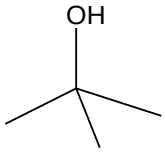
Nacionalni centar za vanjsko vrednovanje obrazovanja

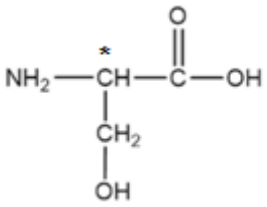
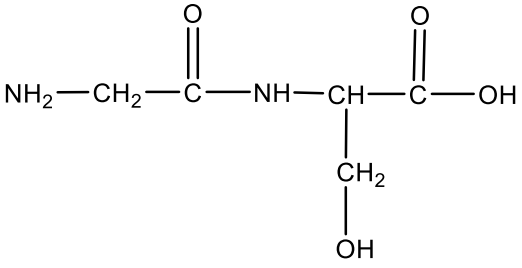
RJEŠENJA ISPITA IZ KEMIJE NA JESENSKOM ROKU
DRŽAVNE MATURE SERIJE D-S042
Rujan 2020.

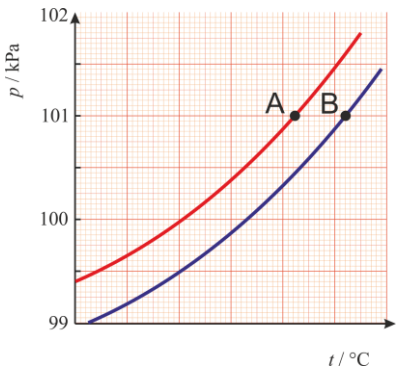
ISPITNA KNJIŽICA 1

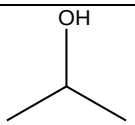
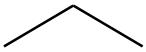
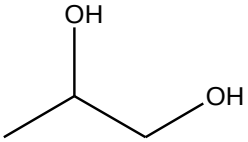
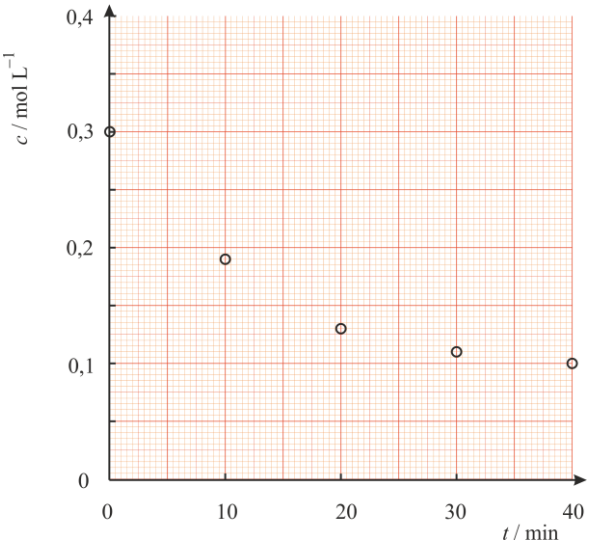
Redni broj zadatka	ODGOVOR
1.	**C.**
2.	**D.**
3.	**D.**
4.	**D.**
5.	**B.**
6.	**D.**
7.	**B.**
8.	**D.**
9.	**B.**
10.	**B.**
11.	**B.**
12.	**A.**
13.	**D.**
14.	**D.**
15.	**A.**
16.	**B.**
17.	**B.**
18.	**A.**
19.	**B.**
20.	**C.**
21.	**C.**
22.	**A.**
23.	**A.**
24.	**A.**
25.	**C.**
26.	**B.**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

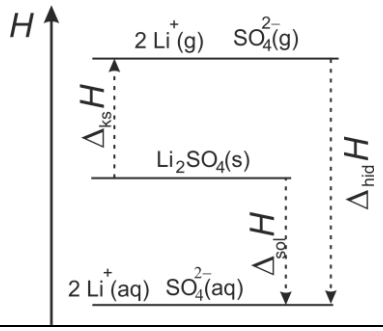
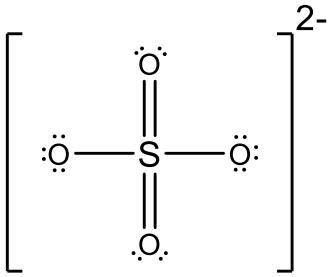
ISPITNA KNJIŽICA 2

Redni broj	ODGOVOR	BOD
1.1.	heksan – 1,3,6 – triol	**1 BOD**
1.2.	$MgCO_3$	**1 BOD**
2.1.		**1 BOD**
2.2.	vodikova veza	**1 BOD**
3.	$\rho = \frac{m_{\text{j.ć.}}}{V_{\text{j.ć.}}} = \frac{N(\text{W}) \cdot m_a}{\text{a}^3} = \frac{N(\text{W}) \cdot A_\text{r}(\text{W}) \cdot \text{u}}{\text{a}^3}$ $N(\text{W}) = \frac{\rho(\text{W}) \cdot \text{a}^3}{m_a} = \frac{\rho(\text{W}) \cdot \text{a}^3}{A_\text{r}(\text{W}) \cdot \text{u}} = \frac{19{,}3\ \text{g cm}^{-3} \cdot (316{,}4 \times 10^{-10}\ \text{cm})^3}{184 \times 1{,}66 \times 10^{-24}\ \text{g}} = 2$ ***N(W)* = 2** ili $m_a = A_\text{r}(\text{W}) \cdot \text{u} = 184 \times 1{,}66 \times 10^{-24}\ \text{g} = 3{,}05 \times 10^{-22}\ \text{g}$ $N(\text{W}) = \frac{\rho(\text{W}) \cdot \text{a}^3}{m_a} = \frac{19{,}3\ \text{g cm}^{-3} \cdot (316{,}4 \times 10^{-10}\ \text{cm})^3}{3{,}05 \times 10^{-22}\ \text{g}} = 2$	**1 BOD** za izvod ili izračunatu masu atoma volframa **1 BOD** za broj atoma

4.	$n(\mathrm{C}) = \frac{m(\mathrm{C})}{M(\mathrm{C})} = \frac{4{,}80\ \mathrm{g}}{12{,}0\ \mathrm{g\ mol^{-1}}} = 0{,}4\ \mathrm{mol}$ $n(\mathrm{H}) = \frac{m(\mathrm{H})}{M(\mathrm{H})} = \frac{1{,}01\ \mathrm{g}}{1{,}01\ \mathrm{g\ mol^{-1}}} = 1{,}0\ \mathrm{mol}$ $n(\mathrm{C}) : n(\mathrm{H}) = N(\mathrm{C}) : N(\mathrm{H}) = 0{,}4\ \mathrm{mol} : 1{,}0\ \mathrm{mol}\ /{:}0{,}4\ \mathrm{mol}$ $n(\mathrm{C}) : n(\mathrm{H}) = N(\mathrm{C}) : N(\mathrm{H}) = 1 : 2{,}5\ /\cdot 2$ $n(\mathrm{C}) : n(\mathrm{H}) = N(\mathrm{C}) : N(\mathrm{H}) = 2 : 5 \Rightarrow$ Empirijska formula C_2H_5 Molekulska formula $= \frac{M_r(\mathrm{spoj})}{M_r(C_2H_5)} = \frac{58{,}1}{29{,}05} = 2$ **Molekulska formula $(C_2H_5)_2$ = C_4H_{10}** ili $m(\mathrm{C}) : m(\mathrm{H}) = 4{,}8$ $x \cdot Ar(\mathrm{C}) + y \cdot Ar(\mathrm{H}) = 58{,}1$ $\frac{x \cdot Ar(\mathrm{C})}{y \cdot Ar(\mathrm{H})} = 4{,}8$ $\left\{ \begin{array}{l} 12\,x + y = 58{,}1 \\ \frac{12\,x}{y} = 4{,}8 \end{array} \right\} \Rightarrow y = 10,\ x = 4$ Molekulska formula C_4H_{10}	**1 BOD** za točno napisanu molekulsku formulu **1 BOD** za empirijsku formulu ili usporedbu brojnosti pojedinih atoma ili bez empirijske formule oba boda.
5.1.		**1 BOD**
5.2.		**1 BOD**
6.1.	Aluminija, Al	**1 BOD**

6.2.	$Ni^{2+} + 2\ e^- \rightarrow Ni$	**1 BOD**
6.3.	$Ni + 2\ Ag^+ \rightarrow Ni^{2+} + 2\ Ag$	**1 BOD**
7.1.	$\Delta T = i \cdot K_f \cdot b$ $b = \frac{\Delta T}{i \cdot K_f} = \frac{3{,}0\ K}{1 \cdot 1{,}86\ K\ kg\ mol^{-1}} = 1{,}61\ mol\ kg^{-1}$ $M(šećer) = \frac{m(šećer)}{b \cdot m(šećer)} = \frac{24{,}0\ g}{1{,}61\ mol\ kg^{-1} \cdot 0{,}1\ kg} = 0{,}149\ kg\ mol^{-1} = 149\ g\ mol^{-1}$ $b = 1{,}61\ mol\ kg^{-1}$ $M(šećer) = 0{,}149\ kg\ mol^{-1} = 149\ g\ mol^{-1}$ ili Ako je izračunato direktno preko formule onda za izvod jednadžbe 1 BOD i 1 BOD za konačno rješenje $M(šećer) = 0{,}149\ kg\ mol^{-1} = 149\ g\ mol^{-1}$ $\Delta T = i \cdot K_f \cdot b = i \cdot K_f \cdot \frac{n(šećer)}{m(H_2O)} = \frac{i \cdot K_f \cdot \frac{m(šećer)}{M(šećer)}}{m(H_2O)} = \frac{i \cdot K_f \cdot m(šećer)}{M(šećer) \cdot m(H_2O)}$ $M(šećera) = \frac{i \cdot K_f \cdot m(šećer)}{\Delta T \cdot m(H_2O)} = \frac{1 \cdot 1{,}86\ K\ kg\ mol^{-1} \cdot 24{,}0\ g}{3{,}0\ K\ \cdot 0{,}1\ kg} = 149\ g\ mol^{-1}$	**1 BOD** **1 BOD**
7.2.		**1 BOD**
8.	$H_3O^+(aq) + OH^-(aq) \rightarrow 2\ H_2O(\ell)$ $n(HCl) = c(HCl) \cdot V(HCl) = 0{,}040\ mol\ L^{-1} \times 0{,}015\ L = 6 \times 10^{-4}\ mol$ $n(H_3O^+) = n(HCl) = 6 \times 10^{-4}\ mol$ $n(Sr(OH)_2) = c(Sr(OH)_2) \cdot V(Sr(OH)_2) = 0{,}010\ mol\ L^{-1} \times 0{,}06\ L = 6 \times 10^{-4}\ mol$ $n(OH^-) = 2n(Sr(OH)_2) = 1{,}2 \times 10^{-3}\ mol$ $n(OH^-)_{suvišak} = 1{,}2 \times 10^{-3}\ mol - 6 \times 10^{-4}\ mol = 6 \times 10^{-4}\ mol$	**1 BOD** za množinu u suvišku

	$c(OH^-) = \frac{n(OH^-)}{V_{ukupno}} = \frac{6\times10^{-4}\ mol}{0{,}075\ L} = 8\times10^{-3}\ mol\ L^{-1}$ 1 BOD za izračunatu $c(OH^-)$ $pOH = -\log(c(OH^-)/mol\ L^{-1}) = -\log\ 8\times10^{-3} = 2{,}1$ $pH = 14 - pOH = 11{,}9$ **pH = 11,9**	**1 BOD** za izračunatu $c(OH^-)$ **1 BOD** pH – vrijednost
9.1.	Spoj A 	**1 BOD**
9.2.	Spoj B 	**1 BOD**
9.3.	Spoj C 	**1 BOD**
9.4.	adicija, katalitičko hidrogeniranje, redukcija	**1 BOD**
10.1.		**1 BOD**
10.2.	$\bar{v}(H_2O_2) = -\frac{\Delta c}{\Delta t} = -\frac{(0{,}13 - 0{,}19)\ mol\ L^{-1}}{(20 - 10)\ min} = 6\times10^{-3}\ mol\ L^{-1}\ min^{-1}$	**1 BOD**
10.3.	$\Delta n(H_2O_2) = \Delta c \cdot V = (0{,}30 - 0{,}13)\ mol\ L^{-1} \cdot 1\ L = 0{,}17\ mol$	**1 BOD**
10.4.	Katalaza ubrzava raspad vodikova peroksida.	**1 BOD**

11.1.	egzoterman	**1 BOD**
11.2.		**1 BOD**
11.3.		**1 BOD**
11.4.	**tetraedarske**	**1 BOD**
12.1.	**U vodi.**	**1 BOD**
12.2.	$n(\mathrm{P_4}) = \frac{11{,}5\ \mathrm{g}}{124\ \mathrm{g\ mol^{-1}}} = 0{,}0927\ \mathrm{mol}$ $n(\mathrm{Cl_2}) = \frac{11{,}2\ \mathrm{dm^3}}{22{,}4\ \mathrm{dm^3\ mol^{-1}}} = 0{,}500\ \mathrm{mol}$ $\frac{n(\mathrm{P_4})}{1} = 0{,}0927\ \mathrm{mol}$ $\frac{n(\mathrm{Cl_2})}{6} = 0{,}0833\ \mathrm{mol} \Rightarrow$ mjerodavni reaktant $n(\mathrm{PCl_3}) : n(\mathrm{Cl_2}) = 4 : 6 = 2 : 3$ $n(\mathrm{PCl_3}) = \frac{2}{3} n(\mathrm{Cl_2}) = \frac{2}{3} \cdot 0{,}500\ \mathrm{mol} = 0{,}333\ \mathrm{mol}$ $m(\mathrm{PCl_3})_{\mathrm{teoretska}} = n(\mathrm{PCl_3}) \cdot M(n(\mathrm{PCl_3}) = 0{,}333\ \mathrm{mol} \cdot 137{,}5\ \mathrm{g\ mol^{-1}} =$ $= 45{,}8\ \mathrm{g}$ $\eta = \frac{m(\mathrm{dobivena})}{m(\mathrm{teoretska})} = \frac{42{,}6\ \mathrm{g}}{45{,}8\ \mathrm{g}} = 0{,}930 \cdot 100 = 93{,}0\ \%$	**1 BOD** za točno izračunate množine fosfora i klora **1 BOD** za točno izračunatu teoretsku masu ili množinu fosforova (III) klorida **1 BOD** za točno izračunato iskorištenje reakcije