) = 8; A_r(\text{O}) = 16$
 $N = 2,23 \cdot 10^{26} \text{ (elektrona /kg Al}^{3+})$
 $10N_A \text{ (elektr) /mol O}^{2-}$
 $m(\text{O}^{2-}) = 5,924 \cdot 10^4 \text{ g}$

7. $n_r(\text{PCl}_3) = n_r(\text{Cl}_2) = m_r(\text{Cl}_2) / M(\text{Cl}_2) = 4,0 \cdot 10^{-3} \text{ mol}$

 $[\text{PCl}_3] = [\text{Cl}_2] = n_r(\text{Cl}_2) / V = 0,20 \text{ mol/m}^3$

 $K_c = [\text{PCl}_3] \cdot [\text{Cl}_2] / [\text{PCl}_5]$

 $[\text{PCl}_5] = [\text{PCl}_3] \cdot [\text{Cl}_2] / K_c = 1,0 \text{ mol/m}^3$

 $[\text{PCl}_5]_{\text{pr.}} = [\text{PCl}_3] = [\text{Cl}_2]$

$$[\text{PCl}_5]_0 = [\text{PCl}_5] + [\text{PCl}_5]_{\text{pr.}} = 1,2 \text{ mol/m}^3$$

$$n_r(\text{PCl}_5) = c \cdot V = 2 \cdot 10^{-2} \text{ mol}$$

$$n_r = n_r(\text{PCl}_5) + n_r(\text{PCl}_3) + n_r(\text{Cl}_2) = 2,8 \cdot 10^{-2} \text{ mol}$$

$$x(\text{PCl}_5) = 0,71$$

8. A) $K_c = [\text{CO}]^2 / [\text{O}_2]$
B) d)

9. $m(r-ra) = 22 \text{ g}$
 $m(\text{HCl}) = 4,54 \text{ g}$
 $n(\text{HCl}) = 0,125 \text{ mol}$
 $n_1(\text{HCl}) = n(\text{HCl})$
 $m_1(r-ra) = 202 \text{ g}$
 $w_1(\text{HCl}) = 0,022 \text{ (2,2\%)}$
 $V_1 = 200 \text{ cm}^3$
 $c_1 = 0,62 \text{ mol/dm}^3$

10. b