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A15 compounds, HTSC and strong coupling superconductors SNEHADRI OTA, Institute of Physics, Bhubaneswar 751005, Orissa, India — We suggest that it is possible to understand the origin of high T_C in the framework of strong coupling theory of superconductors. An exploratory investigation of materials with promising structural or electronic motifs is presented. The electron-phonon coupling constant λ has been calculated for A15 compounds assuming the width of the Γ_{12} band as 80 meV. λ has been found to be inversely proportional to the molecular weight. The analysis is based on the numerically derived equation for T_C from strong coupling theory for superconductivity by McMillan. The Coulomb pseudopotential μ^* has been found to be negative for $YBa_2Cu_3O_7$. The T_C of $YBa_2(Cu_{1-x}Zn_x)_3O_7$ decreases linearly from 89 K to the nonsuperconducting state at a rate of about 15 K/at% of Zn substitution. Similar analysis $YBa_2(Cu_{1-x}Zn_x)_3O_7$ shows that μ^* changes sign from negative to positive as T_C reduces. The isotope effect exponent α is found to go through a maximum as T_C decreases and is found to be equal to 1/2 for x=0.026 which can be verified experimentally.

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