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Testing for superconductivity with normal state properties[1]
O. PAUL ISIKAKU-IRONKWE, The Center for Superconductivity Technologies(TCST), Abuja FCT, Nigeria — One of the challenging problems in the search for superconductors is determining from the chemical formula whether a material will be a superconductor or not. Superconductivity correlates with normal state properties such as electronegativity, valence electron count and mass (atomic number). Using these normal state properties we study known superconductors, non-superconductors and semiconductors. We find that for most superconductors, the ratio of average electron count (Ne), to the square root of the average atomic number (Z), is usually less than 1, but greater than 0.5. We find too that when this applies and the electronegativity is higher than 1.5, we are likely to get a superconductor. We propose here that this relationship could be used as a semi-empirical test for superconductivity, knowing just a materials formula. Except for carbon-based superconductors and some unconventional superconductors, most non-superconductors have Ne over the square root of Z greater than 1 or less than 0.5.

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