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The focus of our research is on extending the chemistry of molecular oxides. We call the compounds “molecular oxides” and not “polyoxometalates” because the word polyoxometalate indicates the compound is anionic and contains metals. Polyoxometalates have compositions and structures reminiscent of oxides. However, there are potentially many such compounds that are neither anionic nor contain any metallic elements [1]. Octaantimonate, $[\text{Sb}_8\text{O}_{12}(\text{OH})_{20}]^{4-}$, is one such example that has been isolated and structurally characterized in our effort to expand the chemistry of molecular oxides [2]. During the course of our study, we have also discovered the tetrahedral tellurate anion, TeO_4^{2-} , and nitroxyl anion, NO^- [3, 4]. The TeO_4^{2-} anion is stable in non-aqueous solutions, although people thought Te atom is too large to form a stable tetrahedral oxoanion. The NO^- anion had been deemed too reactive to be isolated in the condensed phase. We still do not have much to report on the “cationic front”, but had some minor success there and obtained a mixed valent, tetra-nuclear Pt compound [5]. Another branch of our study is the reaction of molecular oxides with small molecules. It was during the study of the reaction of $[\text{Nb}_{10}\text{O}_{28}]^{6-}$ with NO that we unexpectedly obtained $[\text{Nb}_{20}\text{O}_{54}]^{8-}$ [6]. Later, we confirmed this dimerization is reversible and stoichiometric [7]. In the study of the reaction of $[\text{IMo}_6\text{O}_{24}]^{5-}$, we found this anionic molecular oxide undergoes protonation/deprotonation reversibly and reacts with methanol with a very selective manner [8]. Lately, we are interested in the hydrogen-bonded oligomers of molybdoplatinate and just found that the $[\text{H}_9(\text{PtMo}_6\text{O}_{24})_2]^{7-}$ dimer [9] stays intact in solution.

Obviously, solution chemistry is our strong point. We could undertake some joint studies if any of the participants are interested in the solution chemistry of their compound.

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