## Electronic properties of common sugars

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In continuation of our work on solid phase conductivity of sucrose, in the present one, we have initiated to quantify the electrical conductivity of common sugars (glucose and fructose) as a representative selection of monosaccharides. The main objective was to obtain fundamental data on the electronic properties of common sugars; key compounds in the metabolism of the living organism. Therefore, the electronic properties of common sugar products were probed, both qualitatively and quantitatively. Such investigations will be of significant help in understanding the basic mechanism of charge transport in the sugar crystals. The dc electrical conductivity of AnalaR reagent glucose and fructose across the temperature range of 305-350 K has been measured in vacuo employing an ebonite conductivity cell of the configuration Cu/Pellet/Cu. The aforesaid crystals have measurable electronic conductivities, with temperature dependence similar to that of conventional semiconductors. The absolute values of the conductivity are several orders of magnitude lower than in most semiconductors and are greater for the larger molecular species. As a group, they may be classified as poor insulators or semiconductors, according to the preference. Characteristic activation energies ranging from 0.27 to 0.35 eV reveals that there is a protonic conduction mechanism in the sugars which is attributed to the protons of hydrogen bond network present in these crystals. A comparative study with the conductivity of pentamethyl derivatives of sugars where there are no hydrogen bonds brings considerable added assurance to both technique employed as well as endorsing the validity of the results in the sense that pentamethyl sugar crystals have no electrical conductivity which confirms the participation of hydrogen bond as charge carrier which is thought to be responsible for the observed conductivity.