3 Discussions

In this study we only considered the oxidants that appear in reaction equations. However, it is possible that the substrate specificity of such enzymes depends on the oxidants that directly act on the substrate. Some oxidoreductases contain cofactors, which are oxidants that are bound to the enzyme proteins and are required for the enzyme function but do not appear in the reaction equations. 310 oxidoreductases are known to have such cofactors, of which 191 enzymes contain nitrogenous oxidants (FAD, FMN, *etc*.), 241 contain metallic oxidants (Fe, Cu, Mo, Mn, *etc*.), 1 contains disulfide (glutathione) and 11 contain quinone (PQQ). Some enzymes are known to have more than one cofactor and catalyze multi-step electron transfer within single proteins. Some transferases (EC 2), lyases (EC 4) and isomerases (EC 5) also contain these cofactors, suggesting the oxidative reaction mechanisms. It is supposed that considering also these cofactors would give us a better understanding of the relationship among reductants and oxidants, as well as the reaction mechanisms and protein structures.

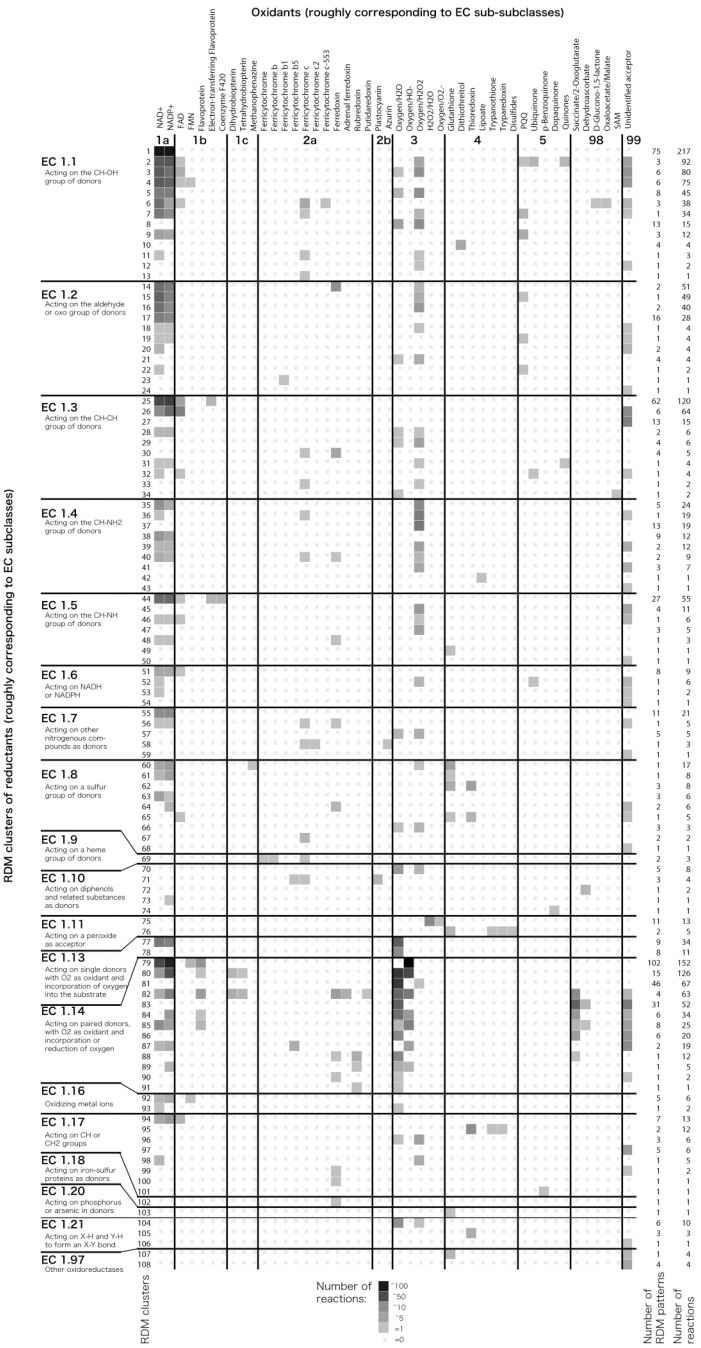

Figure 1: Oxidant usage dependent on the RDM chemical transformation patterns of reductants.

Acknowledgements

This work was supported by the Ministry of Education, Culture, Sports, Science and Technology of Japan, and the Japan Science and Technology Agency. Computational resources were provided by the Bioinformatics Center and the Supercomputer Laboratory, Institute for Chemical Research, Kyoto University.

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