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Chemical Activity in $YBa_2Cu_3O_{7-\delta}$ Acrosst the Transition to Superconductivity[1] JUANA V. ACRIVOS, San Jose' State University — Changes in the Gibbs free enthalpy, chemical activity across the transition temperature to superconductivity T_c in $YBa_2Cu_3O_{7-\delta}$ is described by enhanced element X-Ray absorption XAS and diffraction XRD [HKL] reflections. Critical oscillations in the index of refraction within the XAS line width (± 2.5eV) at the Ba L2, L3 and Y K-edges observed ∼30K above T_c ≈93K in [HKL] reflections indicates their activity. Enhanced absorbance A versus T obtains the activation enthalpy and entropy: $\Delta H^{\neq}_{>}$=-220 meV, $\Delta S^{\neq}_{>}$=-2 meV/K (121≥T≥93K) for mixed normal and superconducting phases, which compensates the reported O atom ordering activation energy near T_c by 50 meV. The activation needed to mix differently ordered superconducting phases: $\Delta H^{\neq}_{<}$= -67 meV, $\Delta S^{\neq}_{<}$ = -1 meV/K (60K≤T≤93K) indicates lattice ordering persists to 60K. Enhanced XRD scattering induced near the transition to superconductivity in 3D solids indicates that the role of 2D reactive [HKL] planes is similar to the chemical activity of reactive linear bonds in molecular reactions.

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