Nacionalni centar
za vanjsko vrednovanje
obrazovanja

RJEŠENJA ISPITA DRŽAVNE MATURE IZ **KEMIJE**
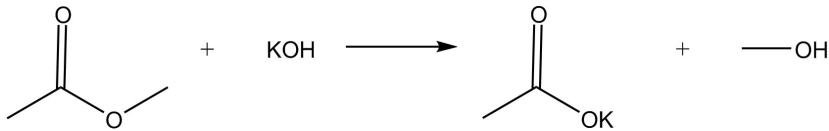## U ŠKOLSKOJ GODINI 2023./2024. (2. rok)

ISPITNA KNJIŽICA 1

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

ISPITNA KNJIŽICA 2
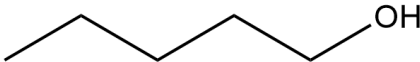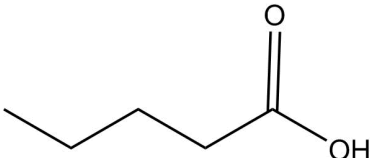
BROJ ZADATKA	TOČAN ODGOVOR	BOD
1.1.	ciklopentan-1,3-diol	**1 BOD**
1.2.	$Ca(ClO_3)_2$	**1 BOD**
2.	XO ili NO $w(O, X_2O) = 0{,}364$, $w(X, X_2O) = 0{,}636$ $w(X, X_2O) = \dfrac{2\,A_r(X)}{2\,A_r(X) + A_r(O)}$ $0{,}636 = \dfrac{2\,A_r(X)}{2\,A_r(X) + 16}$ $0{,}636 \cdot (2\,A_r(X) + 16)) = 2\,A_r(X)$ $1{,}272 \cdot A_r(X) + 10{,}176 - 2\,A_r(X) = 0$ $-0{,}728 \cdot A_r(X) = -10{,}176 \; /:(-0{,}728)$ $A_r(X) = 13{,}978 = 14$ $w(O, X_aO_b) = 0{,}534$, $w(X, X_aO_b) = 0{,}466$ $N(X) : N(O) = \dfrac{w(X)}{A_r(X)} : \dfrac{w(O)}{A_r(O)} = \dfrac{0{,}466}{14} : \dfrac{0{,}534}{16} = 0{,}0333 : 0{,}0333 \; / : 0{,}0333$ $N(X) : N(O) = 1 : 1$ Molekulska formula XO	**1 BOD** **1 BOD**
3.1.	$\Delta_r H = -1299{,}5 \; \text{kJ mol}^{-1}$ $n(C_2H_2) = \dfrac{m}{M} = \dfrac{26{,}020 \text{ g}}{26{,}020 \text{ g mol}^{-1}} = 1 \text{ mol}$ $Q = \Delta_r H \cdot \dfrac{n(C_2H_2)}{\nu(C_2H_2)}$ $\Delta_r H = \dfrac{Q \cdot \nu(C_2H_2)}{n(C_2H_2)} = -1299{,}5 \; \text{kJ mol}^{-1}$	**1 BOD**
3.2.	egzotermna reakcija	**1 BOD**

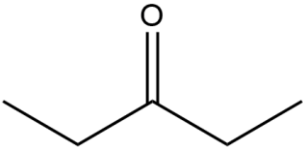| BROJ ZADATKA	TOČAN ODGOVOR	BOD
4.1.	$V(\text{HCl}) = 0{,}019 \text{ L} = 19 \text{ mL}$ $n(\text{Na}_2\text{CO}_3) : n(\text{HCl}) = 1 : 2$ $2\, n(\text{Na}_2\text{CO}_3) = n(\text{HCl})$ $2 \cdot \dfrac{m(\text{Na}_2\text{CO}_3)}{M(\text{Na}_2\text{CO}_3)} = c(\text{HCl}) \cdot V(\text{HCl})$ $V(\text{HCl}) = 2 \cdot \dfrac{m(\text{Na}_2\text{CO}_3)}{M(\text{Na}_2\text{CO}_3) \cdot c(\text{HCl})}$ $V(\text{HCl}) = 2 \cdot \dfrac{0{,}10 \text{ g}}{106 \text{ g mol}^{-1} \cdot 0{,}10 \text{ mol L}^{-1}}$ $V(\text{HCl}) = 0{,}019 \text{ L} = 19 \text{ mL}$	1 BOD
4.2.	lužnata	1 BOD
5.1.	$K_b = 3{,}63 \text{ K kg mol}^{-1}$ $\Delta T = i \cdot K_b \cdot b$ $\Delta T = i \cdot K_b \dfrac{m(\text{I}_2)}{M(\text{I}_2) \cdot m(\text{CHCl}_3)}$ $K_b = \dfrac{\Delta T \cdot M(\text{I}_2) \cdot m(\text{CHCl}_3)}{i \cdot m(\text{I}_2)}$ $K_b = \dfrac{0{,}9 \text{ K} \cdot 254 \text{ g mol}^{-1} \cdot 0{,}100 \text{ kg}}{1 \cdot 6{,}3 \text{ g}} = 3{,}63 \text{ K kg mol}^{-1}$	1 BOD
5.2.		1 BOD
6.1.	III ili tri	1 BOD

BROJ ZADATKA	TOČAN ODGOVOR	BOD
6.2.		**1 BOD**
6.3.	$v = 0{,}0375\ \text{mol dm}^{-3}\,\text{min}^{-1}$ $v = -\dfrac{\Delta c(\text{X})}{\Delta t} = -\dfrac{(0{,}065-0{,}215)\,\text{mol dm}^{-3}}{(4-0)\,\text{min}}$ $v = -\dfrac{-0{,}15\,\text{mol dm}^{-3}}{4\,\text{min}} = 0{,}0375\,\text{mol dm}^{-3}\,\text{min}^{-1}$	**1 BOD**
7.1.	$V = 2{,}70\ \text{mL}$	**1 BOD**
7.2.	$\text{A}(+): 2\,\text{H}_2\text{O}(\ell) \rightarrow \text{O}_2(g) + 4\,\text{H}^+(aq) + 4\,\text{e}^-$	**1 BOD**
7.3.	$t = 26{,}8\ \text{h}$ $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2(g) + \dfrac{1}{2}\,\text{O}_2(g)$ $Q = I \cdot t = n \cdot z \cdot F$ $t = \dfrac{n \cdot z \cdot F}{I} = \dfrac{1\,\text{mol} \cdot 2 \cdot 9{,}65 \times 10^4\ \text{C mol}^{-1}}{2\,\text{A}} = 96\,500\ \text{s}$ $t = 26{,}8\ \text{h}$	**1 BOD**
8.1.	$\text{pH} = 2$ $\xi(\text{NaOH}) = \dfrac{\Delta m(\text{NaOH})}{M(\text{NaOH}) \cdot \nu(\text{NaOH})} = \dfrac{-2\,\text{g}}{40{,}01\,\text{g mol}^{-1} \cdot (-2)} = 0{,}025\ \text{mol}$ $\xi(\text{H}_2\text{SO}_4) = \dfrac{\Delta c(\text{H}_2\text{SO}_4) \cdot V(\text{H}_2\text{SO}_4)}{\nu(\text{H}_2\text{SO}_4)} = \dfrac{-0{,}13\,\text{mol L}^{-1} \cdot 0{,}2\,\text{L}}{-1} = 0{,}026\ \text{mol}$ $n(\text{H}_2\text{SO}_4)_{\text{suvišak}} = 0{,}026\ \text{mol} - 0{,}025\ \text{mol} = 0{,}001\ \text{mol}$ $n(\text{H}_3\text{O}^+) = 2 \cdot 0{,}001\ \text{mol} = 0{,}002\ \text{mol}$ $c(\text{H}_3\text{O}^+) = \dfrac{n(\text{H}_3\text{O}^+)}{V(\text{otopine})} = \dfrac{0{,}002\,\text{mol}}{0{,}2\,\text{L}} = 0{,}01\ \text{mol L}^{-1}$ $\text{pH} = -\log\left(\dfrac{c(\text{H}_3\text{O}^+)}{\text{mol L}^{-1}}\right) = -\log\left(\dfrac{0{,}01\,\text{mol L}^{-1}}{\text{mol L}^{-1}}\right) = 2$	**1 BOD** **1 BOD**

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8.2.	hidrogensulfatni ion ili HSO_4^-	**1 BOD**
9.1.	$Mg(OH)_2$	**1 BOD**
9.2.	$Mg_3N_2 + 6\,H_2O \rightarrow 3\,Mg(OH)_2 + 2\,NH_3$	**1 BOD**
9.3.	$N_2 + 6\,e^- \rightarrow 2\,N^{3-}$	**1 BOD**
9.4.	2, 8, 2	**1 BOD**
10.1.	$p(CO) = 1,87$ bar $K_p = \dfrac{p^2(CO)}{p(CO_2)}$ $p(CO) = \sqrt{K_p \cdot p(CO_2)} = 1,87$ bar	**1 BOD**
10.2.	$N(CO_2) = 4,65 \times 10^{21}$ $p(CO_2) = \dfrac{n(CO_2) \cdot R \cdot T}{V}$ $p(CO_2) = \dfrac{\dfrac{N(CO_2)}{N_A} \cdot R \cdot T}{V}$ $N(CO_2) = \dfrac{p(CO_2) \cdot V \cdot N_A}{R \cdot T}$ $N(CO_2) = 4,65 \times 10^{21}$	**1 BOD**
10.3.	Ravnoteža se pomiče prema produktima.	**1 BOD**
10.4.	dipol – dipol	**1 BOD**
11.1.		**1 BOD**
11.2.		**1 BOD**

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11.3.	nukleofilna adicija, adicija	1 BOD
11.4.		1 BOD
12.1.	hidroksilna skupina	1 BOD
12.2.	$w(H) = 4,6\ \%$ $w(\mathrm{H}) = \dfrac{8 \cdot A_r(\mathrm{H})}{M_r(\mathrm{C_6H_8O_6})} = \dfrac{8,08}{176,08} = 0,046 = 4,6\ \%$	1 BOD
12.3.	$I_2 + I^- \rightleftharpoons I_3^-$	1 BOD
12.4.	[Xe]	1 BOD