Kemia │Tehtävä 1.

Kemi │Uppgift 1.

Chemistry │Question 1.

1. C

2. B

3. C

4.
   a)

   Glukoosin ainemäärä:
   $$n(glukoosi) = \frac{m(glukoosi)}{M(glukoosi)} = \frac{1000 \text{ g}}{180{,}16 \text{ g/mol}} = 5{,}5506 \text{ mol}$$

   Hiilidioksidin ainemäärä:

   $$n(CO_2) = 6 \cdot n(glukoosi) = 33{,}304 \text{ mol}$$

   Hiilidioksidin tilavuus:

   $$V(CO_2) = \frac{nRT}{p} = \frac{33{,}304 \text{ mol} \cdot 8{,}31446 \frac{\text{Pa} \cdot \text{m}^3}{\text{mol} \cdot \text{K}} \cdot 298{,}15 \text{ K}}{101\ 325 \text{ Pa}} = 0{,}8148 \text{ m}^3 \approx \mathbf{0{,}815 \text{ m}^3}$$

   b)

   Ilman tilavuus:

   $$V(\text{ilma}) = \frac{V(CO_2)}{0{,}0004} = \frac{0{,}8148 \text{ m}^3}{0{,}0004} = 2036{,}97 \text{ m}^3 \approx \mathbf{2{,}04 \cdot 10^3 \text{ m}^3}$$

   c)

   Yhtä glukoosimoolia kohti muodostuu 6 mol happea:

   $$n(O_2) = 6 \cdot n(\text{glukoosi}) = 6 \cdot 5{,}551 \text{ mol} = 33{,}304 \text{ mol}$$

   Tarvittava energiamäärä:

   $$33{,}304 \text{ mol} \cdot 1882 \text{ kJ/mol} = 62\ 678 \text{ kJ} \approx \mathbf{62{,}7 \text{ MJ}}$$

a) Substansmängden för glukos:

$$n(glukos) = \frac{m(glukos)}{M(glukos)} = \frac{1000 \text{ g}}{180{,}16 \text{ g/mol}} = 5{,}5506 \text{ mol}$$

Substansmängden för koldioxid:

$$n(CO_2) = 6 \cdot n(glukos) = 33{,}304 \text{ mol}$$

Volymen för koldioxid:

$$V(CO_2) = \frac{nRT}{p} = \frac{33{,}304 \text{ mol} \cdot 8{,}31446 \frac{\text{Pa} \cdot \text{m}^3}{\text{mol} \cdot \text{K}} \cdot 298{,}15 \text{ K}}{101\,325 \text{ Pa}} = 0{,}8148 \text{ m}^3 \approx \mathbf{0{,}815 \text{ m}^3}$$

b) Volymen för luft:

$$V(luft) = \frac{V(CO_2)}{0{,}0004} = \frac{0{,}8148 \text{ m}^3}{0{,}0004} = 2036{,}97 \text{ m}^3 \approx \mathbf{2{,}04 \cdot 10^3 \text{ m}^3}$$

c) Det bildas 6 mol syre per en mol glukos:

$$n(O_2) = 6 \cdot n(glukos) = 6 \cdot 5{,}551 \text{ mol} = 33{,}304 \text{ mol}$$

Energi som behövs:

$$33{,}304 \text{ mol} \cdot 1882 \text{ kJ/mol} = 62\,678 \text{ kJ} \approx \mathbf{62{,}7 \text{ MJ}}$$

---

a) The amount of substance of glucose:

$$n(glucose) = \frac{m(glucose)}{M(glucose)} = \frac{1000 \text{ g}}{180{.}16 \text{ g/mol}} = 5{.}5506 \text{ mol}$$

The amount of substance of carbon dioxide:

$$n(CO_2) = 6 \cdot n(glucose) = 33{.}304 \text{ mol}$$

Volume of carbon dioxide:

$$V(CO_2) = \frac{nRT}{p} = \frac{33{.}304 \text{ mol} \cdot 8{.}31446 \frac{\text{Pa} \cdot \text{m}^3}{\text{mol} \cdot \text{K}} \cdot 298{.}15 \text{ K}}{101\,325 \text{ Pa}} = 0{,}8148 \text{ m}^3 \approx \mathbf{0{.}815 \text{ m}^3}$$

b) Volume of air:

$$V(air) = \frac{V(CO_2)}{0{,}0004} = \frac{0{.}8148 \text{ m}^3}{0{.}0004} = 2036{.}97 \text{ m}^3 \approx \mathbf{2{.}04 \cdot 10^3 \text{ m}^3}$$

c) 6 moles of oxygen is formed per one mole of glucose:

$$n(O_2) = 6 \cdot n(glucose) = 6 \cdot 5{,}551 \text{ mol} = 33{,}304 \text{ mol}$$

Energy needed:

$$33{,}304 \text{ mol} \cdot 1882 \text{ kJ/mol} = 62\,678 \text{ kJ} \approx \mathbf{62{,}7 \text{ MJ}}$$
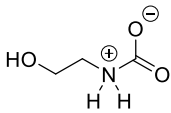
Kemia │Tehtävä 2.

Kemi │Uppgift 2.

Chemistry │Question 2.

1. A

2. D

3. C

4.

5.

   a) $Mg_2SiO_4 + 2\ CO_2 \rightarrow 2\ MgCO_3 + SiO_2$
   b) $Mg_3Si_2O_5(OH)_4 + 3\ CO_2 \rightarrow 3\ MgCO_3 + 2\ SiO_2 + 2\ H_2O$