EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF CHEMISTRY
FIRST EXAMINATION IN SCIENCE 2002/2003
FIRST SEMESTER - 2004 (PROPER)
EXCH101 PERIODICITY AND BONDING
EXTERNAL DEGREE

Time : 1 Hour

Answer all Questions

01) (Planck's const.$= 6.6 \times 10^{-34}$Js ; $1eV = 1.6 \times 10^{-19}$J ; Velocity of light $= 3 \times 10^{8}$ms^{-1};
Mass of electron $= 9.1 \times 10^{-31}$; Rydberg const.$R_H = 2.18 \times 10^{-18}$J)

    a) (i) What is the range of wave length in which visible region exist?
        (ii) The wave length of the green light from a signal is 580nm. What is the
            frequency of this radiation?

    b) The work function of sodium is 2.5eV.
        (i) In photo electric experiment, what condition must be satisfied to produce
            the photo-electrons?
        (ii) Calculate the threshold frequency.
        (iii) Calculate the maximum velocity of the photo-electrons produced when
            sodium is illuminated by the light of wave length 6×10^{-8}m.

    c) (i) Write the expression for the energy of the Hydrogen atom.
        (ii) Hence calculate the wave length of light that correspond s to the transition
            of the electron from the n=4 to n=2 state of the Hydrogen atom. Is the light
            absorbed or emitted?

02)   a) State
        (i) Pauli's exclusion principle
        (ii) Hund's rule

    b) Showing the x,y,z axes, draw the following orbitals
        (i) P_z
        (ii) $d_{x^2-y^2}$
        (iii) d_{xy}

    c) Write the electronic configuration of oxygen atom (atomic number $= 8$). Give the
        quantum numbers n, l, m_l, m_s for each of the unpaired electrons in an oxygen atom.

    d) Write down the molecular orbital electronic configuration of O_2^{2-} and NO.
        In each case
        (i) Calculate the bond order
        (ii) Predict the magnetism.

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