LaAlO₃/SrTiO₃ (LAO/STO) hetero-interfaces are of interest due to observation of unexpected phenomena at the interface, including tunable 2D conductivity, superconductivity and magnetic scattering. A great number of physical and chemical factors have been hypothesized to create these unique observations at the interface such as electronic reconstruction, intermixing, non-stoichiometry and strain; however, neither is necessarily exclusive of each other. Therefore, quantification of all parameters is crucial to understand the extent each factor contributes to both the presence/absence and the magnitude of the 2D conductivity. Presented here is how the local chemistry at the interface affects the local strain and how the surface chemistry can play a role on the electrical conductivity at the interface. The techniques include medium energy ion spectroscopy (MEIS) and X-ray Photoelectron Spectroscopy (XPS). The intermixing of both the A- and B-site cations have been quantified and related to in-plane strain with atomic resolution. The surface adsorbed species have been identified, quantified and was related to electrical properties. The conclusion will focus on the effects of vacancies of strontium and their distribution below the interface. Results show both the need for quantification of parameters and the complex nature of these interfaces.