

Answer on the question #68068, Chemistry / Physical Chemistry

Question:

Write short notes:

- a) Photoelectric effect
- b) Gerade and Ungerade
- c) Degenerate orbitals
- d) Enantiomers
- c) Chromophores

Answer:

- a) The photoelectric effect refers to the emission, or ejection, of electrons from the surface of, generally, a metal in response to incident light. Energy contained within the incident light is absorbed by electrons within the metal, giving the electrons sufficient energy to be 'knocked' out of, that is, emitted from, the surface of the metal. Maximum kinetic energy of the electron will be the energy of the absorbed photons minus work function:

$$K_{max} = E - \phi = \frac{hc}{\lambda} - \phi.$$

- b) Gerade and ungerade concerns the symmetry of molecular orbitals. If inversion through the centre of symmetry in a molecule results in the same phases for the molecular orbital, then the MO is said to have gerade (g) symmetry, from the German word for even. If inversion through the centre of symmetry in a molecule results in a phase change for the molecular orbital, then the MO is said to have ungerade (u) symmetry, from the German word for odd.
- c) Degenerate orbitals are the orbitals that give the same value of energy upon measurement. For example, in the homonuclear diatomic molecules of the first ten elements, the molecular orbitals derived from the p_x and the p_y atomic orbitals result in two degenerate bonding orbitals (of low energy) and two degenerate antibonding orbitals (of high energy).
- d) Enantiomers are the type stereoisomers that are mirror images of each other. One can compare enantiomer term with right and left hands, that are merely mirror images of each other and not superimposable. Enantiomers are able to rotate plane-polarized light by equal angles but in opposite directions.
- e) Chromophores are the parts of the molecule that absorb light and thus are responsible for its colour. The light that was not absorbed is reflected and apprehended by our vision organs. Thus, usually chromophore must absorb the light in visible range of wavelengths. Within light absorption, the molecule is said to pass from its ground state to its excited state.