

2005/2006 õa keemiaolümpiaadi piirkonnavooru  
ülesannete lahendused

8. klass

1. a) i) Segud on soolvesi ja viin, ii) lihtained on hapnik ja teemant, iii) liitained on veeaur, C-vitamiin, jää, söögisooda, süsihappegaas ja vesi.

b) Keemistemperatuur, lahustuvus, sulamistemperatuur ja tihedus.

c) i)  $1250 \text{ m} = 1,25 \text{ km}$ , ii)  $32 \text{ cm}^3 = 0,032 \text{ dm}^3$ , iii)  $1,00 \text{ kg/dm}^3 = 1,00 \text{ g/cm}^3$ ,  
iv)  $1250 \text{ kg/m}^3 = 1,25 \text{ g/cm}^3$ , v)  $10000 \text{ mm} = 10 \text{ m}$ .

2. a) i)  $2\text{H}_2 + \text{O}_2 = 2\text{H}_2\text{O}$

ii)  $\text{C} + \text{O}_2 = \text{CO}_2$

iii)  $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 = 2\text{CO}_2 + 3\text{H}_2\text{O}$

iv)  $2\text{C}_3\text{H}_8\text{O}_3 + 7\text{O}_2 = 6\text{CO}_2 + 8\text{H}_2\text{O}$

v)  $\text{C}_{12}\text{H}_{22}\text{O}_{11} + 12\text{O}_2 = 12\text{CO}_2 + 11\text{H}_2\text{O}$

vi)  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 = 6\text{CO}_2 + 6\text{H}_2\text{O}$

b) i)  $x = \frac{(114/2) - 3}{3} = 18$

$y = \frac{(2 \cdot 110/2) - 5}{3} = 35$

ii)  $\text{C}_3\text{H}_5\text{O}_3(\text{OC}_{18}\text{H}_{35})_3 \Leftrightarrow \text{C}_{57}\text{H}_{110}\text{O}_6$

3. a) i) A –  $\text{H}_2\text{O}$ , vesi, külmub madalal temperatuuril

ii) X –  $\text{O}_2$ , hapnik, on oksüdeerija

iii) B –  $\text{CO}_2$ , süsinikdioksiid, neeldub NaOH lahuses

iv) Y –  $\text{N}_2$ , lämmastik, ei reageeri vesilahustes

b) i)  $m(\text{proov}) = 3,08 \text{ dm}^3 \cdot 0,948 \text{ g/dm}^3 = 2,92 \text{ g}$

$\%(\text{H}_2\text{O}) = \frac{0,21 \text{ g}}{2,92 \text{ g}} \cdot 100 = 7,2$

ii)  $m(\text{O}_2) = 2,92 \text{ g} - 0,21 \text{ g} - 2,54 = 0,17 \text{ g}$

$\%(\text{O}_2) = \frac{0,17 \text{ g}}{2,92 \text{ g}} \cdot 100 = 5,8$

iii)  $m(\text{CO}_2) = 2,54 \text{ g} - 1,95 \text{ g} = 0,59 \text{ g}$

$\%(\text{CO}_2) = \frac{0,59 \text{ g}}{2,92 \text{ g}} \cdot 100 = 20$

iv)  $m(\text{N}_2) = 1,56 \text{ dm}^3 \cdot 1,25 \text{ g/dm}^3 = 1,95 \text{ g}$

$\%(\text{N}_2) = \frac{1,95 \text{ g}}{2,92 \text{ g}} \cdot 100 = 66,8$

4. Graafiku joonistamine: iga kõvera eest 1 p, kokku 3 p

a)  $\text{HgCl}_2$  lahustuvus temperatuuri tõusuga kasvab kõikides lahustites.

b) Väikseim on lahustuvus vees.

c) i) etanoolis  $L(\text{HgCl}_2, 5^\circ\text{C}) = 44 \pm 1 \text{ g}$

$L(\text{HgCl}_2, 55^\circ\text{C}) = 67 \pm 2 \text{ g}$

ii) metanoolis  $L(\text{HgCl}_2, 5^\circ\text{C}) = 30 \pm 2 \text{ g}$

$L(\text{HgCl}_2, 55^\circ\text{C}) = 163 \pm 2 \text{ g}$

$$d) m(\text{HgCl}_2) = 13 \text{ g} \cdot \frac{40 \text{ g}}{100 \text{ g}} = 5,2 \text{ g}$$

$$e) L(\text{HgCl}_2) = 12,5 \text{ g} \cdot \frac{100 \text{ g}}{25 \text{ g}} = 50 \text{ g}$$

$$i) \text{ etanoolis } t = 30 \text{ }^\circ\text{C}$$

$$ii) \text{ metanoolis } t = 19 \pm 2 \text{ }^\circ\text{C}$$

5. Iga lahtri õige täitmine a`0,2 p

Vesiniku mõlema alternatiivse kirjutusviisi eest kokku 1 p

Isotoop	Alternatiivne kirjutusviis	Prootonite arv	Neutronite arv	Massiarv	Elektronide arv
Prootium	H-1; ${}^1_1\text{H}$	1	0	1	1
Deuteerium	H-2; ${}^2_1\text{H}$	1	1	2	1
Tritium	H-3; ${}^3_1\text{H}$	1	2	3	1
${}^{235}_{92}\text{U}$	U-235	92	143	235	92
I-127	${}^{127}_{53}\text{I}$	53	74	127	53
I-125	${}^{125}_{53}\text{I}$	53	72	125	53
I-131	${}^{131}_{53}\text{I}$	53	78	131	53
Cl-35	${}^{35}_{17}\text{Cl}$	17	18	35	17

$$6. a) 2\text{C}_x\text{H}_y\text{O}_z + 15\text{O}_2 = 12\text{H}_2\text{O} + 10\text{CO}_2$$

$$x = 10/2 = 5$$

$$y = (12 \cdot 2)/2 = 12$$

$$z = (12 + 10 \cdot 2 - 15 \cdot 2)/2 = 1$$

Amüülalkoholi valem on **C<sub>5</sub>H<sub>12</sub>O**

$$b) N(\text{C}) = 14 \cdot 0,286 = 4$$

$$N(\text{H}) = 14 \cdot 0,571 = 8$$

$$N(\text{O}) = 14 - 4 - 8 = 2$$

Etüülatsetaadi valem on **C<sub>4</sub>H<sub>8</sub>O<sub>2</sub>**

$$c) \text{C}_4\text{H}_8\text{O}_2 + \text{H}_2\text{O} = \text{C}_2\text{H}_6\text{O} + \text{C}_x\text{H}_y\text{O}_z$$

$$x = 4 - 2 = 2$$

$$y = 8 + 2 - 6 = 4$$

$$z = 2 + 1 - 1 = 2$$

Äädikhappe valem on **C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>**

$$d) \text{C}_5\text{H}_{12}\text{O} + \text{C}_2\text{H}_4\text{O}_2 = \text{H}_2\text{O} + \text{C}_x\text{H}_y\text{O}_z$$

$$x = 5 + 2 = 7$$

$$y = 12 + 4 - 2 = 14$$

$$z = 1 + 2 - 1 = 2$$

Amüülatsetaadi valem on **C<sub>7</sub>H<sub>14</sub>O<sub>2</sub>**