

Chemistry Core Course

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CC15U CHE1 B01: THEORETICAL AND INORGANIC CHEMISTRY-1

Time: 3 hours

Maximum marks: 80

Section A

Answer all questions. (Each question carries 1 mark)

1. A methodological and systematic approach to the acquisition of new knowledge is-----
2. The phenomenon of diffraction of light can be explained on the basis of the ---- nature of light.
3. The significant figure in the reported value 6.0061 is -----
4. ${}^6\text{C}^{14}$, ${}^7\text{N}^{15}$ are -----
5. The number of oxygen atoms in 20 g of oxygen is ----
6. In $\text{Fe}_2(\text{SO}_4)_3$, iron shows a valency of -----.
7. Iodine dissolves in aqueous KI due to the formation of ----- ion.
8. For an electron having momentum 'P', the de Broglie wavelength, $\lambda =$ -----.
9. N-phenyl anthranilic acid is an example for a ----- indicator
10. The emission of a positron is viewed an attempt by the nucleus to ----- its N/P ratio.

(10 x 1 = 10)

Section B (Short answer)

Answer any 10 questions. (Each question carries 2 marks)

11. What is a hazard?
12. What is a scientific law?
13. Explain the term MSDS.
14. Calculate the molality of a solution obtained by dissolving 36g of glucose in 2 kg of water.
15. Differentiate between precision and accuracy
16. What is a desiccant? Give an example.
17. What is oxidation and reduction based on electronic concept? Explain with an example.
18. Calculate the energy of a radiation that has a wavelength of 2000 \AA .
19. Write the nuclear equation for
 - a). the emission of a β - particle from Ra-228
 - b). the emission of a α - particle from Th-232
20. What is K- electron capture?

21. Explain the term binding energy.
22. Why neutrons are better particles for artificial transmutation than α - particle?

(10 x 2 = 20)

Section C (Paragraph)

Answer any **five** questions. (Each question carries **6** marks)

23. What is meant by dual character of an electron? Derive an expression for the wavelength de Broglie matter wave.
24. Differentiate between scientific law and scientific theory.
25. A) State Heisenberg's uncertainty principle.
b) Calculate the uncertainty in the position of a particle whose uncertainty in momentum is $1.65 \times 10^{-2} \text{kgm s}^{-1}$.
26. Distinguish between primary standards and secondary standards as applied to volumetry.
27. Discuss the principles of iodimetric and iodometric titrations.
28. Explain Yukawa's meson field theory.
29. State and illustrate group displacement law.
30. Write short note on a) breeder reactors b) radioactive equilibrium.

(5 x 6 = 30)

Section D (Essay)

Answer any **two** questions. (Each question carries **10** marks)

31. Discuss briefly the components of a research project report.
32. What are adsorption indicators? Explain the principle behind the use of adsorption indicators.
33. What are the postulates of Bohr Theory? Derive the expression for the energy of electron.
34. a) Describe radiocarbon dating. (3 marks)
b) Explain with example how radio isotopes are useful in medical diagnosis and radiotherapy (3 marks)
c) The amount of ^{14}C present in an old piece of wood is found to be one-fourth that present in a fresh piece of wood. Calculate the age of wood. Half-life of ^{14}C is 5668 years. (4 marks)

(2 x 10 = 20)
