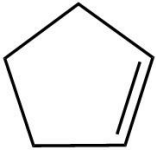


**RJEŠENJA ISPITA DRŽAVNE MATURE IZ KEMIJE  
U ŠKOLSKOJ GODINI 2022./2023.**

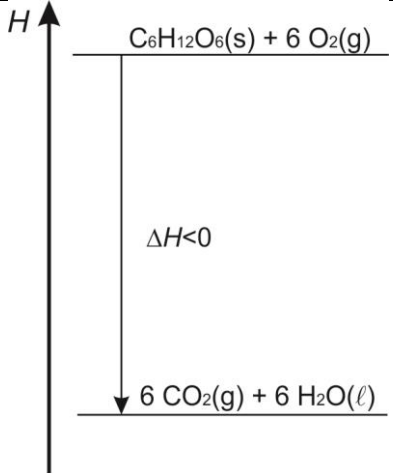
**ISPITNA KNJIŽICA 1**

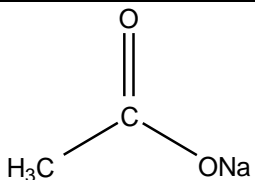
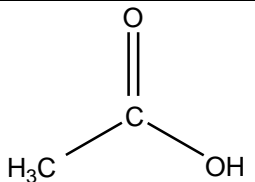
<b>Redni broj zadatka</b>	<b>ODGOVOR</b>
1.	B
2.	A
3.	D
4.	B
5.	B
6.	C
7.	B
8.	B
9.	D
10.	D
11.	C
12.	A
13.	D
14.	A
15.	D
16.	C
17.	A
18.	A
19.	A
20.	C
21.	B
22.	B
23.	B
24.	C
25.	C
26.	A
27.	A
28.	D
29.	B
30.	A
31.	C
32.	C
33.	A
34.	B
35.	C

## ISPITNA KNJIŽICA 2

Red ni broj zad.	ODGOVOR	BOD
1.1.	 <p>Priznaju se i ostali točni strukturni prikazi.</p>	1 BOD
1.2.	natrijev sulfat	1 BOD
2.1.	$\text{MgCl}_2(\text{s}) \rightarrow \text{Mg}^{2+}(\text{aq}) + 2 \text{Cl}^{-}(\text{aq})$	1 BOD
2.2.	$m(\text{MgCl}_2) = 8,54 \text{ kg}$ $\Delta T = i \cdot K_f \cdot b = \frac{i \cdot K_f \cdot n(\text{MgCl}_2)}{m(\text{H}_2\text{O})} = \frac{i \cdot K_f \cdot m(\text{MgCl}_2)}{m(\text{H}_2\text{O}) \cdot M(\text{MgCl}_2)}$ $m(\text{MgCl}_2) = \frac{\Delta T \cdot m(\text{H}_2\text{O}) \cdot M(\text{MgCl}_2)}{i \cdot K_f} = \frac{5 \text{ K} \cdot 100 \text{ kg} \cdot 95,3 \text{ g mol}^{-1}}{3 \cdot 1,86 \text{ K kg mol}^{-1}} = 8539,4 \text{ g} = 8,54 \text{ kg}$	1 BOD
3.	$m(\text{Cu}) = 0,39 \text{ g}$ $\text{Cu}^{2+}(\text{aq}) + 2 \text{e}^{-} \rightarrow \text{Cu}(\text{s})$ $n = \frac{I \cdot t}{z \cdot F} \Rightarrow n(\text{Cu}) = \frac{I \cdot t}{z \cdot F} = \frac{0,22 \text{ A} \cdot 5400 \text{ s}}{2 \cdot 9,65 \times 10^4 \text{ As mol}^{-1}} = 6,16 \times 10^{-3} \text{ mol}$	1 BOD za množinu bakra
	$m(\text{Cu}) = n(\text{Cu}) \cdot M(\text{Cu}) = 6,16 \times 10^{-3} \text{ mol} \cdot 63,5 \text{ g mol}^{-1} = 0,39 \text{ g}$	1 BOD za masu bakra
4.1.	$m(\text{K}_2\text{Cr}_2\text{O}_7) = 105,1 \text{ g}$ $w(\text{K}_2\text{Cr}_2\text{O}_7) = \frac{m(\text{K}_2\text{Cr}_2\text{O}_7)}{m(\text{K}_2\text{Cr}_2\text{O}_7) + m(\text{H}_2\text{O})}$ $0,412 = \frac{m(\text{K}_2\text{Cr}_2\text{O}_7)}{m(\text{K}_2\text{Cr}_2\text{O}_7) + 150 \text{ g}}$ $0,412 m(\text{K}_2\text{Cr}_2\text{O}_7) + 61,8 \text{ g} = m(\text{K}_2\text{Cr}_2\text{O}_7)$ $0,588 m(\text{K}_2\text{Cr}_2\text{O}_7) = 61,8 \text{ g}$ $m(\text{K}_2\text{Cr}_2\text{O}_7) = \frac{61,8 \text{ g}}{0,588} = 105,1 \text{ g}$	1 BOD

4.2.	<p>Vodena otopina bit će nezasićena.</p> $m(\text{K}_2\text{Cr}_2\text{O}_7) = 250 \text{ g}$ $m(\text{H}_2\text{O}) = 500 \text{ g}$ $w(\text{K}_2\text{Cr}_2\text{O}_7) = \frac{m(\text{K}_2\text{Cr}_2\text{O}_7)}{m(\text{K}_2\text{Cr}_2\text{O}_7) + m(\text{H}_2\text{O})} = \frac{250 \text{ g}}{250 \text{ g} + 500 \text{ g}} = 0,333$ <p>Maseni udio otopljene tvari u priređenoj otopini manji je od masenog udjela otopljene tvari u zasićenoj otopini, iz čega se zaključuje da je priređena otopina nezasićena.</p>	1 BOD
5.1.	$N(\text{H}) = 1,2 \times 10^{24}$ $M_r(\text{C}_6\text{H}_8\text{O}_6) = 6 A_r(\text{C}) + 8 A_r(\text{H}) + 6 A_r(\text{O})$ $M_r(\text{C}_6\text{H}_8\text{O}_6) = 6 \cdot 12 + 8 \cdot 1,01 + 6 \cdot 16 = 176,08$ $M(\text{C}_6\text{H}_8\text{O}_6) = 176,08 \text{ g mol}^{-1}$ $N(\text{H}) = 8 \cdot \frac{m(\text{C}_6\text{H}_8\text{O}_6) \cdot N_A}{M(\text{C}_6\text{H}_8\text{O}_6)} = 8 \cdot \frac{44 \text{ g} \times 6,02 \times 10^{23} \text{ mol}^{-1}}{176,08 \text{ g mol}^{-1}} = 1,2 \times 10^{24}$	1 BOD
5.2.	4 stereoizomera	1 BOD
6.1.	$\text{NO}_2$	1 BOD
6.2.	$\Delta_{\text{ks}} H^\circ > \Delta_{\text{hid}} H^\circ$	1 BOD
6.3.	$\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$	1 BOD
7.1.	$K_p = 25 \text{ kPa}^{-2}$ $K_p = \frac{p^2(\text{NH}_3)}{p^3(\text{H}_2) \cdot p(\text{N}_2)} = \frac{0,4^2 \text{ kPa}^2}{0,2^3 \text{ kPa}^3 \cdot 0,8 \text{ kPa}} = 25 \text{ kPa}^{-2}$	1 BOD
7.2.	Od 4,5 minute ( $4,5 < t < 5$ )	1 BOD
7.3.	$\bar{v} = 3,33 \times 10^{-3} \text{ kPa s}^{-1}$ $\bar{v} = \frac{\Delta p(\text{NH}_3)}{\Delta t \cdot \nu(\text{NH}_3)} = \frac{0,2 \text{ kPa}}{30 \text{ s} \cdot 2} = 3,33 \times 10^{-3} \text{ kPa s}^{-1} \text{ ili } 0,2 \text{ kPa min}^{-1}$	1 BOD
8.1.	<p>Odgovor: Fe (željezo)</p> $E^\circ = E^\circ(\text{X}^{2+}   \text{X}) - E^\circ(\text{Al}^{3+}   \text{Al})$ $1,21 \text{ V} = E^\circ(\text{X}^{2+}   \text{X}) - (-1,66 \text{ V})$ $E^\circ(\text{X}^{2+}   \text{X}) = -0,45 \text{ V}$	1 BOD
8.2.	$\text{Al}   \text{Al}^{3+}    \text{X}^{2+}   \text{X}$ <p>ili</p> $\text{Al}   \text{Al}^{3+}    \text{Fe}^{2+}   \text{Fe}$	1 BOD
8.3.	$2 \text{ Al} + 3 \text{ X}^{2+} \rightarrow 2 \text{ Al}^{3+} + 3 \text{ X}$ <p>ili</p> $2 \text{ Al} + 3 \text{ Fe}^{2+} \rightarrow 2 \text{ Al}^{3+} + 3 \text{ Fe}$	1 BOD

9.1.	<p>Rješenje: <math>\Delta_r H^\circ = -2802 \text{ kJ mol}^{-1}</math></p> $n(\text{C}_6\text{H}_{12}\text{O}_6) = \frac{m}{M} = \frac{360,24 \text{ g}}{180,12 \text{ g mol}^{-1}} = 2 \text{ mol}$ $\Delta_r H^\circ = \frac{\Delta H}{n(\text{C}_6\text{H}_{12}\text{O}_6)} = \frac{-5604 \text{ kJ}}{2 \text{ mol}} = -2802 \text{ kJ mol}^{-1}$	1 BOD
9.2.		1 BOD
9.3.	ugljikohidratima, monosaharidima	1 BOD
9.4.	$\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{enzimi iz kvašćevih gljivica}} 2 \text{ C}_2\text{H}_5\text{OH} + 2 \text{ CO}_2$	1 BOD
10.1.	<p>pH = 4,62</p> $\text{pH} = -\log\left(\frac{c(\text{H}_3\text{O}^+)}{\text{mol dm}^{-3}}\right) = -\log\left(\frac{2,4 \times 10^{-5} \text{ mol dm}^{-3}}{\text{mol dm}^{-3}}\right) = 4,62$	1 BOD
10.2.	<p><math>\alpha = 0,002 \%</math></p> $K_a = \frac{c(\text{H}_3\text{O}^+) \cdot c(\text{CN}^-)}{c(\text{HCN})} = \frac{[c(\text{H}_3\text{O}^+)]^2}{c(\text{HCN})} \Rightarrow c(\text{H}_3\text{O}^+) = \sqrt{K_a \cdot c(\text{HCN})}$ $\alpha = \frac{c(\text{H}_3\text{O}^+)}{c(\text{HCN})} = \frac{\sqrt{K_a \cdot c(\text{HCN})}}{c(\text{HCN})} = \frac{\sqrt{4 \cdot 10^{-10} \text{ mol dm}^{-3} \cdot 1 \text{ mol dm}^{-3}}}{1 \text{ mol dm}^{-3}} = \frac{2 \cdot 10^{-5} \text{ mol dm}^{-3}}{1 \text{ mol dm}^{-3}} = 2 \cdot 10^{-5} = 0,002 \%$	1 BOD
10.3.	$K_a = 4 \times 10^{-10} \text{ mol dm}^{-3}$	1 BOD
10.4.	$[\text{:C} \equiv \text{N:}]^-$	1 BOD
11.1.	Propanal ili $\text{CH}_3\text{CH}_2\text{CHO}$	1 BOD
11.2.	<p>Mjerodavni je reaktant <math>\text{Cu}^{2+}</math>.</p> $\xi = \frac{\Delta n}{\nu} = \frac{\Delta m}{M \cdot \nu}$ $\xi(\text{CH}_3\text{CH}_2\text{CHO}) = \frac{-1,45 \text{ g}}{58,06 \text{ g mol}^{-1} \cdot (-1)} = 0,025 \text{ mol}$ $\xi(\text{Cu}^{2+}) = \frac{\Delta n(\text{Cu}^{2+})}{\nu(\text{Cu}^{2+})} = \frac{\Delta N(\text{Cu}^{2+})}{N_A \cdot \nu(\text{Cu}^{2+})} = \frac{-2,41 \times 10^{22}}{6,02 \times 10^{23} \text{ mol}^{-1} \cdot (-2)} = 0,020 \text{ mol}$ $\xi(\text{OH}^-) = \frac{\Delta n(\text{OH}^-)}{\nu(\text{OH}^-)} = \frac{-0,8 \text{ mol}}{-5} = 0,16 \text{ mol}$	1 BOD

11.3.	<p>Rješenje: <math>\eta = 74,4 \% (\pm 0,1)</math></p> $n(\text{CH}_3\text{CH}_2\text{CHO}) = \frac{m(\text{CH}_3\text{CH}_2\text{CHO})}{M(\text{CH}_3\text{CH}_2\text{CHO})} = \frac{1,00 \text{ g}}{58,06 \text{ g mol}^{-1}} = 0,0172 \text{ mol}$ $n(\text{Cu}_2\text{O})_{\text{teorijska}} = n(\text{CH}_3\text{CH}_2\text{CHO}) = 0,0172 \text{ mol}$ $m(\text{Cu}_2\text{O})_{\text{teorijska}} = 0,0172 \text{ mol} \cdot 143 \text{ g mol}^{-1} = 2,46 \text{ g}$ $\eta_{\text{reakcije}} = \frac{m(\text{Cu}_2\text{O})_{\text{dobivena}}}{m(\text{Cu}_2\text{O})_{\text{teorijska}}} \cdot 100 \% = \frac{1,83 \text{ g}}{2,46 \text{ g}} \cdot 100 \% = 74,4 \%$	1 BOD
11.4.	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$ ili $[\text{Ar}] 3d^9$	1 BOD
12.1.		1 BOD
12.2.		1 BOD
12.3.	supstitucija, nukleofilna supstitucija, esterifikacija	1 BOD
12.4.	III	1 BOD