Name: **Midterm 4 EP** **sample**

1. Explain the following terms, give definitions! If you give an equation describe the meaning of each letter all the time! 20p
    a. precision
    b. capacitance
    c. critical angle
    d. visible spectrum
    e. globar light source
    f. transmittance
    g. Snell's law
    h. rotational energy in the quantum mechanical model
    i. azimutal quantum number
    j. chemiluminescence

2. Methanol has a UV absorption peak at 184 nm with $\varepsilon = 150\ dm^3\ mol^{-1}\ cm^{-1}$. Calculate the concentration of methanol in a nonabsorbing solvent for a cell of 50 mm optical length if we measure A = 0.941. 4p

3. Give the Beer–Lambert's law and its limitations! 8p

4. Describe how the moment of inertia can be determined from a rotational spectrum! 6p

5. Compare the random error and the systematic error! 4p

6. We measure the infrared spectrum of the propane molecule. Calculate how many vibrations we can expect! 4p

7. Describe the special requirements and possibilities in the infrared sample handling! 6p

8. Give a short overview on the photoelectric effect and its consequences! 6p

9. Draft the block diagram of a single beam spectrophotometer and explain the roles of its parts! 6p

10. Give the wavelength and frequency of the light if its wavenumber is $2.1 \cdot 10^6\ m^{-1}$! 4p

11. How to estimate confidence intervals? 4p

Scoring: the sum of the scores shown next to the problems will be normalized to 20 points.

You have 2 hours to answer the questions. Write only those paper which are provided! You can use only pen, calculator without text memory and the formula collection we provide!