The invention concerns a praseodymium cluster of formula (1): \([\text{Pr}_n\text{O(OH)}_n \cdot \text{NO}_3 \cdot (\text{H}_2\text{O})_m]^{2+}\) (1), \(n\) being equal to 12 or 14, as well as a dispersion comprising clusters corresponding to said formula (1) in an aqueous liquid phase or in a liquid phase based on a non-protogenic polar solvent. The inventive cluster can be obtained by a method which consists in: forming a praseodymium nitrate solution; contacting said solution and a base in an amount such that the mol ratio O/H/Pr is not more than 1; concentrating the medium obtained at the preceding step so as to obtain a praseodymium concentration of at least 1 mol/l whereby an aqueous dispersion of said cluster is obtained. Evaporation of said dispersion enables a solid to be obtained which can be re-suspended in said polar solvent. The inventive cluster can be used in the production of catalysts.