

**Prirodno-matematički fakultet  
Društvo matematičara i fizičara Crne Gore**

**OLIMPIJADA ZNANJA 2022.**

**Rješenja zadataka iz HEMIJE  
za I razred srednje škole**

1. A)  $E_{j2}(\text{N}) < E_{j2}(\text{F}) < E_{j2}(\text{Ne}) < E_{j2}(\text{Li})$  ; B) 3
2. A) V grupi i 4. periodi. B) 1B, 2D, 3E i 4A.
3. 0,3 mol  $\text{Fe}_x\text{O}_y$   
 $m(\text{Fe}) : m(\text{O}) = 7 : 3$   
 $56 n_x : 16 n_y = 7 : 3$   
 $n_x : n_y = 2:3$  ( **$\text{Fe}_2\text{O}_3$** )  
 **$N(\text{Fe}) = 0,6 N_A = 3,6 \cdot 10^{23}$ ;  $N(\text{O}) = 0,9 \cdot N_A = 5,4 \cdot 10^{23}$**
4.  $\text{EO}_3$   
 $n(\text{E}) : n(\text{O}) = 40/\text{Ar}(\text{E}) : 60/16$   
 $1:3 = 40/\text{Ar}(\text{E}) : 3,75$   
 **$\text{Ar}(\text{E}) = 32$**
5. Na  $80^\circ\text{C}$  masa  $\text{Al}_2(\text{SO}_4)_3$  u 150 g rastvora:  $73:173 = m:150$   
 $m = 63,3\text{g}$   $\text{Al}_2(\text{SO}_4)_3$   
 Hlađenjem rastvora na  $20^\circ\text{C}$  iskristališe masa  $\text{Al}_2(\text{SO}_4)_3$  ( $m_{\text{isk}}$ ).
- A u rastvoru je:  $m(\text{Al}_2(\text{SO}_4)_3) = 63,3 - m_{\text{isk}}(\text{Al}_2(\text{SO}_4)_3)$   
 $m(r-r_a) = 150 - [m_{\text{isk}}(\text{Al}_2(\text{SO}_4)_3) \cdot M(\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}) / M((\text{Al}_2(\text{SO}_4)_3)]$
- $36,4:136,4 = [63,3 - m_{\text{isk}}(\text{Al}_2(\text{SO}_4)_3)] : [150 - m_{\text{isk}}(\text{Al}_2(\text{SO}_4)_3) \cdot M(\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}) / M((\text{Al}_2(\text{SO}_4)_3)]$   
 $m_{\text{isk}}(\text{Al}_2(\text{SO}_4)_3) = 48,45\text{ g}$   
 **$m_{\text{isk}}(\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{HO}) = 94,35\text{ g}$**
6.  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$

	$\text{H}_2$	$\text{I}_2$	$\text{HI}$
Početna konc.	0,75	1,0	0,90
Reaguje	-x	-x	+2x
Ravnotežna konc.	0,75-x	1,0-x	0,9+2x

$$K = \frac{[\text{HI}]^2}{[\text{H}_2][\text{I}_2]}$$

$$K = \frac{(0,9+2x)^2}{(0,75-x)(1-x)}$$

$$x_1 = 0,57$$

$x_2=1,39$  (nije upotrebljivo)

**$c(\text{H}_2)=0,18 \text{ mol/dm}^3$**

**$c(\text{I}_2)=0,43 \text{ mol/dm}^3$**

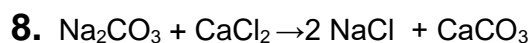
**$c(\text{HI})=2.04 \text{ mol/dm}^3$**

**7.**  $m(\text{r-ra})_1 = \rho \cdot V = 35,25 \text{ g}$

$$m_1 = \omega_1 \cdot m(\text{r-ra})_1 = 0,4 \cdot 35,25 = 14,1 \text{ g}$$

$$m(\text{r-ra})_2 = 14,1 / 0,02 = 705 \text{ g}$$

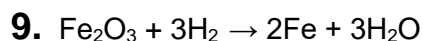
$$\Delta m = 705 - 35,25 = \mathbf{669,75 \text{ g}}$$



$$n(\text{Na}_2\text{CO}_3) = n(\text{CaCl}_2) = c \cdot V = 0,5 \cdot 0,050 = 0,025 \text{ mol}$$

$$c(\text{Na}_2\text{CO}_3) = n/V = 0,025/0,125 = 0,2 \text{ mol/dm}^3$$

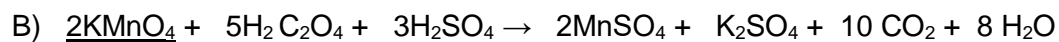
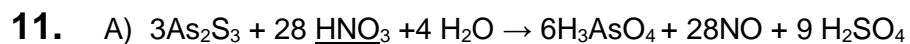
**$c(\text{Na}_2\text{CO}_3) = 0,2 \text{ mol/dm}^3$**



$$160:112 = x: 50$$

**$X = 71,43 \text{ g} (\text{Fe}_2\text{O}_3)$**

**10.** **8,66 kJ**



*(oksidaciona sredstva su podvučena u jednačinama hemijskih reakcija)*

12.  $v_1^1 = 3v_1$ ;  $v_2^2 = 9v_2$ . Pomjera se ulijevo.

a) smanjiti P; b) povećati T