THERMOELECTRIC EFFECT

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Summary:

→ The thermoelectric effect represents the appearence of a potential difference in a system of two different metals, brought into contact when the contacts have different temperatures. If the circuit constituted of the two conductors is closed, then you can see the appearance of a current, called thermoelectric current, which exists as long as $T_1 \neq T_2$.

→ The thermoelectric effect is explained by physical phenomena which appear at metal-to-metal contact. So, bringing in contact two different metals, between them appears a contact potential difference

(1) → $U_c = \frac{L_{02} - L_{01}}{e}$ (at 0K), $U_c = \frac{L_{02} - L_{01}}{e} + \frac{kT}{e} \cdot \ln \frac{n_1}{n_2}$ (2)

$E = U_c^{(A)} - U_c^{(B)}$ (electromotive voltage) (3)

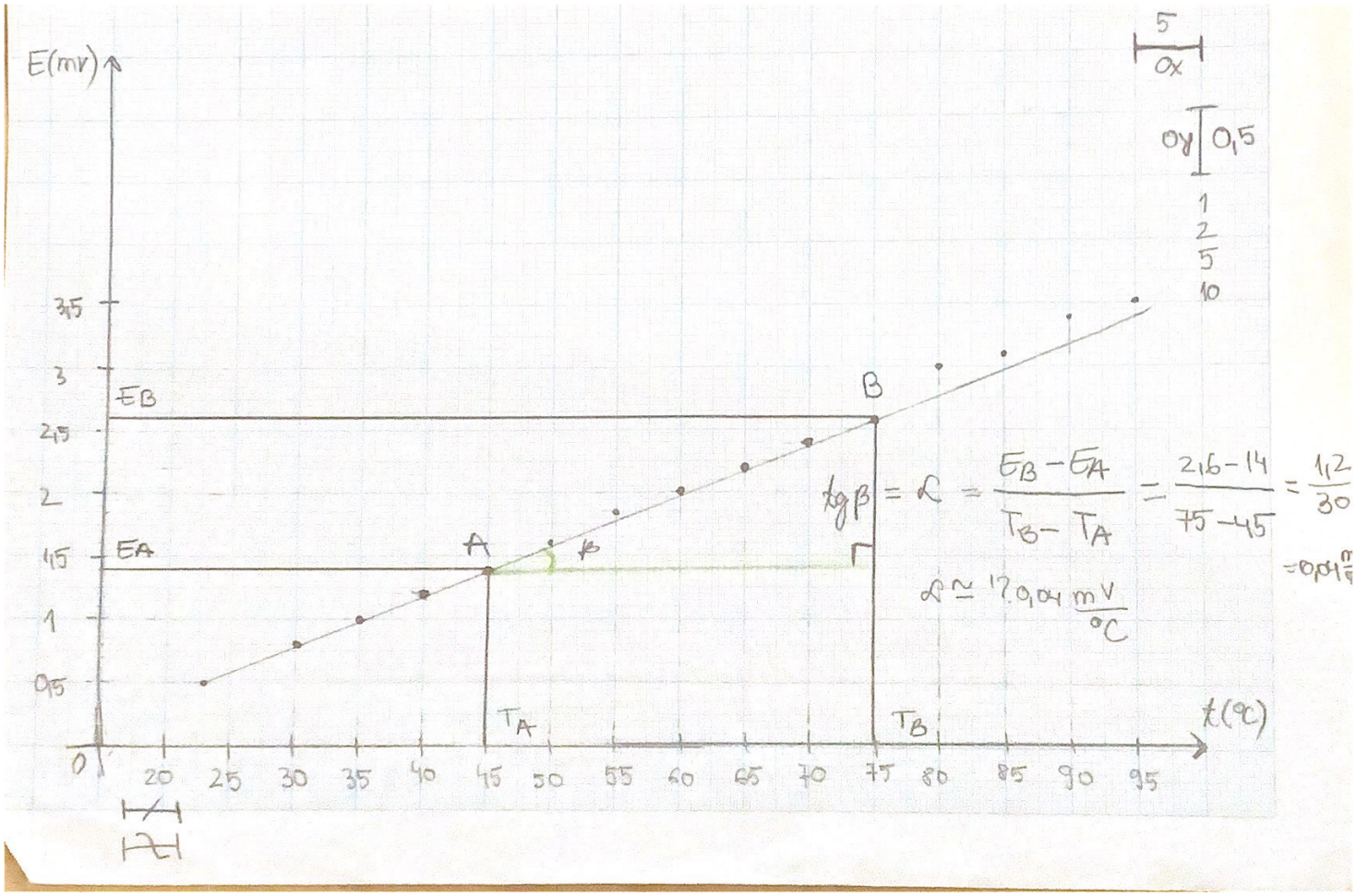
$E = \frac{k}{e} \ln \frac{n_1}{n_2} (T_A - T_B)$ (4) = (2) & (3)

$\frac{k}{e} \ln \frac{n_1}{n_2} = \alpha$ (two metals) (5)

$E = \alpha (T_A - T_B)$

T_A [°C]	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0
E [mV]	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80

Cele două cupru


E(mV)
t(°C)
EB
EA
A
B
TA
TB
β
5
ox
oy 0,5
1
2
5
10
3,5
3
2,5
2
1,5
1
0,5
0
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
tgβ = α = (EB − EA)/(TB − TA) = (2,16 − 1,4)/(75 − 45) = 1,2/30
α ≃ 0,04 mV/°C