1.

a) $K_p = \dfrac{P_{H_2O}^2}{P_{SO_2} \cdot P_{H_2S}^2}$ 1pt

/1pt

b) $\Delta_r G^\circ = -RT \ln K_p = \Delta_r H^\circ - T \cdot \Delta_r S^\circ \quad | : -RT$ 1pt 1pt

$$\ln K_p = \frac{\Delta_r S^\circ}{R} - \frac{\Delta_r H^\circ}{RT}$$

/2pt

c) grafiks pierienots: C → K → 1/K – 2pt

K → ln K → 1pt

virziena koef.: $-\dfrac{\Delta_r H^\circ}{R} = 12\,665$ grafiks – 2pt

$\rightarrow \Delta_r H^\circ = -12\,665 \times 8.3145$

$= -105\,\text{kJ} \cdot \text{mol}^{-1}$ 2pt

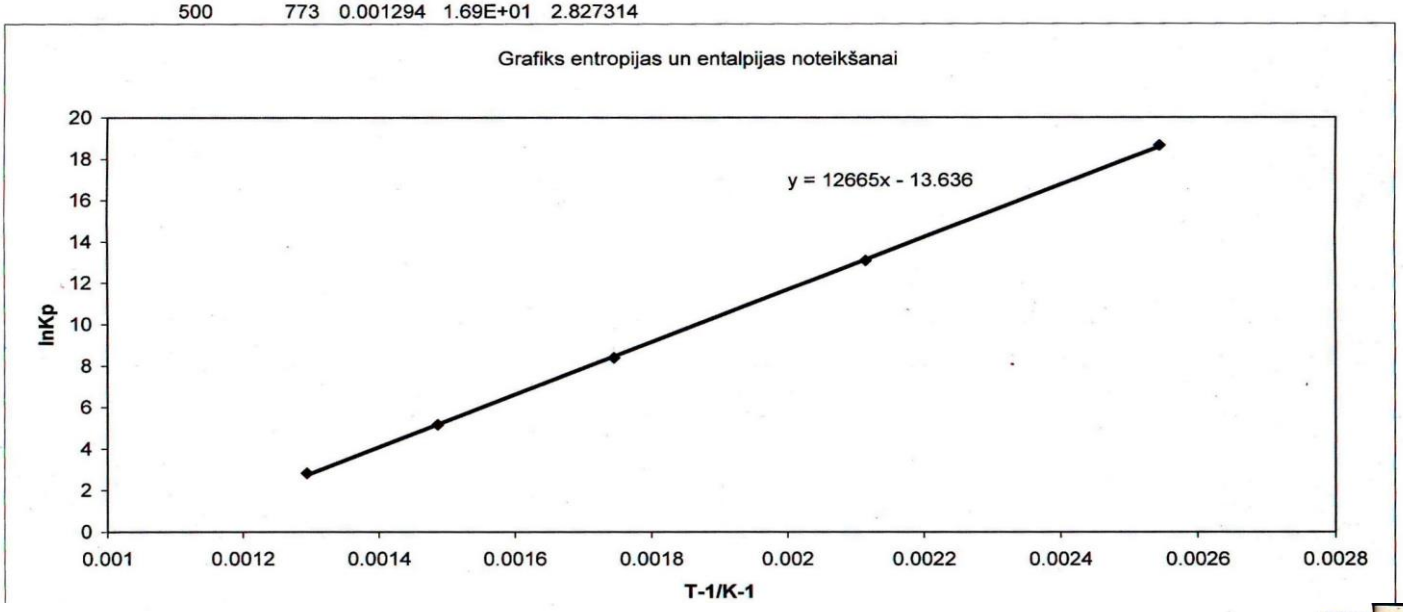
krustpunkts ar y asi: $\dfrac{\Delta_r S^\circ}{R} = -13.636$

$\Delta_r S^\circ = 8.3145 \times 13.636$ 2pt

$= -113\ \text{J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$

/9pt

T/C	T/K	T-1/K-1	Kp	ln(Kp)
120	393	0.002545	1.26E+08	18.65179
200	473	0.002114	4.84E+05	13.08984
300	573	0.001745	4.41E+03	8.39163
400	673	0.001486	1.75E+02	5.164786
500	773	0.001294	1.69E+01	2.827314



(2)

d) $AgCl(s) + e^- \longrightarrow Ag(m) + Cl^-(aq)$, K 1p+

$\frac{1}{2}Cl_2(g) + e^- \longrightarrow Cl^-(aq)$, A 1p+

$AgCl(s) + Cl^-(aq)$, K $\longrightarrow Ag(m) + Cl^-_{(aq)}$, A $+\frac{1}{2}Cl_{2(g)}$ 2p+ /4p+

e) $E = E^\ominus - \frac{RT}{F} \ln \frac{\sqrt{P_{Cl_2}} \cdot [Cl^-]_A}{[Cl^-]_K}$ 1p+

$\rightarrow E^\ominus = E + \frac{RT}{F} \cdot \ln \dots$

$= -1.1363 + \frac{8.314 \times 298}{96500} \cdot \ln \frac{10^{-3}}{10^{-4}}$ 2p+

$= -1.1372$ V /3p+

f) Nē, jo $E^\ominus < 0$. 1p+ /1p+

20 p+
kopā.

2.

a) $r_i = 2f\, k_d\, [I]$ — 3pt

b) $[I]_t = [I]_0\, e^{-k_d t}$ — 2pt

c) $r_a = k_a [M][P]$ — 2pt

d) $r_{opr} = k_t [P]^2$ — 2pt

e) $r_{opr} = r_i$

$k_t [P]^2 = 2f\, k_d [I]$

$\rightarrow [P] = \sqrt{\frac{2f\, k_d [I]}{k_{topr}}}$ — 2pt

f) $r_a = k_a \cdot [M] \cdot \sqrt{\frac{2f\, k_d [I]}{k_{topr}}}$ } b) dahil

$= k_a \cdot [M] \cdot \sqrt{\frac{2f\, k_d [I]_0}{k_{topr}}}\, e^{-k_d t}$ — 2pt

g) Sonsuz $[M] = [M]_0$: $p = \frac{[M]_0 - [M]_0}{[M]_0} = 0$

— 2pt

Hiç $[M] = 0$: $p = \frac{[M]_0}{[M]_0} = 1$

h) $r_a = \frac{d[M]}{dt} = -k_a \cdot [M] \cdot \sqrt{\frac{2 f k_d [I]}{k_t k_p}}$

3pt

$\rightarrow [M]_t = [M]_0 \cdot e^{-k_a \sqrt{\frac{2 f k_d [I]}{k_t k_p}}}$

$\rightarrow p = 1 - \frac{[M]_t}{[M]_0} = \underline{\underline{1 - e^{-k_a \sqrt{\frac{2 f k_d [I]}{k_t k_p}}}}}$

i) $t \rightarrow \infty \quad e^{-\infty} \rightarrow 0$

$\rightarrow p_\infty = \underline{\underline{1 - e^{2 k_a \cdot \sqrt{\frac{2 f [I]_0}{k_d \cdot k_t k_p}}}}}$

2pt

20pt

3.

(a) – (g) – katrs 0.5 pt, kopā 16 pt

Tabula atbildēm

savienojums	λ_{max} / nm	konjugētas saites	enerģijas līmeņu daudzums	n_{HOMO}	n_{LUMO}	sistēmas garums, pm	$n^2_{LUMO} - n^2_{HOMO}$	ΔE(teor) / J	λ_{teor} / nm
hex-1-ene	215	1	2	1	2	290	3	2.15×10^{-18}	92
2,4-hexadiene	228	3	4 ~~8~~	2	3	570	5	9.27×10^{-19}	214
1,3,5 - hexatriene	272	5	6 ~~12~~	3	4	850	7	5.85×10^{-19}	341
retinol	328	9	10 ~~18~~	5	6	1410	~~9~~ 11	$3.33\cdot10^{-19}$	596
molekula X	482								

tiek prasīta tikai izteiksme, bet starpreizultāts pieder.

e) $\Delta E = E_{LUMO} - E_{HOMO}$

$$= \frac{h^2 n_{LUMO}^2}{8 m_e l^2} - \frac{h^2 n_{HOMO}^2}{8 m_e l^2}$$

$$= \frac{h^2}{8 m_e l^2}\left(n_{LUMO}^2 - n_{HOMO}^2\right)$$

f) $\lambda = \frac{hc}{\Delta E} = \frac{8 c m_e l^2}{h(n_{LUMO}^2 - n_{HOMO}^2)}$ 2pt

g) jebkurš saprātīgs skaidrojums der 2pt

h) $y = 15x + 194$

$482 = 15x + 194$ 2pt

$x = 19.2 \approx 19$ konj. saišu

/ 20 pt kopā