

Ülesannete lahendused*

10. klass

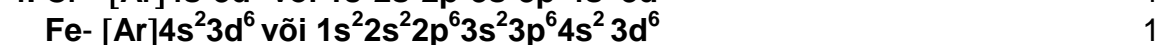
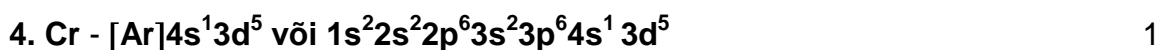
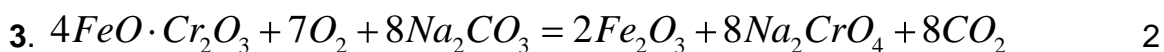
Tallinna XVI koolinoorte keemiaolümpiaadi koolivoor 2015/ 2016 õ.a

1. (10)

$$1. P(A) = 100\% - \left(\frac{4 \times 16 \text{ g/mol}}{224 \text{ g/mol}} \times 100\% + 25\% \right) \sim \mathbf{46,43\%} \quad 2$$

$$2. M(A) = \frac{224 \text{ g/mol} \times 46,43\%}{2 \times 100\%} = 52 \text{ g/mol} \Rightarrow \mathbf{Cr} \quad 1$$

$$M(B) = \frac{224 \text{ g/mol} \times 25\%}{100\%} = 56 \text{ g/mol} \Rightarrow \mathbf{Fe} \quad 1$$



5.

Cr^{2+}



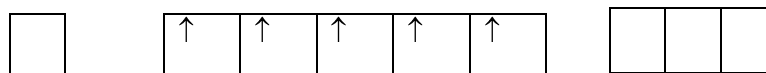
4s

3d

4p

1

Fe^{3+}



4s

3d

4p

$\frac{1}{10}$

2. (10)



$$n(NaOH) = 0,025371 \times 0,2000 \text{ mol/l} = 0,005074 \text{ mol} \quad 1$$

$$2. n(HCl) = \frac{0,005074 \text{ mol} \times 100 \text{ ml}}{10 \text{ ml}} = 0,05074 \text{ mol} \quad 1$$

$$3. m(\text{HCl}) = \frac{0,05074 \text{ mol}}{10,00 \text{ ml}} \times 209 \text{ ml} \times 36,5 \text{ g/mol} = 38,71 \text{ g} \quad 1$$

$$m(\text{HCl lahuses}) = 209 \text{ cm}^3 \times 1,083 \text{ g/cm}^3 = 226,3 \text{ g}$$

раствора HCl

$$P(\text{HCl}) = \frac{38,71 \text{ g}}{226,3 \text{ g}} \times 100\% \sim 17,10\% \quad 1$$

4.

$$m(\text{H}_2\text{O})_{\text{lahuses, peale proovi võtmist}} = 226,37 \text{ g} - 38,71 \text{ g} = 187,66 \text{ g}$$

m_1 – m(HCl) 35% lahuses
в 35% растворе кислоты

$$P(\text{HCl}) = \frac{m_1}{m_1 + 187,66 \text{ g}} \times 100\% = 35,0\%$$

$$m_1 \sim 101 \text{ g}$$

$$n(\text{HCl}) = \frac{101 \text{ g}}{36,5 \text{ g/mol}} \sim 2,77 \text{ mol} \quad 1$$

$$n(\text{HCl jäi lahusesse}) = \frac{38,71 \text{ g}}{36,5 \text{ g/mol}} = 1,06 \text{ mol}$$

осталось в растворе

$$n(\text{HCl juhtida lahusesse}) = 2,77 \text{ mol} - 1,06 \text{ mol} = 1,71 \text{ mol} \quad 1$$

HCl необходимо пропустить в раствор

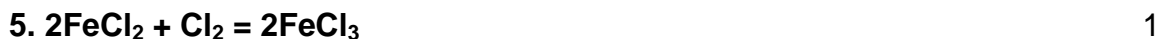
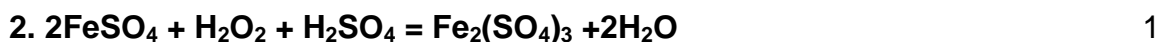
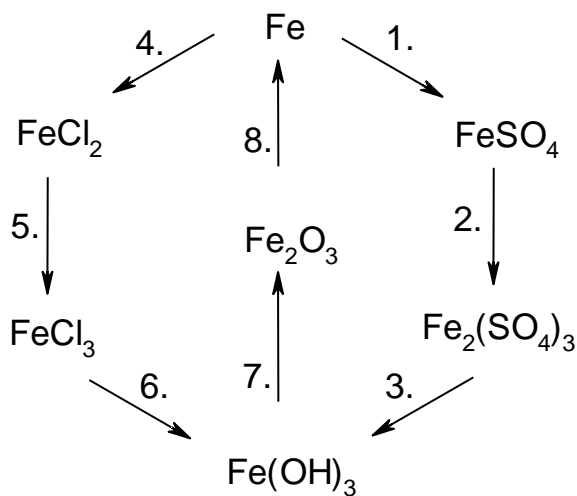


$$m(\text{NaHCO}_3) = 2,77 \text{ mol} \times 84 \text{ g/mol} \sim 233 \text{ g} \quad 1$$

$$V(\text{CO}_2) = 2,77 \text{ mol} \times 22,4 \text{ l/mol} = \sim 62 \text{ l}$$

3. (10)

I.



II.	A – Fe	raud <i>железо</i>	0,5
	B – FeSO ₄	raud (II) sulfaat <i>сульфат железа (II)</i>	0,5
	C – Fe ₂ (SO ₄) ₃	raud (III) sulfaat <i>сульфат железа (III)</i>	0,5
	D – Fe(OH) ₃	raud (III) hüdroksiid <i>гидроксид железа (III)</i>	0,5
	E – FeCl ₂	raud (II) kloriid <i>хлорид железа (II)</i>	0,5
	F – FeCl ₃	raud (III) kloriid <i>хлорид железа (III)</i>	0,5
	G – Fe ₂ O ₃	raud (III) oksiid <i>оксид железа (III)</i>	0,5

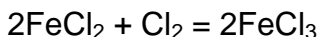
III.



Oksüdeerija on H₂O₂

H₂O₂ – окислитель

0,5



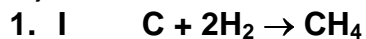
Oksüdeerija on Cl₂

Cl₂ - окислитель

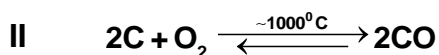
0,5

10

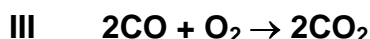
4. (10)



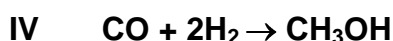
0,5



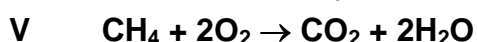
0,5



0,5



0,5



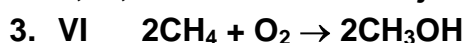
0,5

2. I, IV **C on oksüdeerija**

1

II, III, V **C on redutseerija**

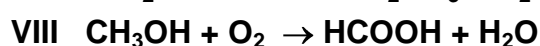
1,5



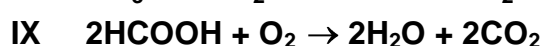
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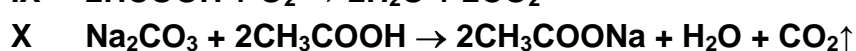
1



0,5



1



0,5

4. reaktsioon VI on **oksüdeerumisreaktsioon**

0,5

VI реакция окисления

reaktsioon IX on **põlemisreaktsioon**

IX реакция горения

0,5

10

* Keemiaolümpiaadi koolivooru komisjon võib iseseisvalt hinnata võimalikke alternatiivseid lahendusvariante.