

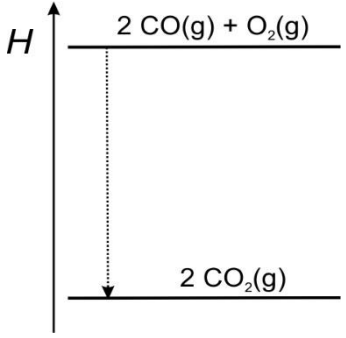
**RJEŠENJA ISPITA DRŽAVNE MATURE IZ KEMIJE
U ŠKOLSKOJ GODINI 2021./2022. (jesenski rok)**

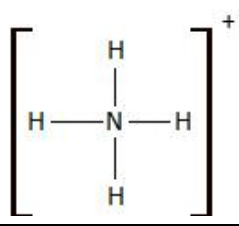
ISPITNA KNJIŽICA 1

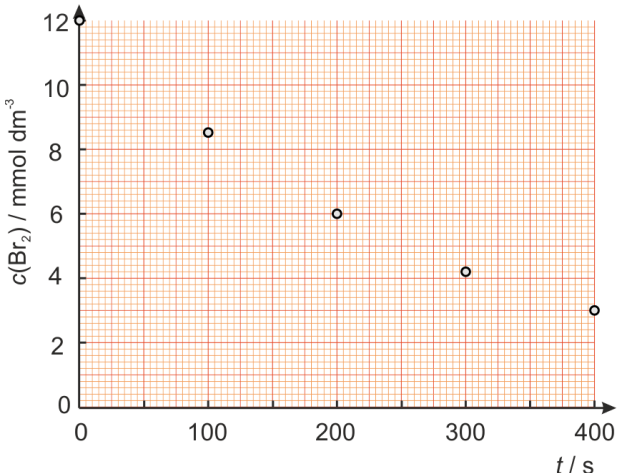

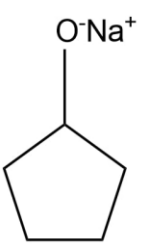
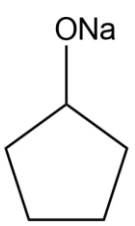
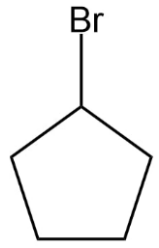
Redni broj zadatka	ODGOVOR
1.	B
2.	C
3.	A
4.	B
5.	B
6.	A
7.	B
8.	C
9.	B
10.	A
11.	B
12.	C
13.	C
14.	B
15.	C
16.	C
17.	D
18.	C
19.	D
20.	C
21.	A
22.	A
23.	A
24.	C
25.	B
26.	C
27.	D
28.	D
29.	C
30.	B
31.	A
32.	B
33.	C
34.	A
35.	C

ISPITNA KNJIŽICA 2

Redni broj zadatka	ODGOVOR	BOD
1.1.	$ \begin{array}{c} \text{OH} \\ \\ \text{H}_3\text{C} - \text{C} - \text{CH}_3 \\ \\ \text{CH}_3 \end{array} $	1 BOD
1.2.	CaSO ₄ · 2 H ₂ O	1 BOD
2.	<p>HCOOH ⇌ H⁺ + HCOO⁻</p> <p>$K_a(\text{HCOOH}) = 10^{-3,75} \text{ mol dm}^{-3} = 1,78 \times 10^{-4} \text{ mol dm}^{-3}$</p> $K_a(\text{HCOOH}) = \frac{[\text{H}^+][\text{HCOO}^-]}{c(\text{HCOOH})} = \frac{[\text{H}^+]^2}{c_0(\text{HCOOH}) - [\text{H}^+]}$ <p>Koncentracija [H⁺] može se izračunati rješavanjem kvadratne jednadžbe ili pojednostavljenjem ($c_0(\text{HCOOH}) \gg [\text{H}^+]$)</p> $K_a(\text{HCOOH}) = \frac{[\text{H}^+]^2}{c_0(\text{HCOOH})}$ $[\text{H}^+] = \sqrt{K_a(\text{HCOOH}) \cdot c_0(\text{HCOOH})}$ $[\text{H}^+] = \sqrt{1,78 \times 10^{-4} \text{ mol dm}^{-3} \cdot 2,5 \times 10^{-3} \text{ mol dm}^{-3}}$ $[\text{H}^+] = 6,67 \times 10^{-4} \text{ mol dm}^{-3}$ $\text{pH} = -\log\left(\frac{6,67 \times 10^{-4} \text{ mol dm}^{-3}}{\text{mol dm}^{-3}}\right) = 3,18$ $\text{pOH} = 14 - 3,18 = 10,82$ <p>ili $[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{10^{-14} \text{ mol}^2 \text{ dm}^{-6}}{6,67 \times 10^{-4} \text{ mol dm}^{-3}} = 1,5 \times 10^{-11} \text{ mol dm}^{-3}$</p> $\text{pOH} = -\log\left(\frac{1,5 \times 10^{-11} \text{ mol dm}^{-3}}{\text{mol dm}^{-3}}\right) = 10,82$ <p>Rješavanjem kvadratne jednadžbe: pOH = 10,77. Priznaju se oba postupka.</p>	<p>1 BOD za točno izračunatu koncentraciju H⁺</p> <p>1 BOD za točno izračunatu pOH vrijednost</p>
3.	<p>Parcijalni tlakovi u ravnotežnom stanju :</p> $p(\text{HI}) = 0 + 0,328 \text{ bar} = 0,328 \text{ bar}$ $p(\text{H}_2) = 0,239 \text{ bar} - \frac{1}{2} \cdot 0,328 \text{ bar} = 0,075 \text{ bar}$ $p(\text{I}_2) = 0,194 \text{ bar} - \frac{1}{2} \cdot 0,328 \text{ bar} = 0,030 \text{ bar}$ $K_p = \frac{p(\text{HI})^2}{p(\text{H}_2) \cdot p(\text{I}_2)} = \frac{(0,328 \text{ bar})^2}{0,075 \text{ bar} \cdot 0,030 \text{ bar}} = 47,8$	<p>1 BOD za točno izračunate parcijalne tlakove u ravnoteži</p> <p>1 BOD za točno izračunatu tlačnu konstantu</p>

4.1.		1 BOD
4.2.	$\Delta_r H = 2 \Delta_b H(\text{CO}) + \Delta_b H(\text{O}=\text{O}) - 4 \Delta_b H(\text{C}=\text{O})$ $\Delta_b H(\text{CO}) = \frac{1}{2} [\Delta_r H - \Delta_b H(\text{O}=\text{O}) + 4 \Delta_b H(\text{C}=\text{O})]$ $\Delta_b H(\text{CO}) = \frac{1}{2} [-566 \text{ kJ mol}^{-1} - 494 \text{ kJ mol}^{-1} + 4 \cdot 799 \text{ kJ mol}^{-1}]$ $\Delta_b H(\text{CO}) = 1068 \text{ kJ mol}^{-1}$	1 BOD
5.	$n(\text{Al}) = \frac{m(\text{Al})}{M(\text{Al})} = \frac{0,07 \text{ g}}{27 \text{ g mol}^{-1}} = 0,0026 \text{ mol} = 2,6 \times 10^{-3} \text{ mol}$ $\xi(\text{Al}) = \frac{\Delta n(\text{Al})}{\nu} = \frac{-2,6 \times 10^{-3} \text{ mol}}{-2} = 1,3 \times 10^{-3} \text{ mol}$ $n(\text{HCl}) = c(\text{HCl}) \cdot V(\text{HCl})$ $= 5,7 \text{ mol/L} \cdot 0,012 \text{ L}$ $= 0,0684 \text{ mol} = 6,84 \times 10^{-2} \text{ mol}$ $\xi(\text{HCl}) = \frac{\Delta n(\text{HCl})}{\nu} = \frac{-6,84 \times 10^{-2} \text{ mol}}{-6} = 1,14 \times 10^{-2} \text{ mol}$ <p>Mjerodavni reaktant je aluminij. Priznaje se svaki drugi točan postupak.</p>	<p>1 BOD za točno izračunate množine Al i HCl</p> <p>1 BOD za točno određen mjerodavni reaktant</p>
6.1.	$p = p^0 \cdot x(\text{metanol}) = 3386 \text{ Pa} \cdot 0,78 = 2641 \text{ Pa}$	1 BOD
6.2.	$x(\text{metanol}) = \frac{n(\text{metanol})}{n(\text{metanol}) + n(\text{T})}$ $0,78 = \frac{1}{1 + n(\text{T})}$ $n(\text{T}) = 0,282 \text{ mol}$ $M(\text{T}) = \frac{16,3 \text{ g}}{0,282 \text{ mol}} = (58 \pm 0,3) \text{ g mol}^{-1}$	1 BOD
6.3.	$\text{CO} + 2 \text{H}_2 \rightarrow \text{CH}_3\text{OH}$	1 BOD

7.1.	$\frac{54,6 \text{ g MgCl}_2}{100 \text{ g H}_2\text{O}} = \frac{x \text{ g MgCl}_2}{60,0 \text{ g H}_2\text{O}}$ $x = \frac{54,6 \text{ g} \cdot 60,0 \text{ g}}{100 \text{ g}} = 32,8 \text{ g}$ $m = 32,8 (\pm 0,1) \text{ g}$ <p>Priznaje se svaki drugi točan postupak.</p>	1 BOD
7.2.	$w(\text{MgX}_2) = \frac{m(\text{MgX}_2)}{m(\text{otopine})} = \frac{54,6 \text{ g}}{154,6 \text{ g}} = 0,353 = 35,3 \% \text{ ILI}$ $w(\text{MgX}_2) = \frac{m(\text{MgX}_2)}{m(\text{otopine})} = \frac{32,8 \text{ g}}{92,8 \text{ g}} = 0,353 = 35,3 \%$	1 BOD
7.3.	magnezijev klorid	1 BOD
8.1.	$E^\circ(\text{Cu}^{2+}(\text{aq}) \text{Cu}(\text{s})) = 342 \text{ mV} = 0,342 \text{ V}$ $E^\circ = E^\circ(\text{Cu}^{2+}(\text{aq}) \text{Cu}(\text{s})) - E^\circ(\text{M}^{2+}(\text{aq}) \text{M}(\text{s}))$ $E^\circ(\text{M}^{2+}(\text{aq}) \text{M}(\text{s})) = 0,342 \text{ V} - 0,479 \text{ V} = -0,137 \text{ V}$ <p>kositar, Sn</p>	<p>1 BOD za točno izračunat elektrodni potencijal</p> <p>1 BOD za točno određen metal</p>
8.2.	$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$	1 BOD
9.1.	$\text{HCl}(\text{aq}) + \text{NaOH}(\text{aq}) \rightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\ell)$ $\text{H}_3\text{O}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow 2 \text{H}_2\text{O}(\ell)$ $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\ell)$	1 BOD
9.2.	fenolftalein	1 BOD
9.3.	$V(\text{NaOH}) = 29,55 \text{ mL} (\pm 0,05)$	1 BOD
9.4.	$\text{HCl}(\text{aq}) + \text{NaOH}(\text{aq}) \rightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\ell)$ $n(\text{HCl}) = n(\text{NaOH})$ $c(\text{HCl}) \cdot V(\text{HCl}) = c(\text{NaOH}) \cdot V(\text{NaOH})$ $c(\text{HCl}) = \frac{c(\text{NaOH}) \cdot V(\text{NaOH})}{V(\text{HCl})} = \frac{0,1050 \text{ mol dm}^{-3} \cdot 29,55 \text{ cm}^3}{25,00 \text{ cm}^3} = 0,1241 \text{ mol dm}^{-3}$ $c(\text{HCl}) = (0,1241 \pm 0,0002) \text{ mol dm}^{-3}$	<p>1 BOD za ispravno izračunatu množinsku koncentraciju</p> <p>$c(\text{HCl}) = 0,1241 \text{ mol dm}^{-3}$ s postupkom</p>
10.1.	kovalentna i ionska veza	1 BOD
10.2.		1 BOD
10.3.	tetraedar	1 BOD

10.4.	$w(\text{H}, \text{NH}_4\text{Cl}) = \frac{4 \cdot Ar(\text{H})}{Mr(\text{NH}_4\text{Cl})} = \frac{4 \cdot 1,01}{53,54} = 0,0755 = 7,55 \%$	1 BOD
11.1.		1 BOD
11.2.	$\bar{v} = \frac{\Delta c(\text{HBr})}{\nu(\text{HBr})\Delta t} = \frac{\Delta c(\text{HBr})}{2\Delta t}$	1 BOD
11.3.	$\bar{v} = -\frac{\Delta c(\text{Br}_2)}{\Delta t} = -\frac{(0,003 - 0,0085) \text{ mol dm}^{-3}}{(400 - 100) \text{ s}} = 1,83 \times 10^{-5} \text{ mol L}^{-1}\text{s}^{-1}$ $\bar{v} = 1,83 \times 10^{-5} \text{ mol L}^{-1}\text{s}^{-1} = 1,83 \times 10^{-2} \text{ mmol L}^{-1}\text{s}^{-1}$	1 BOD
11.4.	Povećat će se brzina reakcije.	1 BOD
12.1.		1 BOD
12.2.	 ili 	1 BOD
12.3.		1 BOD
12.4.	eliminacija	1 BOD