The goal of this experiment was to determine the thermal conductivity, specific heat capacity, emissivity, and convective heat transfer coefficient of a rod, as well as the fraction of power generated by a power resistor that flowed down the rod, and observe how these values changed when we changed the orientation or color of the rod. We obtained the following numerical results:

* Thermal conductivity: 100.26 ± 0.87 W/m\*K
* Specific heat capacity: 370.55 ± 7.43 J/g\*K
* Power fraction: 93.38% ± 7.43%
* Emissivity: 0.9091 W/m2 (didn’t change with different colored rod)
* Convective heat transfer coefficient:
  + Vertical: 8.40 W/m2K
  + Horizontal: 5.66 W/m2K
  + Diagonal: 6.63 W/m2K

Overall, our data was very uncertain (and we have reasons to be skeptical of those results with low uncertainties), and it is difficult to draw meaningful conclusions from our numerical results. This was due to a combination of a lot of noise in the temperature data that we measured directly, as well as serious flaws in the program we used to derive parameters from the temperature data. In future experiments, we need to find ways to better minimize or account for noise when measuring temperatures with thermocouples or find alternative ways to measure temperature. We also need to create a better simulation and optimization program, probably by reducing the number of degrees of freedom that it has and doing a better job of measuring and entering precise physical constants (such as ambient temperature).