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Our research is focused on the basic chemistry of peroxopolyoxometalates. Our main targets at present are:

1. Peroxovanadates with various heteroatom group(s) such as orthophosphate and linear/circular polyphosphates. Some novel peroxopolyphosphatovanadates were isolated and structurally analyzed. NMR (^{31}P and ^{51}V) investigation on their aqueous behavior is going on.
2. Peroxoisomolybdates and -tungstates with rare earth atoms. A series of novel type peroxomolybdates and -tungstates with two rare earth (III) atoms were isolated and structurally analyzed. Elucidation of their formation by NMR (^{95}Mo, ^{183}W, ^{89}Y and ^{139}La), and measurements of their physical properties are in progress.
3. Peroxoheteropolymolybdates and -tungstates having linear and circular polyphosphate(s). Several polyanions with diphosphate(s) were obtained and their structures were determined. The complex formation in the aqueous molybdate/tungstate - diphosphate - hydrogen peroxide systems is quite complicated, and the investigation is going on mainly by ^{31}P NMR.
4. Peroxoheteropolymolybdates and -tungstates with (mono)phosphate(s), sulfate(s) or borate(s) as heteroatom group(s). Various anions have been isolated and structurally analyzed. The aqueous reaction systems are also complicated, and elucidation of complex formation in each system is attempted by NMR (^{31}P, ^{11}B, ^{95}Mo, ^{183}W and ^{17}O).

Synthetic and structural studies on peroxoisopolumolybdates/tungstates, and peroxoheteropolymolybdates/tungstates with rare earth (III), are also attempted. In the peroxopolyoxometalate reaction systems the (addenda atom)/(hydrogen peroxide) molar ratio is essential in addition to usual conditions important for the formation of polyoxometalates. However, as the peroxide is not stable in the reaction system (and changes of other conditions such as pH followed by the decomposition of the peroxide) it is difficult to keep all the reaction conditions under control. We often have a problem to get good reproducibility due to this reason, and thus no detailed result is given here.