Temperature Dependence of the resistivity of a metal:

In a simple light bulb consists of a thin tungsten wire is used, which absorbs all of the electric energy. (The resistance of the wire is the largest in the closed circuit.) The electrical energy is then transformed to heat and can heat up the wire up to 3600 K. At these temperatures, the wire starts radiating in the visible spectrum (blackbody radiation) and we perceive this as a generation of light. The tungsten wire, however, changes its resistance between room temperature and 3600 K. The resitivity for tungsten can be approximated for a wide range of temperature by:

$$R(T) = 5.65 * 10^{-8} \Omega / m \; + \; \alpha * \frac{\mathrm{T}}{300\mathrm{K}}$$

Use the instruction sheet for the Stefan-Boltzmann lamp to answer the following questions:

- How does the resistivity of tungsten depend on temperature?
- What is the reason for the temperature dependence of the resistivity of a metal?
- Calculate the temperature coefficient of the resistivity α. (give a value + units)

Table. 1. Resistivity of tungsten as a function of temperature

R/R_{300K}	Temp [K]	Resistivity μΩ·cm	R/R_{300K}	Temp [K]	Resistivity μΩ·cm	R/R_{300K}	Temp [K]	Resistivity μΩ·cm	R/R_{300K}	Temp [K]	Resistivity μΩ·cm
1.0	300	5.65	5.48	1200	30.98	10.63	2100	60.06	16.29	3000	92.04
1.43	400	8.06	6.03	1300	34.08	11.24	2200	63.48	16.95	3100	95.76
1.87	500	10.56	6.58	1400	37.19	11.84	2300	66.91	17.62	3200	99.54
2.34	600	13.23	7.14	1500	40.36	12.46	2400	70.39	18.28	3300	103.3
2.85	700	16.09	7.71	1600	43.55	13.08	2500	73.91	18.97	3400	107.2
3.36	800	19.00	8.28	1700	46.78	13.72	2600	77.49	19.66	3500	111.1
3.88	900	21.94	8.86	1800	50.05	14.34	2700	81.04	26.35	3600	115.0
4.41	1000	24.93	9.44	1900	53.35	14.99	2800	84.70			
4.95	1100	27.94	10.03	2000	56.67	15.63	2900	88.33			