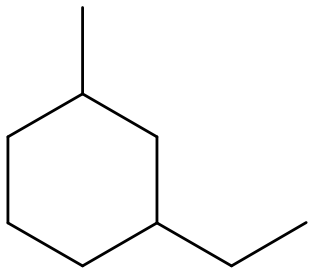
Nacionalni centar za vanjsko vrednovanje obrazovanja

RJEŠENJA OGLEDNOGA ISPITA DRŽAVNE MATURE IZ **KEMIJE**
U ŠKOLSKOJ GODINI 2021./2022.

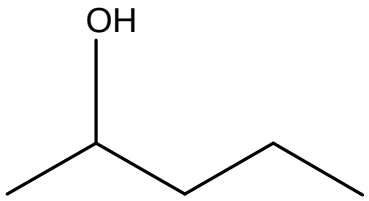
ISPITNA KNJIŽICA 1

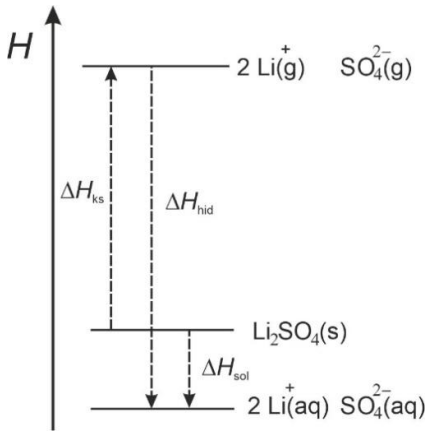
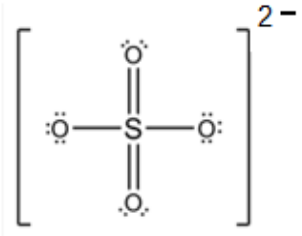
BROJ ZADATKA	ODGOVOR
1.	D
2.	A
3.	D
4.	D
5.	D
6.	B
7.	D
8.	C
9.	D
10.	A
11.	D
12.	B
13.	B
14.	B
15.	D
16.	C
17.	C
18.	B
19.	C
20.	B
21.	A
22.	B
23.	D
24.	C
25.	B
26.	B
27.	D
28.	A
29.	A
30.	A
31.	A
32.	A
33.	B
34.	B
35.	C

ISPITNA KNJIŽICA 2

BR. ZAD.	ODGOVOR	BOD
1.1.		**1 BOD**
1.2.	N_2O_3	**1 BOD**
2.	$N(\text{C}) = \frac{w(\text{C}) \cdot M_r(\text{spoj})}{A_r(\text{C})} = \frac{0{,}40 \cdot 60{,}06}{12{,}01} = 2$ $N(\text{H}) = \frac{w(\text{H}) \cdot M_r(\text{spoj})}{A_r(\text{H})} = \frac{0{,}067 \cdot 60{,}06}{1{,}01} = 4$ $N(\text{O}) = \frac{w(\text{O}) \cdot Mr(\text{spoj})}{A_r(\text{O})} = \frac{0{,}533 \cdot 60{,}06}{16{,}0} = 2$ $N(\text{C}) : N(\text{H}) : N(O) = 2 : 4 : 2$ Molekulska formula spoja jest $C_2H_4O_2$. $\frac{C_2H_4O_2}{2} = CH_2O$ Empirijska formula spoja jest CH_2O.	**1 BOD** za empirijsku formulu ili izraz za brojnost pojedinih atoma **1 BOD** za točno napisanu molekulsku formulu
3.1.	Plošno-centrirana kubična jedinična ćelija	**1 BOD**
3.2.	$V(\text{jedinične ćelije}) = a^3 = (409\ \text{pm})^2 = 6{,}84 \cdot 10^7\ \text{pm}^3$ $Z = 4$ $V(\text{atom,srebro}) = \frac{\varphi \cdot V(\text{jedinične ćelije})}{Z} = \frac{0{,}74 \cdot 6{,}84 \cdot 10^7\ \text{pm}^3}{4} = 1{,}26 \cdot 10^7\ \text{pm}^3$ V(atom, srebro) = $1{,}26 \cdot 10^7\ \text{pm}^3$	**1 BOD**
4.1.	$CH_3CH_2OH \xrightarrow{H_2SO_4} H_2C{=}CH_2 + H_2O$	**1 BOD**
4.2.	$H_2C{=}CH_2 + Br_2 \rightarrow Br - H_2C - CH_2 - Br$	**1 BOD**
5.1.	$CH_3CH_2COOH(aq) + H_2O(\ell) \rightleftharpoons CH_3CH_2COO^-(aq) + H_3O^+(aq)$	**1 BOD**

5.2.	$K_a = \dfrac{c\left(H_3O^+\right)\cdot c\left(CH_3CH_2COO^-\right)}{c\left(CH_3CH_2COOH\right)}$ $c_{uk}\left(CH_3CH_2COOH\right) = c\left(CH_3CH_2COO^-\right) + c\left(CH_3CH_2COOH\right)$ $\alpha = \dfrac{c\left(CH_3CH_2COO^-\right)}{c_{uk}\left(CH_3CH_2COOH\right)}$ $K_a = \dfrac{\left(\alpha\cdot c_{uk}\left(CH_3CH_2COOH\right)\right)^2}{(1-\alpha)c_{uk}\left(CH_3CH_2COOH\right)} \approx \alpha^2\cdot c_{uk}\left(CH_3CH_2COOH\right)$ $\alpha = \sqrt{\dfrac{K_a}{c_{uk}\left(CH_3CH_2COOH\right)}} = \sqrt{\dfrac{1{,}34\times10^{-5}\,\text{mol L}^{-1}}{1{,}0\ \text{mol L}^{-1}}} = 3{,}66\times10^{-3} = 0{,}366\ \%$ α = 0,366 %	**1 BOD**
6.	$m(C_2H_6O_2) = \rho(C_2H_6O_2)\cdot V(C_2H_6O_2) = 1110\ \text{g dm}^{-3}\cdot 1\ \text{dm}^3 = 1110\ \text{g}$ $m(H_2O) = \rho(H_2O)\cdot V(H_2O) = 1\ \text{kg dm}^{-3}\cdot 1\ \text{dm}^3 = 1\ \text{kg}$ $b(C_2H_6O_2) = \dfrac{n(C_2H_6O_2)}{m(H_2O)} = \dfrac{m(C_2H_6O_2)}{M(C_2H_6O_2)\cdot m(H_2O)} = \dfrac{1110\ \text{g}}{62{,}06\ \text{g mol}^{-1}\cdot 1\ \text{kg}} = 17{,}89\ \text{mol kg}^{-1}$ $\Delta T = i\cdot K_f\cdot b = 1\cdot 1{,}86\ \text{K kg mol}^{-1}\cdot 17{,}89\ \text{mol kg}^{-1} = 33{,}3\ \text{K}$ $t_L = 0\ °\text{C} - 33{,}3\ °\text{C} = -33{,}3\ °\text{C}$ $T_L = 273\ \text{K} - 33{,}3\ \text{K} = 239{,}7\ \text{K}$ t_L = –33,3 °C, T_L = 239,7 K	**1 BOD** za točno izračunatu **masu** $C_2H_6O_2$ i H_2O **1 BOD** za točno izračunatu **molalnost** $C_2H_6O_2$ **1 BOD** za točno izračunato **ledište**
7.1.	$\text{pOH} = -\log(c(OH^-)/\ \text{mol L}^{-1}) = -\log 10^{-4} = 4$ $\text{pH} + \text{pOH} = 14 \Rightarrow \text{pH} = 14 - \text{pOH} = 14 - 4 = 10$ pH vodene otopine u boci B pH = 10	**1 BOD**
7.2.	$c_2(HCl) = \dfrac{c_1(HCl)\cdot V_1(HCl)}{V_2(HCl)} = \dfrac{10^{-3}\ \text{mol dm}^{-3}\cdot 20\ \text{mL}}{100\ \text{mL}} = 2\times10^{-4}\ \text{mol dm}^{-3}$ $\text{pH} = -\log\left(c(H^+)/\text{mol dm}^{-3}\right) = 3{,}7$ c(otopina) = $2\cdot10^{-4}$ mol dm^{-3} pH = 3,7	**1 BOD** za točno izračunatu koncentraciju **1 BOD** za točno izračunatu pH-vrijednost

8.1.	$\frac{v(\mathrm{A})}{v(\mathrm{C})} = \frac{\Delta n(\mathrm{A})}{\Delta n(\mathrm{C})} = \frac{\Delta c(\mathrm{A}) \cdot V}{\Delta c(\mathrm{C}) \cdot V} = \frac{\Delta c(\mathrm{A})}{\Delta c(\mathrm{C})}$ $\Delta c(\mathrm{C}) = \Delta c(\mathrm{A}) \cdot \frac{v(\mathrm{C})}{v(\mathrm{A})} = -2\ \mathrm{mmol\ dm^{-3}} \cdot \frac{3}{-1} = 6\ \mathrm{mmol\ dm^{-3}}$ $\Delta c(\mathrm{C}) = c(\mathrm{C})_2 - c(\mathrm{C})_1$ $c(\mathrm{C})_2 = \Delta c(\mathrm{C}) + c(\mathrm{C})_1 = 6\ \mathrm{mmol\ dm^{-3}} + 0\ \mathrm{mmol\ dm^{-3}} = 6\ \mathrm{mmol\ dm^{-3}}$ $c(\mathrm{C}) = 6\ \mathrm{mmol\ dm^{-3}}$	**1 BOD**
8.2.	$\bar{v} = \frac{\Delta c(\mathrm{A})}{\nu(\mathrm{A}) \cdot \Delta t} = \frac{-2\ \mathrm{mmol\ dm^{-3}}}{-1 \cdot 5\ \mathrm{min}} = 0{,}4\ \mathrm{mmol\ dm^{-3}\ min^{-1}}$ Prosječna brzina kemijske reakcije jest 0,4 mmol dm^{-3} min^{-1}.	**1 BOD**
8.3.	Ravnoteža će se pomaknuti ulijevo prema reaktantima.	**1 BOD**
9.1.	eliminaciji	**1 BOD**
9.2.	$CH_3CH_2CH_2CH{=}CH_2 + HCl \rightarrow CH_3CH_2CH_2CH(Cl)CH_3$	**1 BOD**
9.3.		**1 BOD**
9.4.	II	**1 BOD**
10.1.	$Mn^{2+}(aq) + Ce^{4+}(aq) \rightarrow Mn^{3+}(aq) + Ce^{3+}(aq)$	**1 BOD**
10.2.	$K = \frac{\left[Ce^{3+}\right] \cdot \left[Mn^{3+}\right]}{\left[Ce^{4+}\right] \cdot \left[Mn^{2+}\right]} = 15 \cdot 215 = 3225$ $K_c = 3225$	**1 BOD**
10.3.	Povećat će se koncentracija Mn^{3+} iona.	**1 BOD**
10.4.	$1s^2\ 2\ s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^2$ ili $[Ar]\ 4s^2\ 3d^2$	**1 BOD**
11.1.	egzoterman	**1 BOD**

11.2.		**1 BOD**
11.3.		**1 BOD**
11.4.	tetraedarske	**1 BOD**
12.1.	elektrolitski most	**1 BOD**
12.2.	$Fe(s) \mid Fe^{2+}(aq) \mid\mid Ag^{+}(aq) \mid Ag(s)$ ili $Fe(s) \mid Fe^{2+}(aq) \,\vdots\vdots\, Ag^{+}(aq) \mid Ag(s)$	**1 BOD**
12.3.	$Fe(s) \rightarrow Fe^{2+}(aq) + 2\,e^{-}$	**1 BOD**
12.4.	Kemijska energija pretvara se u električnu energiju.	**1 BOD**