

EASTERN UNIVERSITY, SRI LANKA
First Examination in Science 2001/2002 (May 2002)
First Semester
CH 101 Periodicity and Bonding

Time: 1 hour

Answer **all** questions

1. (a) What are the postulates of Bohr Theory? ✓
(b) Calculate the energy, the frequency and the wavelength of the radiation emitted by the electron transition from the fifth to the second quantum level in a Hydrogen atom. In which spectral region can a line corresponding to this transition be detected? ($R_H = 2.179 \times 10^{-18} \text{ J}$, $h = 6.63 \times 10^{-34} \text{ Js}$)
(c) Calculate the ionization energy of hydrogen in its ground state in joules per mole of atoms?
(d) (i) What are the possible values of l for $n = 4$?
(ii) What are the possible values of m_l for $l = 3$? ✓

2. (a) What do you understand by Valence Shell Electron Pair Repulsion (VSEPR) theory?
(b) Predict the shape of PCl_3 molecule using
(i) VSEPR theory and
(ii) the concept of hybridization.
(c) Write down the molecular orbital configuration of O_2 and O_2^{2-} .
Answer the following questions.
(i) What are the bond orders of O_2 and O_2^{2-} ?
(ii) Which molecule has the shorter bond length? Give reasons for your answer.
(iii) Predict their magnetic property. Give reasons for your answer.

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