

Državna matura Kemija 2017./18.**INAČICA A (33)****Ispitna knjižica 1**

Zadatak	Točan odgovor	Zadatak	Točan odgovor
1	C	26	C
2	D	27	A
3	D	28	B
4	B	29	B
5	C	30	C
6	C	31	B
7	A	32	D
8	D	33	D
9	A	34	A
10	C	35	B
11	D	36	B
12	B	37	C
13	D	38	D
14	B	39	A
15	C	40	A
16	D	41	B
17	B	42	C
18	B	43	B
19	C	44	A
20	C	45	C
21	A		
22	C		
23	B		
24	B		
25	D		

II. Zadatci kratkoga odgovora, zadatci dopunjavanja i zadatci produženoga odgovora

1.

1.1. natrijev hidrogensulfit

1 BOD

1.2. $\text{CH}_3\text{C}(=\text{O})\text{NH}_2$ ili CH_3CONH_2

1 BOD

2.

2.1. $\text{A} + 3 \text{B} \rightleftharpoons 2 \text{C}$

1 BOD

$$2.2. v_p(\text{B}) = -\frac{\Delta p(\text{B})}{\Delta t} = -\frac{(0,6-0,9) \text{ bar}}{(5-0) \text{ min}} = 0,06 \text{ bar min}^{-1}$$

1 BOD

$$2.3. N(\text{C}) = n(\text{C}) \cdot N_A = \frac{p(\text{C})}{RT} \cdot V(\text{smjesa}) \cdot N_A = \frac{0,4 \times 10^5 \text{ Pa}}{8,31 \text{ J K}^{-1} \text{ mol}^{-1} \cdot 745 \text{ K}} \cdot 5 \times 10^{-3} \text{ m}^3 \cdot 6,02 \times 10^{23} \text{ mol}^{-1}$$

$$= (1,95 \pm 0,01) \times 10^{22}$$

1 BOD

2.4. Brzina reakcije će se povećati.

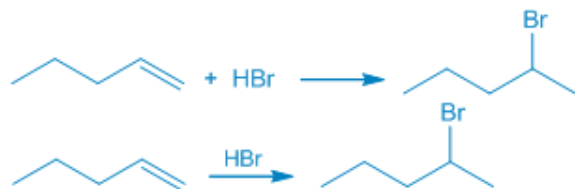
1 BOD

3.

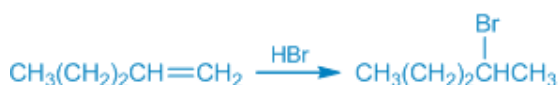
3.1. eliminacija

1 BOD

3.2.

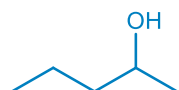


1 BOD

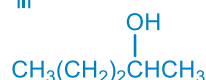


Jedno od ponuđenih rješenja ili neki drugi točan zapis JKR u kojem se vidi da nastaje 2-brompentan.

3.3.



ili



1 BOD

Jedno od ponuđenih rješenja ili neki drugi točan prikaz u kojem se vidi da nastaje pentan-2-ol.

$$3.4. \eta = \frac{n_{\text{dobiveno}}}{n_{\text{teorijski}}} = \frac{m_{\text{dobiveno}}}{m_{\text{teorijski}}} = \frac{\rho \cdot V}{m_{\text{teorijski}}} = \frac{0,812 \text{ g cm}^{-3} \cdot 14,5 \text{ cm}^3}{12,84 \text{ g}}$$

$$\eta = 0,917 = 91,7 \%$$

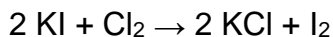
1 BOD

4.

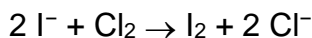
4.1. klor (Cl_2)

1 BOD

4.2.



ili



1 BOD

4.3.



1 BOD

4.4.

$$n_0(\text{P}_4) = \frac{m(\text{P}_4)}{M(\text{P}_4)} = \frac{10,0 \text{ g}}{124,0 \text{ g mol}^{-1}} = 0,081 \text{ mol}$$

$$n_0(\text{Cl}_2) = \frac{m(\text{Cl}_2)}{M(\text{Cl}_2)} = \frac{10,0 \text{ g}}{71 \text{ g mol}^{-1}} = 0,141 \text{ mol}$$

$$\frac{n_0(\text{P}_4)}{1} > \frac{n_0(\text{Cl}_2)}{10}$$

Odgovor: Mjerodavni reaktant je klor.

1 BOD

5.

5.1.

$$c(\text{CH}_3\text{COONa}) = \frac{n(\text{CH}_3\text{COONa})}{V(\text{otopina})} = \frac{m(\text{CH}_3\text{COONa})}{M(\text{CH}_3\text{COONa}) \cdot V(\text{otopina})} = \frac{w(\text{CH}_3\text{COONa}) \cdot m(\text{otopina})}{M(\text{CH}_3\text{COONa}) \cdot V(\text{otopina})} =$$

$$\frac{w(\text{CH}_3\text{COONa})}{M(\text{CH}_3\text{COONa})} \cdot \rho(\text{otopina}) = \frac{0,40}{82,03 \frac{\text{g}}{\text{mol}}} \cdot 1,38 \times 10^3 \frac{\text{g}}{\text{dm}^3} = (6,73 \pm 0,01) \text{ mol/dm}^3$$

1 BOD

5.2. nezasićena otopina

1 BOD

5.3.

$$m(\text{CH}_3\text{COONa}) = m(\text{CH}_3\text{COONa, pri } 80^\circ\text{C}) - m(\text{CH}_3\text{COONa, pri } 20^\circ\text{C})$$

$$= w(\text{CH}_3\text{COONa, pri } 80^\circ\text{C}) \cdot m(\text{otopina}) - \frac{w(\text{CH}_3\text{COONa, pri } 20^\circ\text{C}) \cdot m(\text{H}_2\text{O})}{1 - w(\text{CH}_3\text{COONa, pri } 20^\circ\text{C})}$$

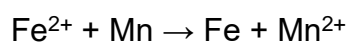
$$= 0,60 \cdot 100 \text{ g} - \frac{0,32 \cdot 40 \text{ g}}{1 - 0,32} = 60 \text{ g} - 18,8 \text{ g} = (41,2 \pm 0,1) \text{ g}$$

1

BOD

6.

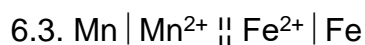
6.1.



1 BOD

6.2. Elektroda od željeza, Fe

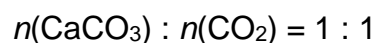
1 BOD



1 BOD

7.

7.1.

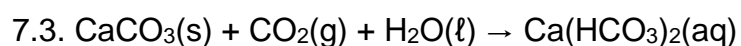


$$V(\text{CO}_2) = \frac{m(\text{CaCO}_3)}{M(\text{CaCO}_3)} \cdot V_m = \frac{10,0 \text{ g}}{100,1 \text{ g/mol}} \cdot 22,4 \text{ L/mol} = 2,24 \text{ L}$$

1 BOD

7.2. kalcijev karbonat, CaCO_3

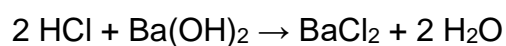
1 BOD



1 BOD

8.

8.1.



$$c(\text{Ba}(\text{OH})_2) = 0,2 \text{ mol dm}^{-3}$$

$$V(\text{Ba}(\text{OH})_2) = 350 \text{ mL}$$

$$n(\text{HCl}) = ?$$

$$n(\text{HCl}) : n(\text{Ba}(\text{OH})_2) = 2 : 1$$

$$n(\text{HCl}) = 2 n(\text{Ba}(\text{OH})_2)$$

$$n(\text{Ba}(\text{OH})_2) = c(\text{Ba}(\text{OH})_2) \cdot V(\text{Ba}(\text{OH})_2) = 0,2 \text{ mol dm}^{-3} \cdot 0,350 \text{ dm}^3 = 0,07 \text{ mol}$$

$$n(\text{HCl}) = 2 \cdot 0,07 \text{ mol} = 0,14 \text{ mol}$$

1 BOD

8.2. NH_4Cl , BaCl_2 , Li_2CO_3

1 BOD

9.

9.1.

$$c(\text{AB}) = 0,0159 \text{ mol L}^{-1}$$

1 BOD

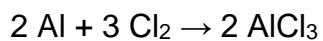
9.2.

$$K_c = \frac{[\text{AB}]^2}{[\text{A}_2][\text{B}_2]} = \frac{(0,0159 \text{ mol dm}^{-3})^2}{0,0033 \text{ mol dm}^{-3} \cdot 0,0013 \text{ mol dm}^{-3}} = 58,93$$

1 BOD

10.

10.1.



1 BOD

10.2. egzotermna promjena

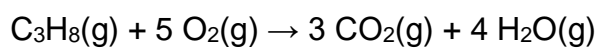
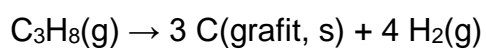
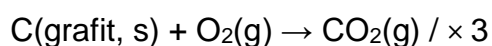
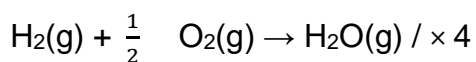
1 BOD

11.

11.1. $\Delta_f H^\circ(\text{C}_3\text{H}_8, \text{g}) = -103,9 \text{ kJ mol}^{-1}$

1 BOD

11.2.



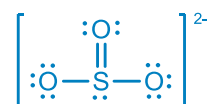
$$\Delta_r H^\circ = 4 \cdot (-241,8 \text{ kJ mol}^{-1}) + 3 \cdot (-393,5 \text{ kJ mol}^{-1}) + 103,9 \text{ kJ mol}^{-1}$$

$$\Delta_r H^\circ = -2043,8 \text{ kJ mol}^{-1}$$

1 BOD

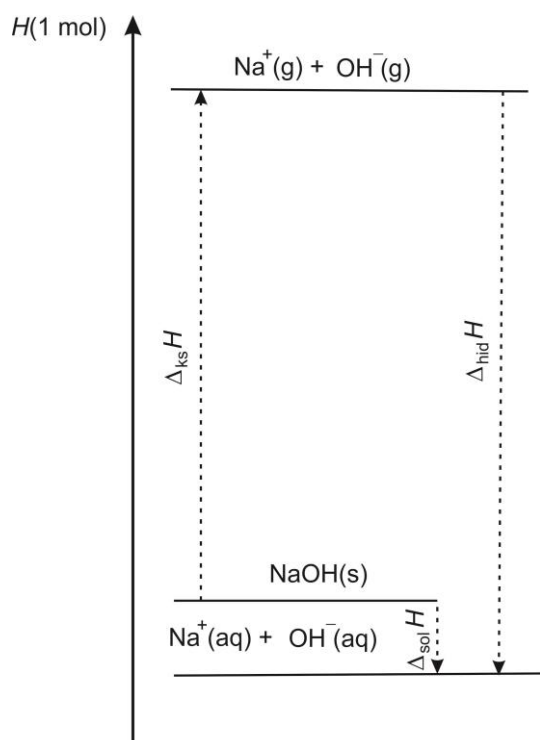
12.

12.1.



1 BOD

12.2.



1 BOD

13.

13.1. Područje označeno oznakom **A** predstavlja plinovito agregacijsko stanje. **1 BOD**

13.2. temperatura: 120 °C

tlak: 0,6 bar

1 BOD

14.

14.1. lužnata

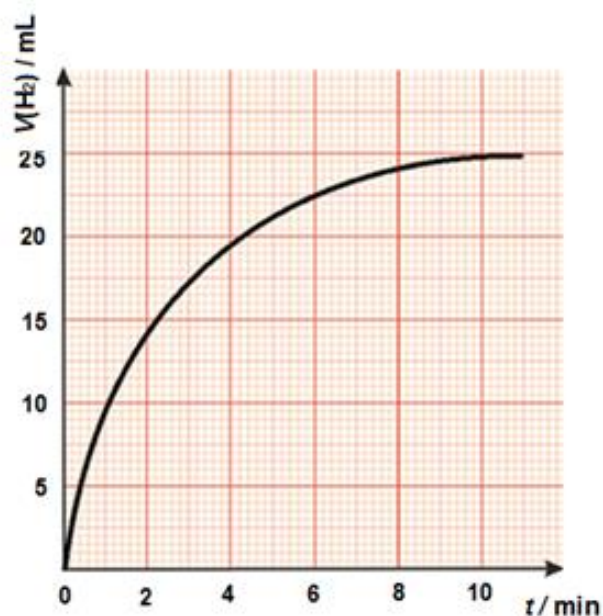
1 BOD

14.2. $\text{PO}_4^{3-}(\text{aq}) + \text{H}_2\text{O}(\ell) \rightarrow \text{HPO}_4^{2-}(\text{aq}) + \text{OH}^-(\text{aq})$

1 BOD

15.

15.1.



1 BOD

15.2.

$$n(\text{Zn}) = n(\text{H}_2) = \frac{p(\text{H}_2) \cdot V(\text{H}_2)}{R \cdot T(\text{H}_2)} = \frac{101\,325 \text{ kPa} \cdot 25 \times 10^{-6} \text{ m}^3}{8,31 \text{ Pa m}^3 \text{ K}^{-1} \text{ mol}^{-1} \cdot 298 \text{ K}} = 1,02 \times 10^{-3} \text{ mol}$$

Odgovor: $n(\text{Zn}) = 1,02 \times 10^{-3} \text{ mol}$

1 BOD

16.

16.1.

$$m_f(I_2) = M_r(I_2) \cdot u = 254 \cdot 1,66 \times 10^{-24} \text{ g} = 4,22 \times 10^{-22} \text{ g}$$

1 BOD

16.2.

$$m(I_2) = 6,35 \text{ g}$$

$$m(C_2H_5OH) = 100 \text{ g}$$

$$K_b = 1,22 \text{ K kg mol}^{-1}$$

$$\Delta T = ?$$

$$n(I_2) = \frac{m(I_2)}{M(I_2)} = \frac{6,35 \text{ g}}{254 \text{ g mol}^{-1}} = 0,0250 \text{ mol}$$

$$b(I_2) = \frac{n(I_2)}{m(C_2H_5OH)} = \frac{0,0250 \text{ mol}}{0,1 \text{ kg}} = 0,250 \text{ mol kg}^{-1}$$

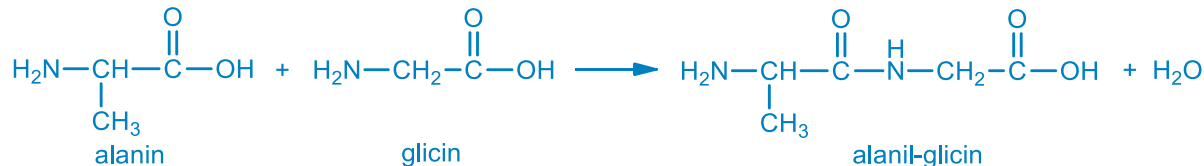
$$\Delta T = i \cdot K_b(C_2H_5OH) \cdot b(I_2) = 1 \cdot 1,22 \text{ K kg mol}^{-1} \cdot 0,250 \text{ mol kg}^{-1} = 0,305 \text{ K}$$

Odgovor: $\Delta T = 0,305 \text{ K}$

1 BOD

17.

17.1.



1 BOD

17.2.

$$N(\text{H}_2\text{O}) = N(\text{aminokiselina}) - 1$$

$$= 51 - 1$$

$$= 50$$

18.

18.1. Pare natrija boje plamen žutom bojom.

1 BOD

18.2.

$$\rho(\text{Na}) = \frac{m}{V} = \frac{z \cdot A_r(\text{Na}) \cdot u}{a^3} = \frac{2 \cdot 23,0 \cdot 1,66 \times 10^{-24} \text{ g}}{(429 \times 10^{-10} \text{ cm})^3} = 0,967 \text{ g cm}^{-3}$$

1

BOD