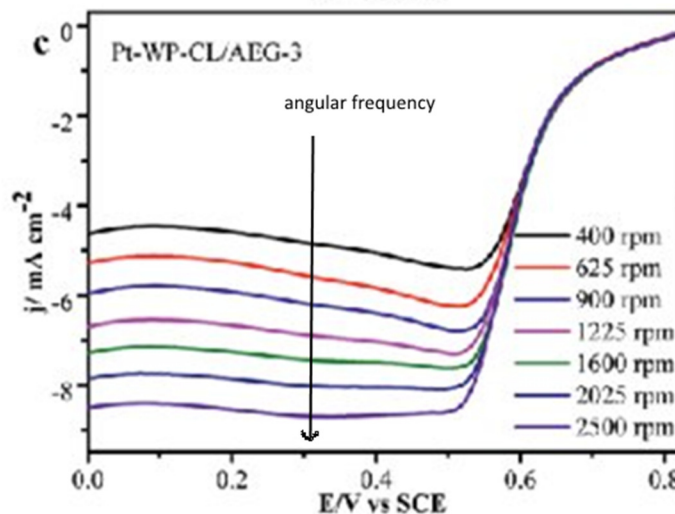


1. Explain the following terms, give definitions! If you give an equation describe the meaning of each letter all the time! 20p
 - a. GC
 - b. HPLC
 - c. specific detector in chromatography
 - d. electric potential difference
 - e. activity coefficient
 - f. conductivity (κ)
 - g. conductance
 - h. electrode
 - i. E_{MF}
 - j. polarization potential
2. Find the potential range for diffusion polarization in the figure! Explain your answer! Give this potential range versus the standard potential of the hydrogen electrode if we know that the potential of the reference saturated calomel electrode, $E_{SCE} = 240 \text{ mV}$! 6p
3. Explain the relation between the Tafel equation and the Erdey-Grúz – Volmer – Butler equation! 5p
4. Classify the electrodes and give examples for each class! 10p
5. Calculate the potential of the copper/copper ion electrode if the electrolyte solution contains 0.017 mol/dm^3 CuSO_4 and $T = 25.4^\circ \text{C}$! The formal standard potential is 339 mV ! 4p
6. Give the cell diagram of the following cell! We have a piece of silver metal (appr. 3.7 cm long) immersed in a silver nitrate solution (volume 142 ml, $c = 0.0013 \text{ mol/dm}^3$), connected to saturated potassium chloride solution in a beaker of 25 ml which is further connected to a zinc sulphate solution of 0.014 M. Beside this we have two rods in the zinc sulphate solution: one is made of zinc (diameter 5 mm), another is made of glass (diameter 3 mm). 6p
7. Describe the factors affecting the efficiency of the GC separation (use the appropriate equation and figure)! 5p
8. How many grams of copper is produced during 76.6 min electrolysis from copper sulphate solution with 0.78 A current on both the anode and cathode? 4p
9. Explain how pH can be measured! 6p
10. Calculate the ionic strength of a solution having 0.15 mol/kg sodium bromide and 0.42 mol/kg sodium phosphate dissolved! 4p
11. How can you calculate the maximum work and equilibrium constant for an electrochemical cell? 6p



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!