① a) $Zn \mid Zn^{2+}, Cl^- \mid AgCl, Ag$ 1/4

$Zn_{(s)} \rightarrow Zn^{2+}_{(aq)} + 2e^-$ 1/4

$AgCl_{(s)} + e^- \rightarrow Ag_{(s)} + Cl^-_{(aq)}$

b) $E_{Zn} = E^\circ_{Zn} + \frac{RT}{2F} \ln a_{Zn^{2+}}$

$E_{Ag,AgCl} = E^\circ_{Ag,AgCl} - \frac{RT}{F} \ln a_{Cl^-}$

$E = E_{Ag,AgCl} - E_{Zn}$

$E = E^\circ_{Ag,AgCl} - E^\circ_{Zn} - \frac{RT}{2F} \ln a_{Zn^{2+}} a_{Cl^-}^2$ 1/4

$E = 0{,}222\,V + 0{,}762\,V - \frac{8{,}314\,J/molK \cdot 298\,K}{2\,mol \cdot 96487\,As} \cdot \ln(0{,}005 \cdot 0{,}01^2) =$

$= 0{,}984\,V - 0{,}0128\,V \cdot \ln 5 \cdot 10^{-7} = \mathbf{1{,}170\,V}$ 1/4

c) $E_x = \frac{I \cdot l_x \cdot \varrho}{\frac{\pi d^2}{4}} \cdot \frac{0{,}056\,A \cdot 0{,}633\,m \cdot 105\,\Omega}{m \cdot \pi \cdot (0{,}32)^2 m^2} = 0{,}793\,V$ 1/2

d) $E'_x = \frac{E_x \cdot l'_x}{l_x} = 0{,}624\,V$ $R_u = \left(\frac{E_x - E'_x}{E'_x}\right) \cdot R_z = 6{,}1\,k\Omega$ 1/2

$I = \frac{E'_x}{R_z} = 27{,}8\,\mu A$ 1/4

e) $\Delta E_x = I \cdot R_u = 0{,}1\,k\Omega \cdot 1\,\mu A = 0{,}006\,V$ 1/2

f) $\Delta G = -zFE_x = -2 \cdot 96487\,As\,mol^{-1} \cdot 1{,}170\,V = -225{,}8\,kJ/mol$ 1/4

$\frac{dE_x}{dT} = -\frac{R}{2F} \ln a_{Zn^{2+}} \cdot a_{Cl^-}^2 = +0{,}624 \cdot 10^{-4}\,\frac{V}{K}$ $\Delta S = zF\frac{dE}{dT} = +120{,}4\,J/molK$ 1/4

$\Delta H = \Delta G + T\Delta S = -225{,}8\,kJ/mol + 298\,K\,(+120{,}4)\,J/molK =$ 1/4 190,0

g) $dE = dE^\circ_{Zn} + dE_{Ag/AgCl} + \frac{R}{2F} \ln a_{Zn^{2+}} a_{Cl^-}^{-2}\,dT + \frac{RT}{2F}\left(\frac{da_{Zn}}{a_{Zn}} + 2\frac{da_{Cl}}{a_{Cl}}\right) = 0{,}0028\,V$

$d\frac{dE}{dT} = \frac{R}{2F}\left(\frac{da_{Zn}}{a_{Zn}} + 2\frac{da_{Cl}}{a_{Cl}}\right) = \frac{8{,}314\,J}{mol\,K \cdot 2 \cdot 96487\,As}\left(\frac{0{,}0001}{0{,}0050} + 2 \cdot \frac{0{,}0002}{0{,}0100}\right) = 2{,}59 \cdot 10^{-6}\,\frac{V}{K}$

$d\Delta G = zF\,dE = 0{,}54\,\frac{kJ}{mol}$ 1/4 $d\Delta S = zF\,d\frac{dE}{dT} = 0{,}50\,\frac{J}{molK}$ 1/4

$d\Delta H = d\Delta G + T\,d\Delta S + \Delta S \cdot dT = 0{,}54\,\frac{kJ}{mol} + 298\,K \cdot 0{,}5\,\frac{J}{molK} + 120\,\frac{J}{molK} \cdot 0{,}1\,K$

$\cdot 701\,\frac{J}{mol} = 0{,}7\,\frac{kJ}{mol}$ 1/4

h) $\Delta H = (-190{,}0 \pm 0{,}7)\,\frac{kJ}{mol} = -190{,}0\,(1 \pm 0{,}006)\,\frac{kJ}{mol}$ 1/4

i) transportno število – delež toka (naboja), ki ga nosijo pozitivni ioni / gibljivost je odvisna od naboja, velikosti ionu in hidratacije ter viskoznosti topila 1/4

③ a) $p_1 = \frac{nRT}{V}$ (mehurček)

$V = \frac{4\pi r^3}{3}$ 1/4

$\gamma(4°C) = 75'68 - 0'138 \cdot 4 - 0'356 \cdot 10^{-3} 4^2 + 0'47 \cdot 10^{-6} 4^3$

$\gamma(4°C) = 75'12 \frac{din}{cm} = 0'0751 \frac{N}{m}$

zunaj mehurčka $p_2 = p_0 + \rho \cdot g \cdot h$

$p_1 = p_2 + \frac{2\gamma}{r}$ 1/4

$\frac{3nRT}{4\pi r^3} = p_0 + \rho \cdot g \cdot h + \frac{2\gamma}{r}$ 1/2

$\frac{3 \cdot 0'02 \text{ mol} \cdot 8'314 \text{ kPa} \cdot l \cdot 273 \text{ K}}{\text{mol K} \cdot 4 \cdot \pi \cdot r^3} = 101'3 \text{ kPa} + 98'1 \text{ kPa} + \frac{0'1502 \cdot N}{r \cdot m}$

$\frac{11 \text{ kPa} \cdot l}{r^3} - 199'4 \text{ kPa} - \frac{0'1502 \frac{N}{m^2} \cdot m}{r} = 0$

$\frac{N}{m^2} = 10^{-3} \text{ kPa}$

$m = 10 \text{ dm}$

$\frac{11 \text{ dm}^3}{r^3} - 199'4 - \frac{0'001502 \text{ dm}}{r} = 0$

to je majhno

$\frac{11 \text{ dm}^3}{r^3} = 199'4$

$r^3 = \frac{11 \text{ dm}^3}{199'4} \Rightarrow r = 0'38 \text{ dm} = 3'8 \text{ cm}$ 1/2

b) 1) od palmara kapilare, dolžine kapilare, tekočega parametra povprečne višine tekočine, gostote tekočine, volumna tekočine (viskoznosti) 1/2

2) ker nismo poznali zgoraj omenjenih količin in smo s tem viskozimeter umerili 1/2