Autoevaluation TEST Nº2 *(Topics 3-5)*

Family name and name_____

Important: Write your name before beginning the test. No additional material will be provided. Books, class notes are not allowed. Calculators are allowed. Use margins for drafts or calculus. **Mark with a cross the correct answer in the box at your left when you are completely sure. No crossings out and no additional comments are allowed. Correct answers mark as +1. Errors mark -0.1. Blanks mark as 0. The final score can not be less than 0**. There is only one correct answer in each question.

A) When 3.24 g of $Hg(NO_3)_2$ are dissolved in 1000 g of water the freezing point of the solution is -0.0558 ºC. When 10,84 g of $HgCl_2$ are dissolved in 1000 g water, the freezing point of the solution is -0.0744 ºC. Kc for water is 1.86. Are ionized any of these salts in water? M(Hg)=200.6; M(N)=14; M(Cl)=35.5; M(O)=16

B) Consider the Daniell galvanic cell Zn | Zn^{2+} (ac)(1M) || Cu^{2+}(ac) (1M) | Cu. A solution of sodium sulfide (Na_2S) was added to the Zn electrode to precipitate the Zn(II) cations in the form of ZnS. The final concentration of sulfide anions was 1 M and the cell potential was +1.78V.

a. The flow of electrons goes from Zn electrode to Cu electrode or the other way round?
b. Calculate the solubility constant for ZnS.

Data: $E^o_{(Cu\ (II)/Cu)}$ = 0,34 V, $E^o_{(Zn(II)/Zn)}$ = -0,76 V

C) Hidrazine is a base ($K_b = 3\cdot10^{-6}$) that dissociates in aqueous solution as $NH_2\text{-}NH_2 + H_2O \leftrightarrow NH_2\text{-}NH_3^+ + OH^-$. 1 mL of a 0.02 M NaOH solution was added to 200 mL of 0.1 M hydrazine. Calculate the pH of the solution.

D) ΔG^o_f for the following reaction S (s) + 3/2 O_2 (g) ⇔ SO_3 (g) is ΔG^o_f = -370.7 $kJ\cdot mol^{-1}$ at 298 K. Calculate Kp at 298K, Kc at 1000 K. How shifts equilibrium if T is decreased at constant pressure?