Class - B.Sc. Part I (Subbidiary)

Subject - chemistry

Paper - gr. e

Topic - Bond length

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Define Bond Length.

The average distance between the centres of the nuclei of the two bonded atom in a molecule is called the bond length. The length of a covalent bond between two given atoms depends on whether it is a sigma bond or combination of a sigma and π- bond or π- bonds, i.e. it is a single, double or Triple bond. It also depends on the type of hybridization and the resonance.

The order of bond length is

Single bond > Double bond > Triple bond

The bond length of the sigma bond in different type of hybridization following the following order :—

σ- bond(sp^3) > σ- bond(sp^2) > σ- bond(sp)

Bond length between two given atoms is approximately constant in different molecules depending upon the above conditions unless it is not affected by inductive effect and mesomerism. The units of bond length is angstrom (Å) or Picometre (pm). The microwave spectroscopy. For most of the bonds the values are 1 to 2 Å. It may be noted that the values of bond lengths are subject to small changes depending on the structural environment of the bond and the experimental method used to measure it.

For Example :- Sum of the bond length are given below :-

Bond	Bond length (Å) or pm
C – C	1.54 (154)
C = C	1.34 (134)
C ≡ C	1.20 (120)
C – O	1.40 (140)
C = O	1.20 (120) etc.