3. DZ (Termodinamika pt 1)

Zadatak 1)

$t_z = 15°C = 288,15K$

$t_č = 34°C = 307,15K$

brzina gubljenja topline? → [W]

$S_t = 1,5m^2$

$\frac{P_č}{P_{CT}} = 70\% \rightarrow \varepsilon = 0,7$

Stefan Boltzman – prijenos topline zračenjem

$P = S\sigma T^4$ za crno tijelo

↓

$P = \varepsilon \cdot S \cdot \sigma (T_č^4 - T_z^4)$

$\boxed{P = 119,44W}$

Zadatak 2.)

$t_{oko} = 37°C = t_č$

– gubi energiju isparavanjem

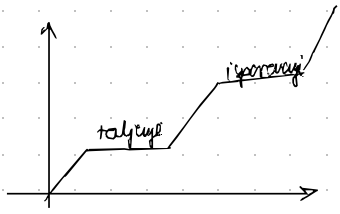
P (metabolizmom) = 120W

m (znoj) = ? $\left[\frac{g}{h}\right]$

$L_i = 580 kcal/kg$

↳ 2428344 J/kg

$W = \frac{J}{s} \rightarrow \frac{J}{h} = 3600$



$Q = m \cdot L_i$

$P = \frac{Q}{t} \rightarrow P = \frac{m \cdot L_i}{t}$

$\frac{m}{t} = \frac{P}{L_i} = \frac{120}{2428344} 3600 \cdot 1000 \frac{g}{h}$

$\boxed{\frac{m}{t} = 177,9 g/h}$

Zadatak 3.)

$t = 70°C$

$t_č = 100°C$

$t_v = 19°C$

$V = 300mL$

$V_v = ?$

$V = V_č + V_v$

$\rho = \frac{m}{V}$ (voda)

$m = 1000 kg/m^3 \cdot 300mL$

$m = 0,3kg$

$m_č c \Delta T_1 = m_c c \Delta T_2$

$m = m_č + m_v = 0,3kg$

$m_č (100 - 70) = m_v (70 - 19)$

$m_č \cdot 30 = m_v \cdot 51$

$m_č = 1,7 m_v$

$\Rightarrow 0,3 = 1,7 m_v + m_v$

$m_v = \frac{1}{9} kg = 0,111 kg$

$\boxed{V_v = 111,11mL}$

Zadatak 4.)

$t = 70°C$

$t_č = 100°C$

$t_v = 18°C$

$V = 300mL$

↳ $m = 0,3kg$

$V_v = ?$

$c_š = 840 J/kgK$

$m_š = 150g$

$t_š = 20°C$

$c_v = 4186 J/gK$

$m_č + m_v = 0,3kg \rightarrow m_č = 0,3 - m_v$

$m_č \cdot c_v (100 - 70) = m_v c_v (70 - 18) + m_š c_č (70 - 20)$

$(0,3 - m_v) c_v 30 = m_v c_v 52 + m_š \cdot c_š \cdot 50$

$0,3 \cdot c_v \cdot 30 - m_v \cdot c_v 30 = m_v c_v 52 + m_š c_š 50$

$9 c_v - m_š c_š \cdot 50 = m_v c_v \cdot 82$

$\rightarrow m_v = \frac{9 c_v - m_š c_š 50}{82 \cdot c_v} = 0,00918 kg$

$\boxed{V_v = 91,8 mL}$