Uva Wellassa University, Sri Lanka
Faculty of Applied Sciences
Department of Science and Technology
200 Level 1st Semester Examination July/August 2019
SCT 231-2 Physical Chemistry

Uva Wellassa University

Instructions to candidates
Number of questions: Three (03)
Answer all questions
Time allocation: Two (02) hours
Total marks allocated: 400
Scientific calculates are allowed
Write the answers in given space for part A. Use separate booklet for part B

Part A

1.

i. What do you mean by relative activity of a species?

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ii. Write down the relationship of relative activity of species in a solution of concentration C.

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iii. The conductivity of a saturated aqueous solution of silver bromide at 20 °C is 2.02×10^{-5} S m^{-1}. The conductivity of water used to prepare this solution is 1.0×10^{-5} S m^{-1} at the same temperature. The limiting molar conductivities of Ag^+ and Br^- are 6.19 mS m^2 mol^{-1} and 7.81 mS m^2 mol^{-1}, respectively, at 20 °C.

a. Write down the solubility equilibrium and equilibrium constant for above system.

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b. Calculate the conductivity due to Ag^+ and Br^- ions in the solution.

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c. Calculate the limiting molar conductivity of AgBr in water.

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d. Calculate the solubility product constant (K_{sp}) of AgBr in water at 20 °C.

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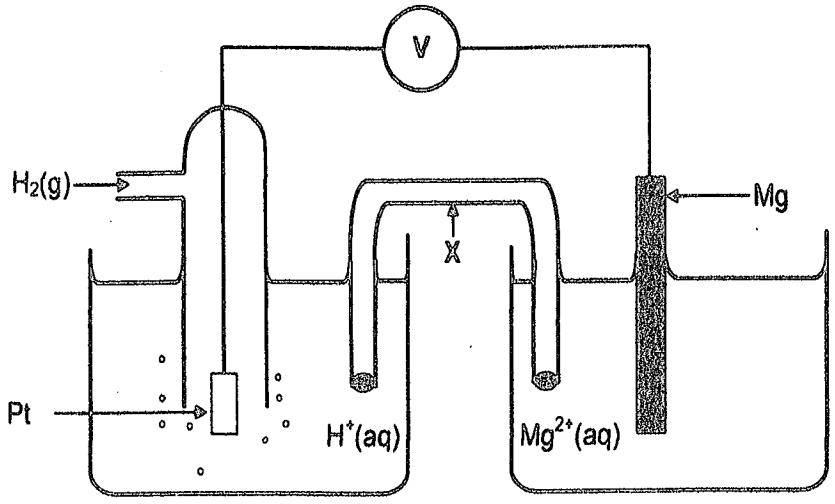
iv. The galvanic cell represented below consists of a hydrogen half-cell and a magnesium half-cell at standard conditions. The reading on the voltmeter is 2.36 V.



a. In addition to the concentration, what are the other necessary two conditions needed for the hydrogen half-cell to function at standard conditions?

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b. Write down the name and the importance of the item labeled as X.

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c. Is magnesium the anode or cathode in the cell above? Briefly explain your answer using the relative strengths of reducing agents.

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d. Write down the standard cell notation for the above cell.

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e. Calculate the standard reduction potential of the magnesium half-cell. Show all the steps o your calculation.

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f. Write down the balanced overall reaction of the cell that takes place in the above system.

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g. Few drops of Universal indicator are added to the hydrogen half-cell. When the cell is workir the color of the indicator gradually changes and then it remains unchanged. What would yc expect to happen to the pH of the solution from the time the cell starts work till there is r change in the color of indicator?

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(100 marks