bond length

The distance between atomic centers involved in a *chemical bond*. The notion of bond length is defined differently in various experimental methods of determination of molecular geometry; this leads to small (usually 0.01-0.02 *E*) differences in bond lengths obtained by different techniques. For example, in gas-phase electron-diffraction experiments, the bond length is the interatomic distance averaged over all occupied vibrational states at a given temperature. In an X-ray crystal structural method, the bond length is associated with the distance between the centroids of electron densities around the nuclei. In gas-phase microwave spectroscopy, the bond length is an effective interatomic distance derived from measurements on a number of isotopic molecules, etc. A number of empirical relationships between bond lengths and bond orders in polyatomic molecules were suggested, see, for example, fractional bond number (the Pauling's bond order).

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