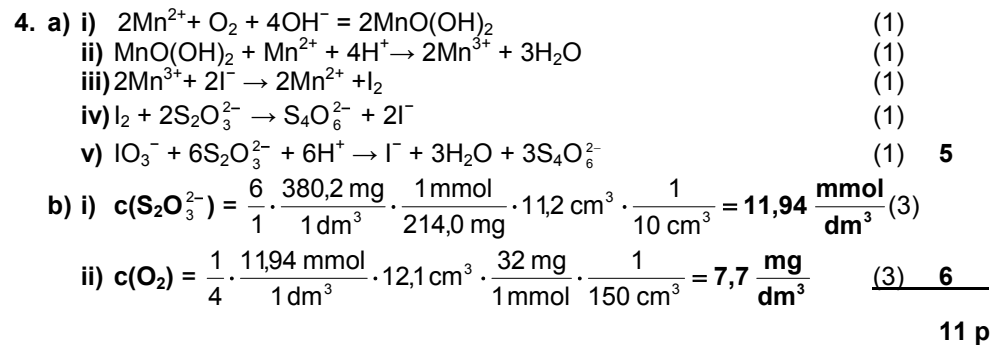
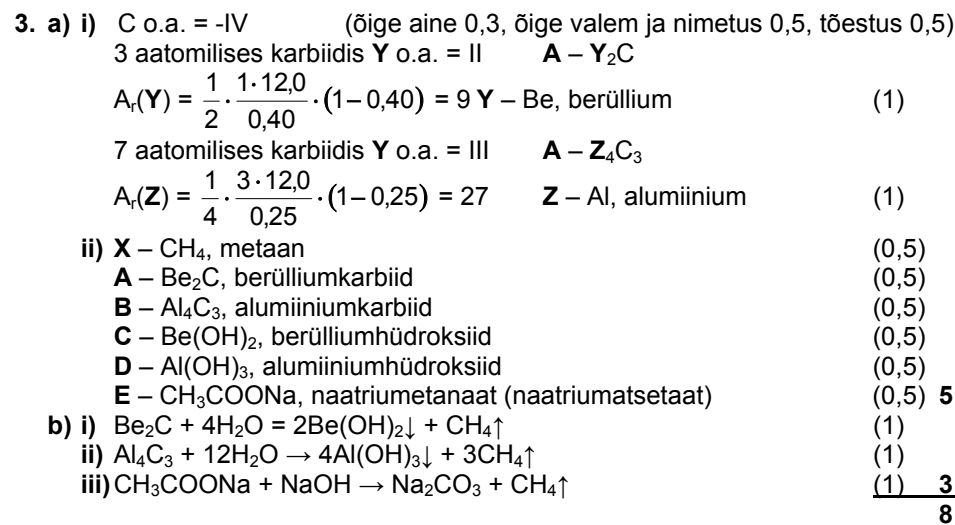
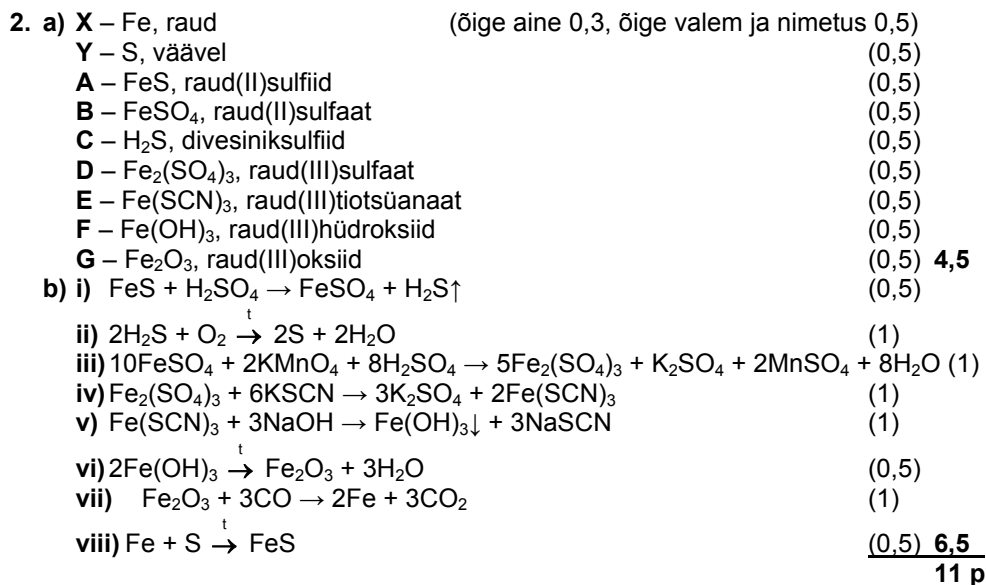
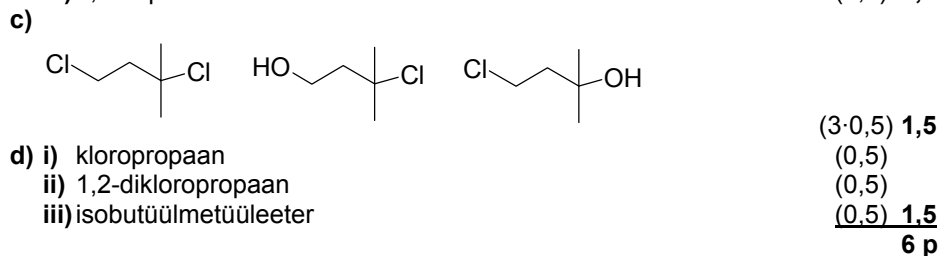
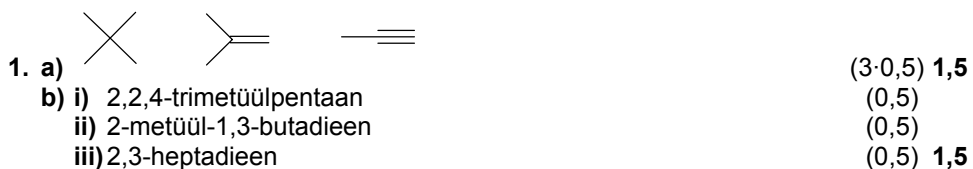


2006/2007 õ.a. keemiaolümpiaadi piirkonnavooru
ülesannete lahendused

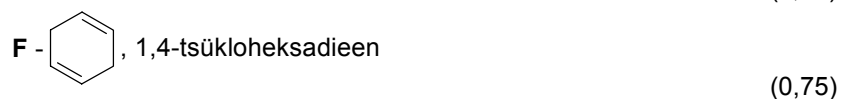
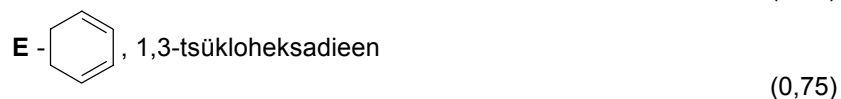
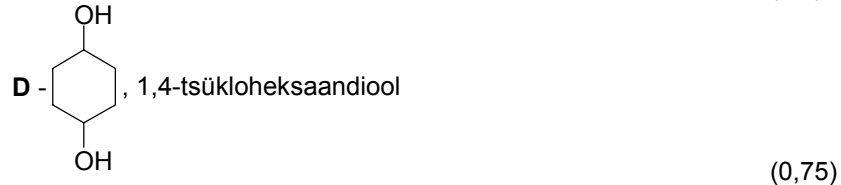
11. klass



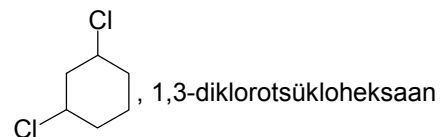
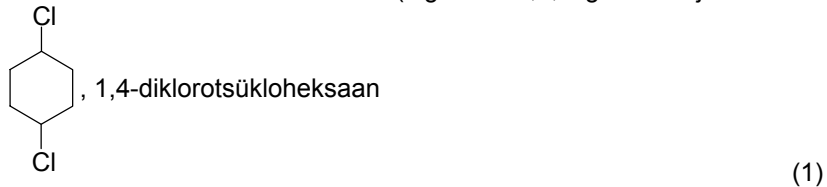
5. a) i)
$$\begin{cases} \frac{A_r(\mathbf{X})}{80 + A_r(\mathbf{X}) + A_r(\mathbf{Y})} = 0,18 \\ \frac{A_r(\mathbf{Y})}{80 + A_r(\mathbf{X}) + A_r(\mathbf{Y})} = 0,41 \end{cases} \quad \begin{matrix} A_r(\mathbf{X}) = 36 & \mathbf{X} - \text{Cl, kloor} \\ A_r(\mathbf{Y}) = 80 & \mathbf{Y} - \text{Br, broom} \end{matrix}$$

(võrrandite süsteemi koostamine 2,5, lahendamine 1,5, õiged ained ja nimetused 0,75) (4,75)

ii) (õige aine 0,5, õige struktuurvalem ja nimetus 0,75)



b) (õige aine 0,6, õige valem ja nimetus 1)



(1) 2
11 p

6. a) i) $c(\text{HCl}) = 12,23 \text{ cm}^3 \cdot \frac{0,1024 \text{ mol}}{1 \text{ dm}^3} \cdot \frac{1}{10 \text{ cm}^3} = \mathbf{0,1252 \text{ M}}$ (1,5)

ii) $[\text{OH}^-] = \frac{K_w}{[\text{H}^+]} = \frac{10^{-14}}{10^{-7}} = \mathbf{10^{-7} \text{ M}}$ (0,5)

iii) $\text{NaOH} + \text{HCl} = \text{NaCl} + \text{H}_2\text{O}$
 (i) $c(\text{HCl}, \text{(i)}) = [\text{H}^+] = 10^{-0,9024} = 0,1252 \text{ M}$ $V(\text{NaOH}) = 0 \text{ cm}^3$ (0,5)
 (ii) $[\text{H}^+] = c(\text{HCl}, \text{(ii)}) = \frac{10 \text{ cm}^3 \cdot 0,1252 \text{ M} - 9,50 \cdot 0,1024 \text{ M}}{(9,50 + 10) \text{ cm}^3} = 0,01432 \text{ M}$ (1)

$\text{pH} = -\log(0,01432) = \mathbf{1,84}$ (0,5)

(iii) $[\text{H}^+] = 10^{-11,54} = 2,884 \cdot 10^{-12} \text{ M}$ (0,5)

$c(\text{NaOH}, \text{(iii)}) = [\text{OH}^-] = \frac{10^{-14}}{2,884 \cdot 10^{-12}} = 3,467 \cdot 10^{-3} \text{ M}$ (0,5)

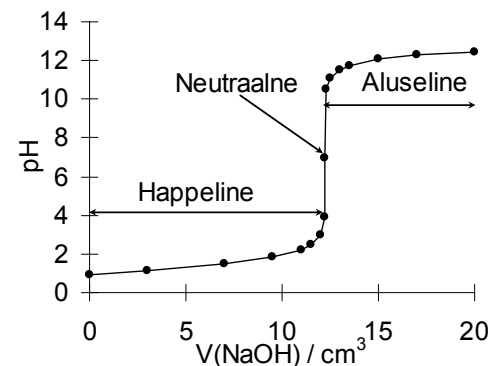
$3,467 \cdot 10^{-3} \text{ M} = \frac{(V - 12,23 \text{ cm}^3) \cdot 0,1024 \text{ M}}{V + 10 \text{ cm}^3}$ (1,5)

$V(\text{NaOH}, \text{(iii)}) = \mathbf{13,01 \text{ cm}^3}$

(iv) $[\text{OH}^-] = c(\text{NaOH}, \text{(iv)}) = \frac{(17 - 12,23) \text{ cm}^3 \cdot 0,1024 \text{ M}}{(17 + 10) \text{ cm}^3} = 0,01809 \text{ M}$ (1)

$[\text{H}^+] = \frac{10^{-14}}{0,01809} = 5,528 \cdot 10^{-13} \text{ M}$ $\text{pH} = -\log(5,528 \cdot 10^{-13}) = \mathbf{12,26}$ (1) **8,5**

b) i) ii) (graafiku joonistamine 3, piirkondade tähistamine 3·0,5)



(3 + 1,5) 4,5
13 p