U.G. 4th Semester Examination - 2021

CHEMISTRY

[PROGRAMME]

Course Code : CHEM-G-CC-T-4

Full Marks : 20 Time : 1 Hour

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: 1×5=5

   a) What is lever rule?

   b) Define specific conductance.

   c) Give examples of congruent and incongruent melting points.

   d) Write the ground state electronic configuration of Hf^{o} (Atomic Number 72).

   e) What is Arrehenius equation for rate constant?

   f) Which region of the spectrum is absorbed by the $[Cu(H_2O)_6]^{2+}$ solution? $[Cu(H_2O)_6]^{2+}$ solution has blue colour.

   g) Calculate the spin-only magnetic moment of $Ni(en)_3SO_4$.

   h) Write the IUPAC name of $[Ni(dmg)_2]^{o}$.

2. Answer any **one** question: 5×1=5

   a) Give the phase diagram of water system and discuss the importance of various points, lines and areas. 5

   b) Describe the potentiometric method to determine the pH of a solution using hydrogen electrode. 5

   c) What is John-Teller effect? What distortion is expected for octahedral d^9 ion? 3+2=5

3. Answer any **one** question: 10×1=10

   a) Deduce thermodynamically phase rule equation, F=C–P+2. 10

   b) Can a solution of 1M Copper sulphate be stored in a vessel made of nickel metal? Given that $E^0_{Ni,\,Ni^{2+}} = +0.25$ volt and $E^0_{Cu,\,Cu^{2+}} = -0.34$ volt.

   Derive distribution law from thermodynamic considerations. Write a short note on Azeotropes. 3+4+3

c) Write a short notes on the following (any **two**): 5×2=10

i) Write a short note on Werner's coordination theory.

ii) IUPAC nomenclature of the super heavy element.

iii) Write a short note on lanthanide contraction.

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