Mixed lead chloride oxalate, Pb$_2$Cl$_2$(C$_2$O$_4$), has been obtained in a polycrystalline form in the course of an extended study on lead-oxalate-based precursors of nanocrystalline PZT-type oxides (Boudaren et al., Chem. Mater. 12, 2324, 2000; Solid State Sci. 3, 367, 2001). Such compounds are also of interest in relation with the environmental impact of lead in aqueous solutions. Its crystal structure has been solved \textit{ab initio} from powder diffraction data collected with a monochromatic radiation from a conventional X-ray source (Bragg-Brentano geometry). Pattern indexing has been carried out with DICVOL91, structure solution was derived from EXPO and FULLPROF was used for the refinement of the atomic coordinates. The symmetry is monoclinic, space group \textit{C}2/\textit{m}, the cell dimensions are \(a = 5.9411(3) \text{ Å}, b = 5.8714(4) \text{ Å}, c = 9.4212(4) \text{ Å}, \beta = 95.232(4)^\circ\) and \(Z = 2\) \([M_{20} = 175, F_{30} = 205(0.0046,32), R_{wp} = 0.156, R_F = 0.047]\]. The structure consists of a stacking of complex double sheets, built from lead polyhedra, parallel to (001) and connected together through oxalate groups. The lead atom is nine-fold coordinated by four O atoms from one bidentate and two monodentate oxalate groups and five Cl atoms. The polyhedron can be described as a highly distorted square antiprism, mono-capped by a Cl atom. The thermal behavior of lead chloride oxalate, in vacuum and in air, has been carefully described from temperature-dependent powder diffraction and thermogravimetric measurements. It is shown that reaction pathways are complicated by (i) the identification of various oxide chloride phases with a ratio Cl/O decreasing with temperature and (ii) the formation of metallic lead, which is in a liquid form for temperatures greater than 327 °C. Lead oxide is the final product.