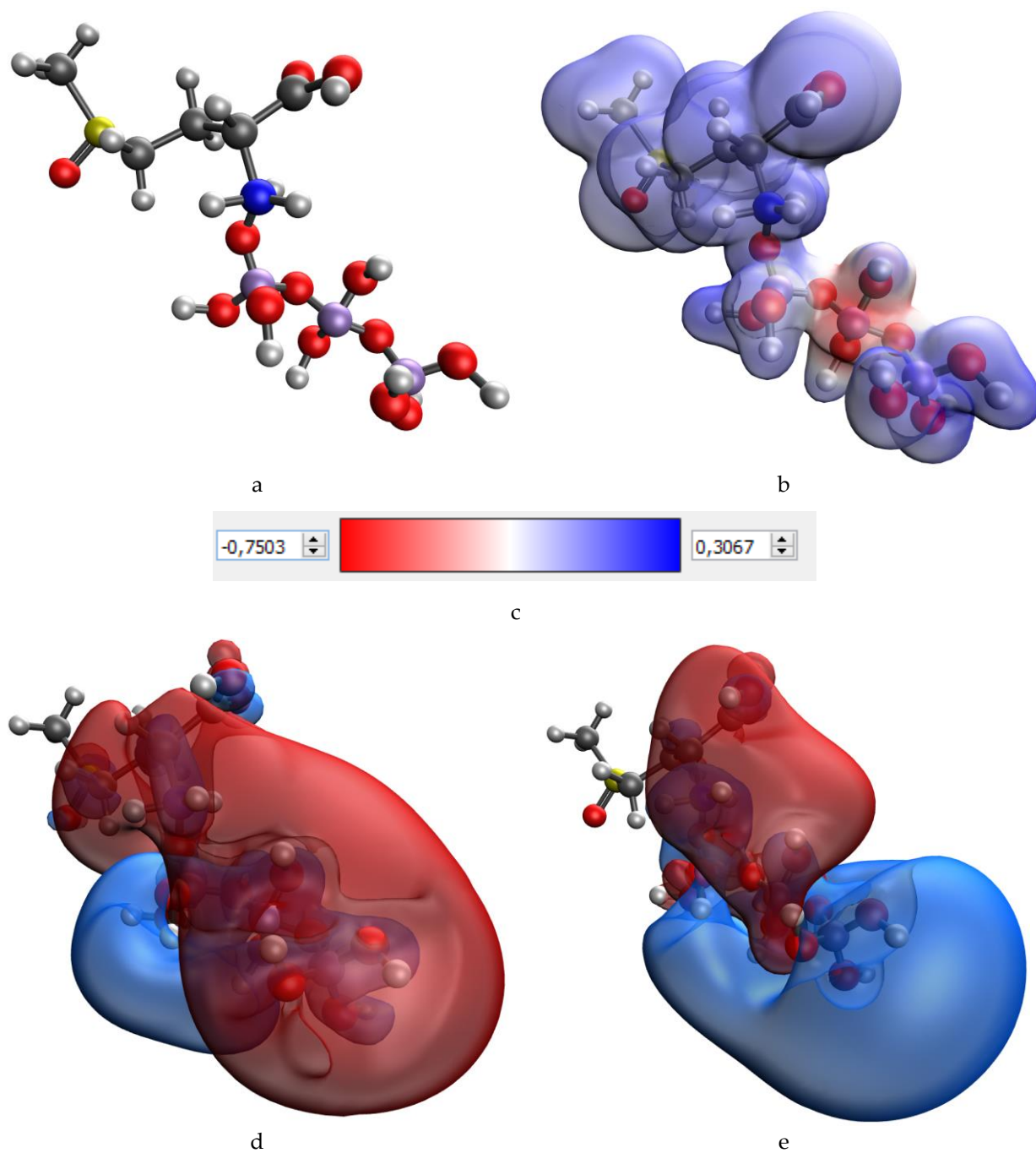
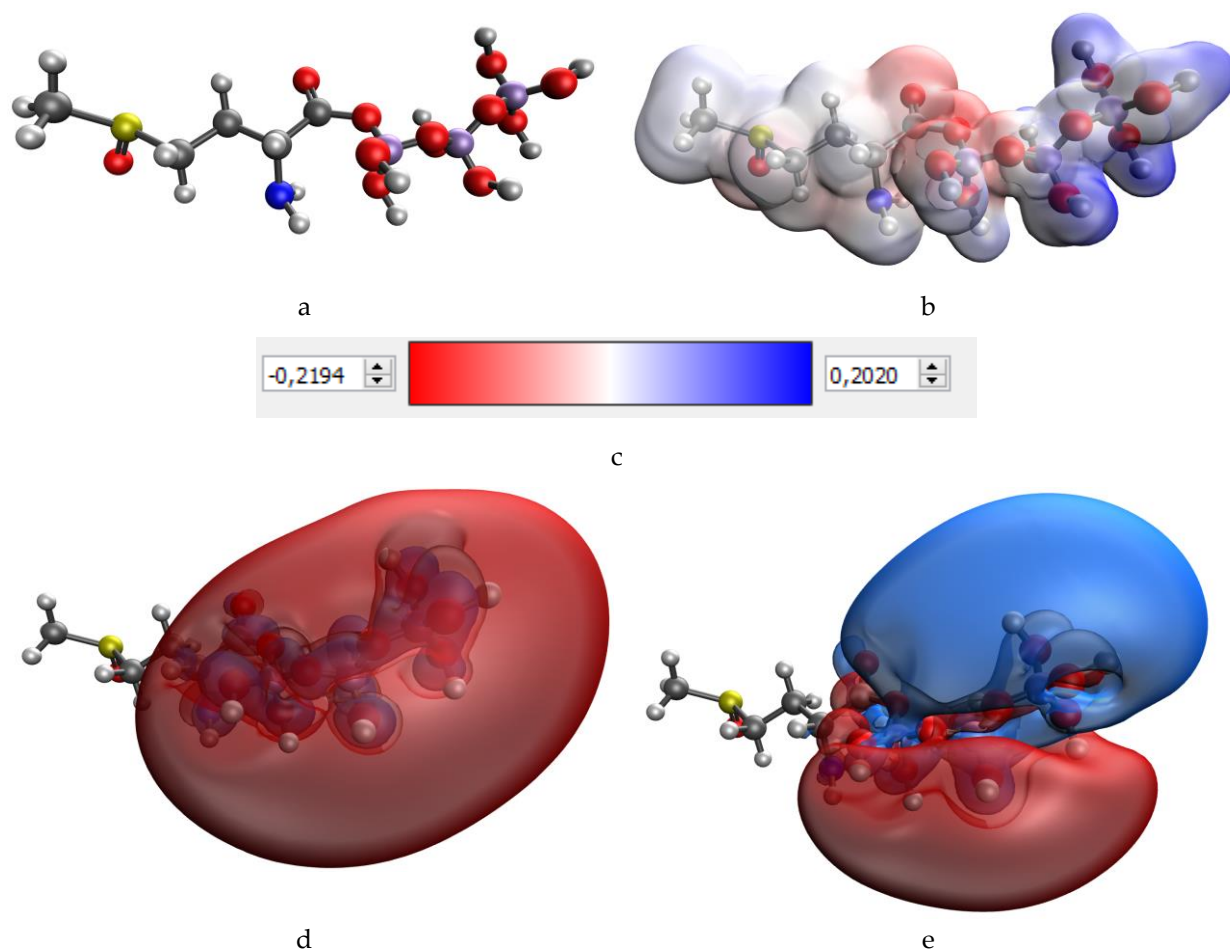


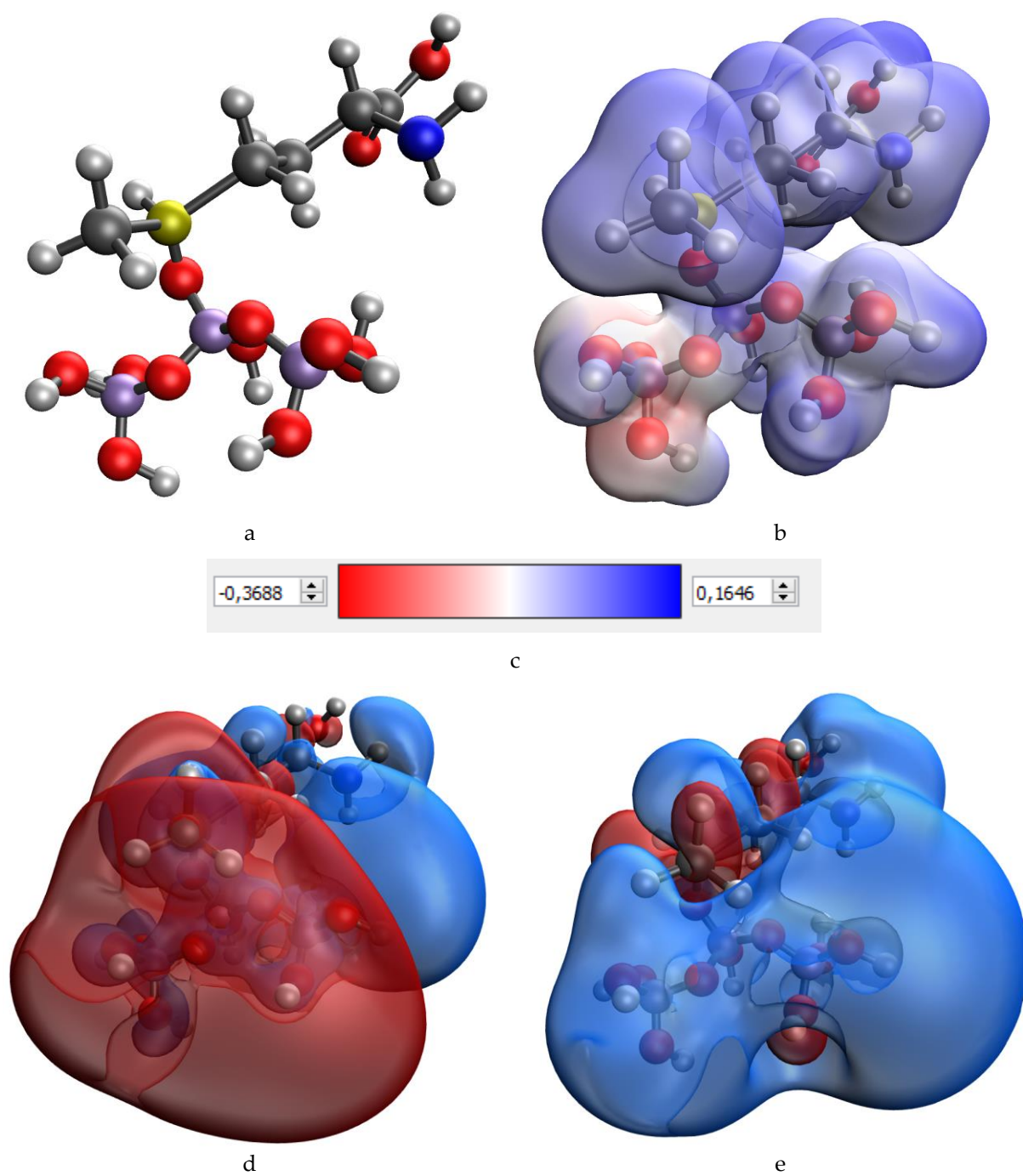
**Figure S1.** Interaction of the oxygen of the sulfo group of methionine sulfoxide and the hydroxo group of the extreme manganese atom of  $\text{MnO}_2$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)



**Figure S2.** Interaction of the amino group of methionine sulfoxide and the hydroxo group of the extreme manganese atom of  $\text{MnO}_2$ : molecular complex model (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

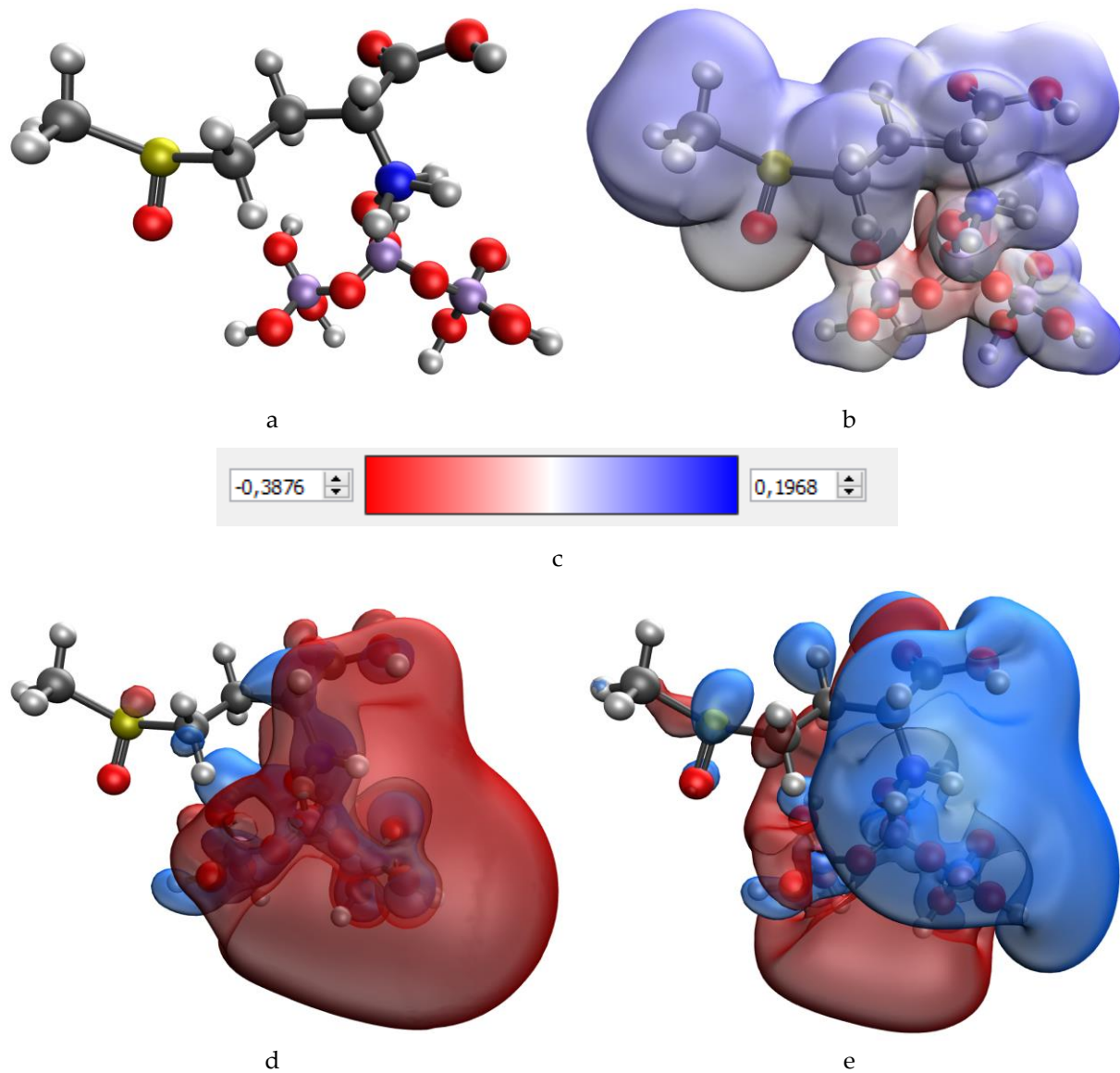


**Figure S3.** Interaction of the carboxyl group of methionine sulfoxide and the hydroxo group of the extreme manganese atom of  $\text{MnO}_2$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

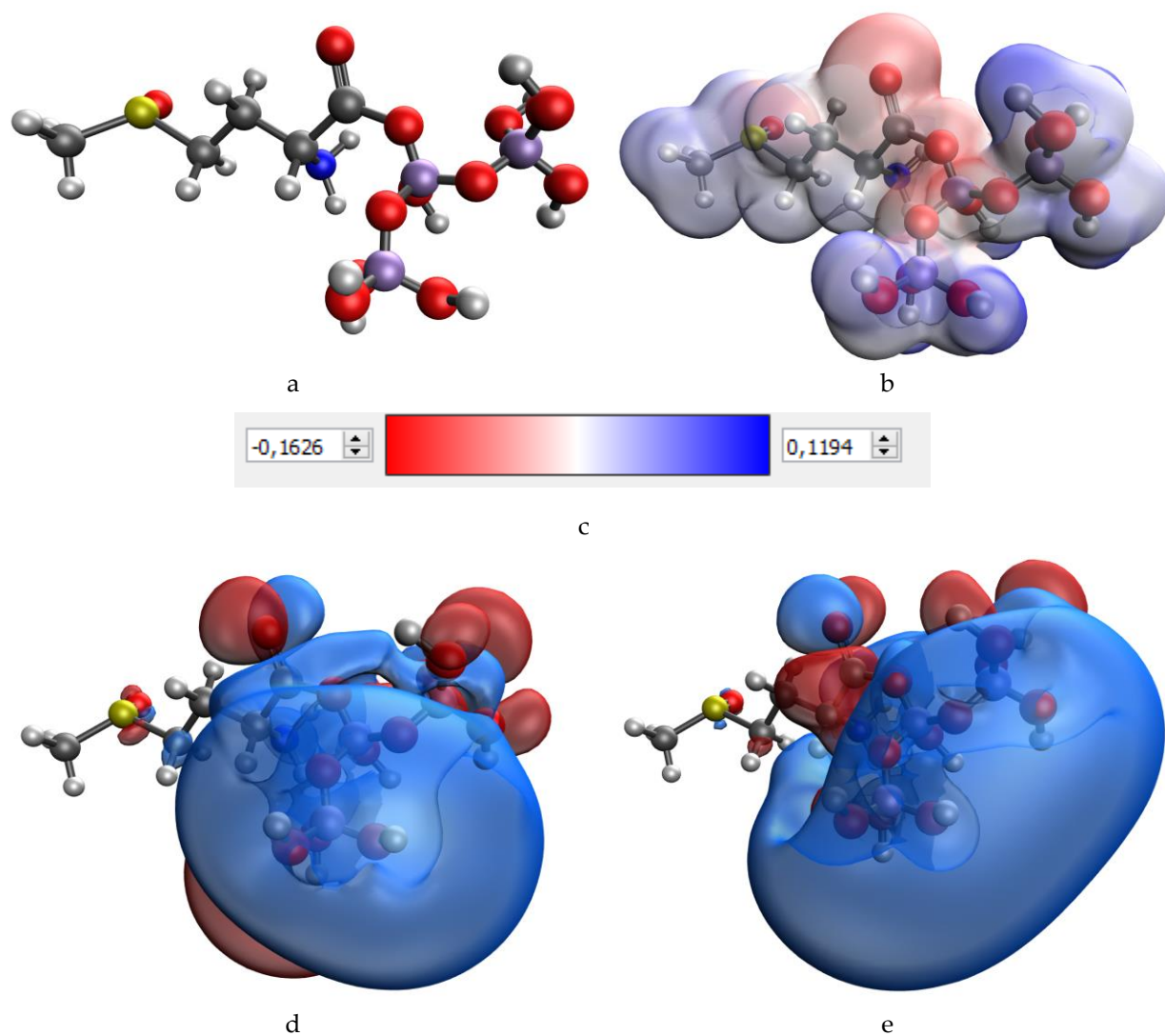


**Figure S4.** Interaction of the oxygen of the sulfo group of methionine sulfoxide and the hydroxo group of the middle manganese atom of  $\text{MnO}_2$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

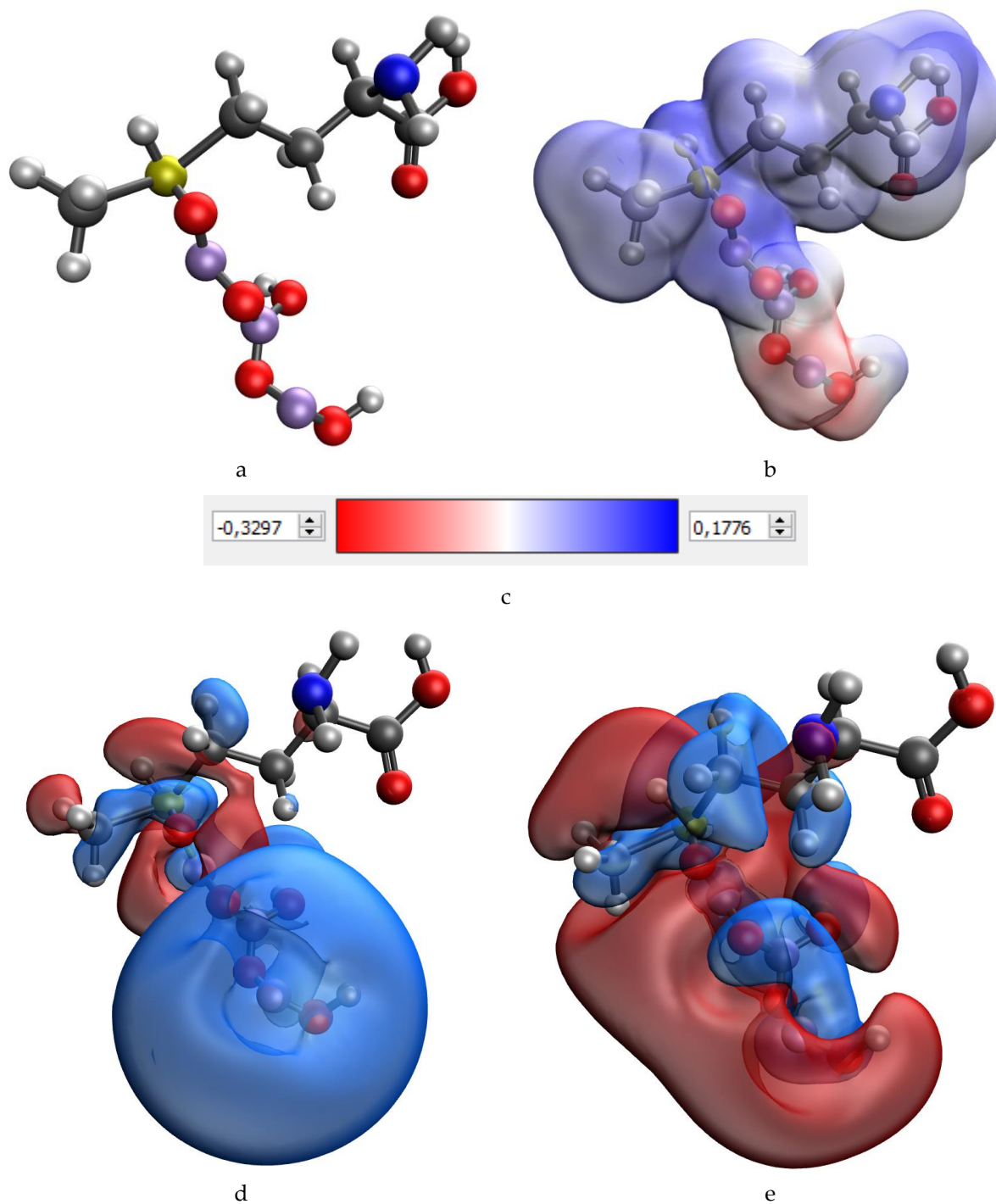




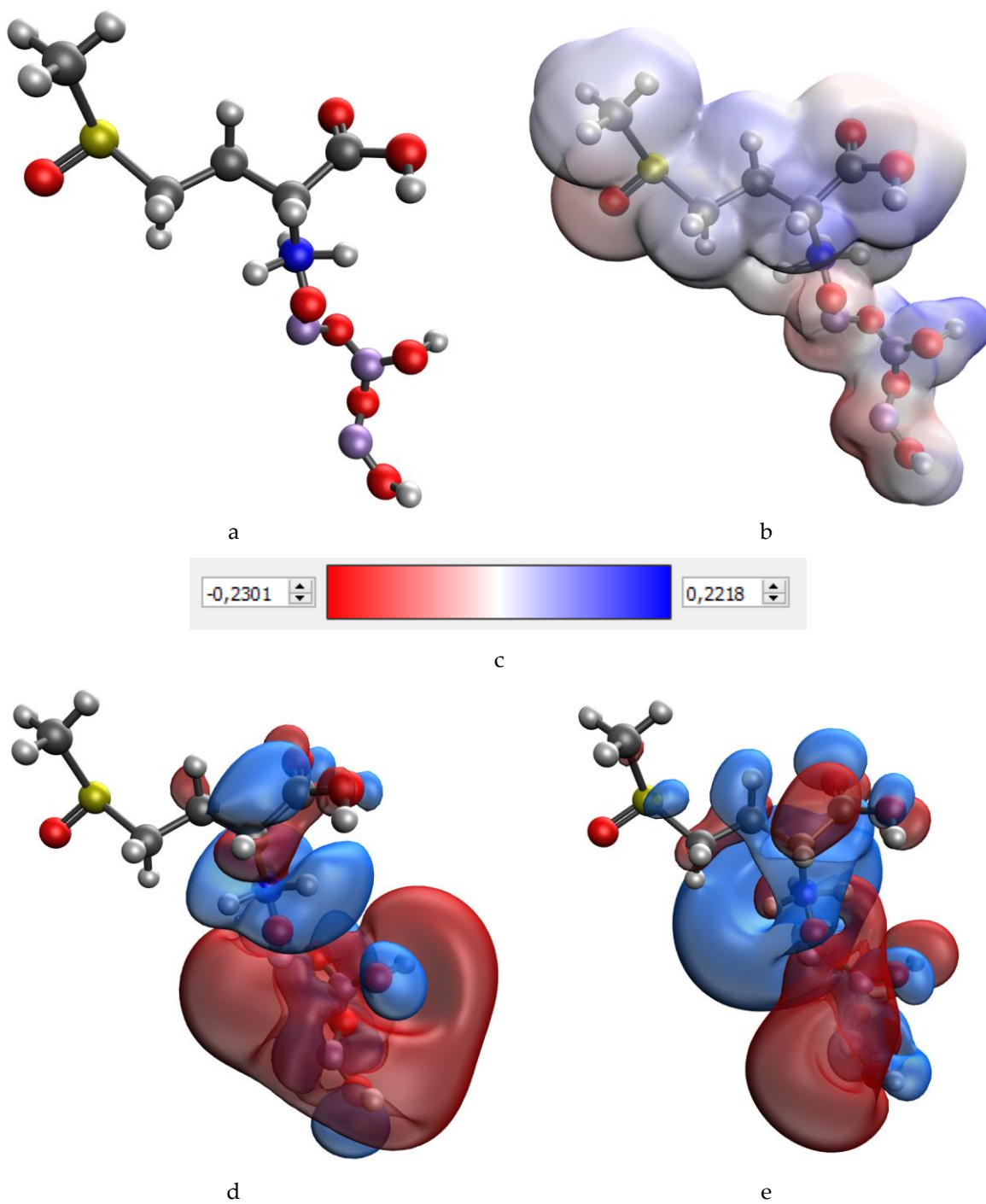
**Figure S5.** Interaction of the amino group of methionine sulfoxide and the hydroxo group of the middle manganese atom of  $\text{MnO}_2$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)



**Figure S6.** Interaction of the carboxyl group of methionine sulfoxide and the hydroxo group of the middle manganese atom of  $\text{MnO}_2$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

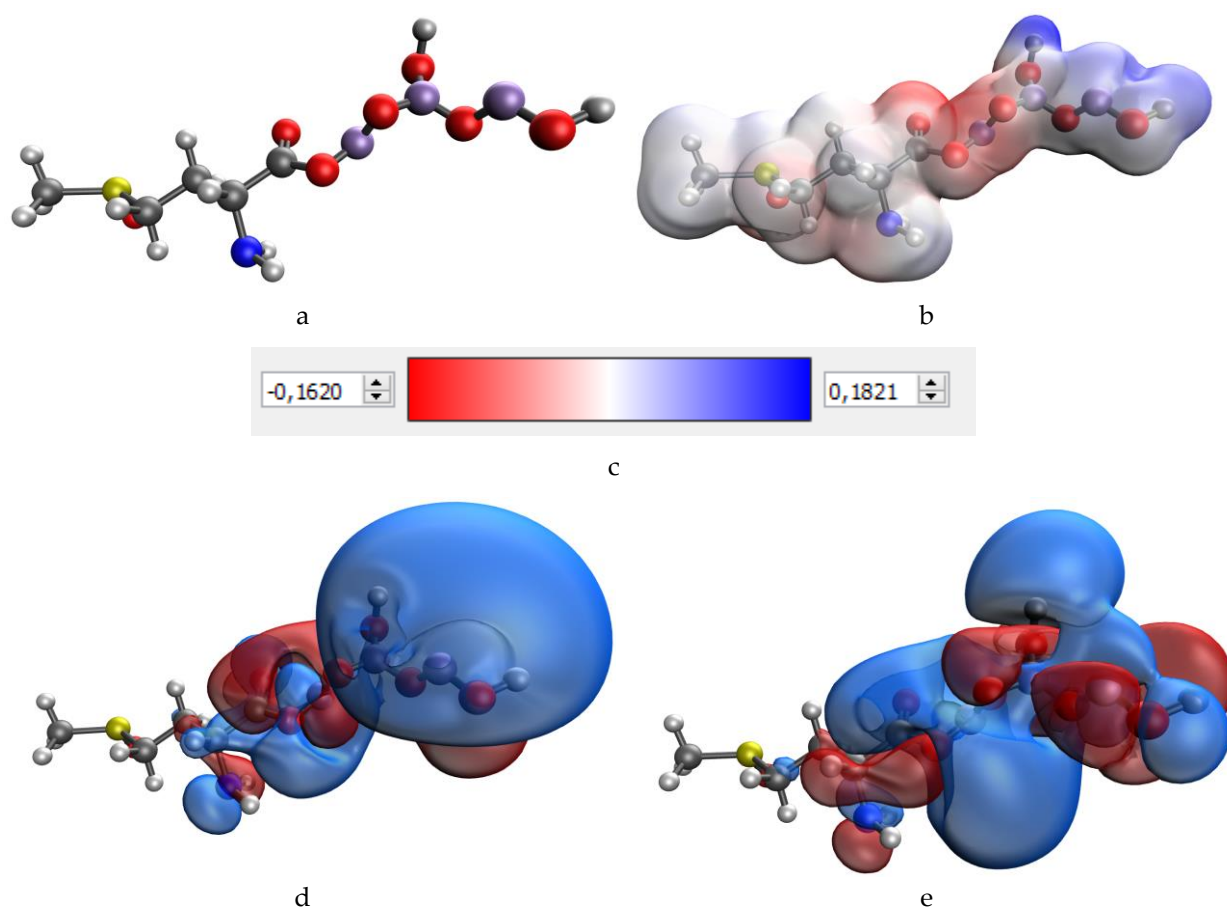


**Figure S7.** Interaction of the oxygen of the sulfo group of methionine sulfoxide and the hydroxo group of the extreme manganese atom of  $\text{Mn}_3\text{O}_4$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

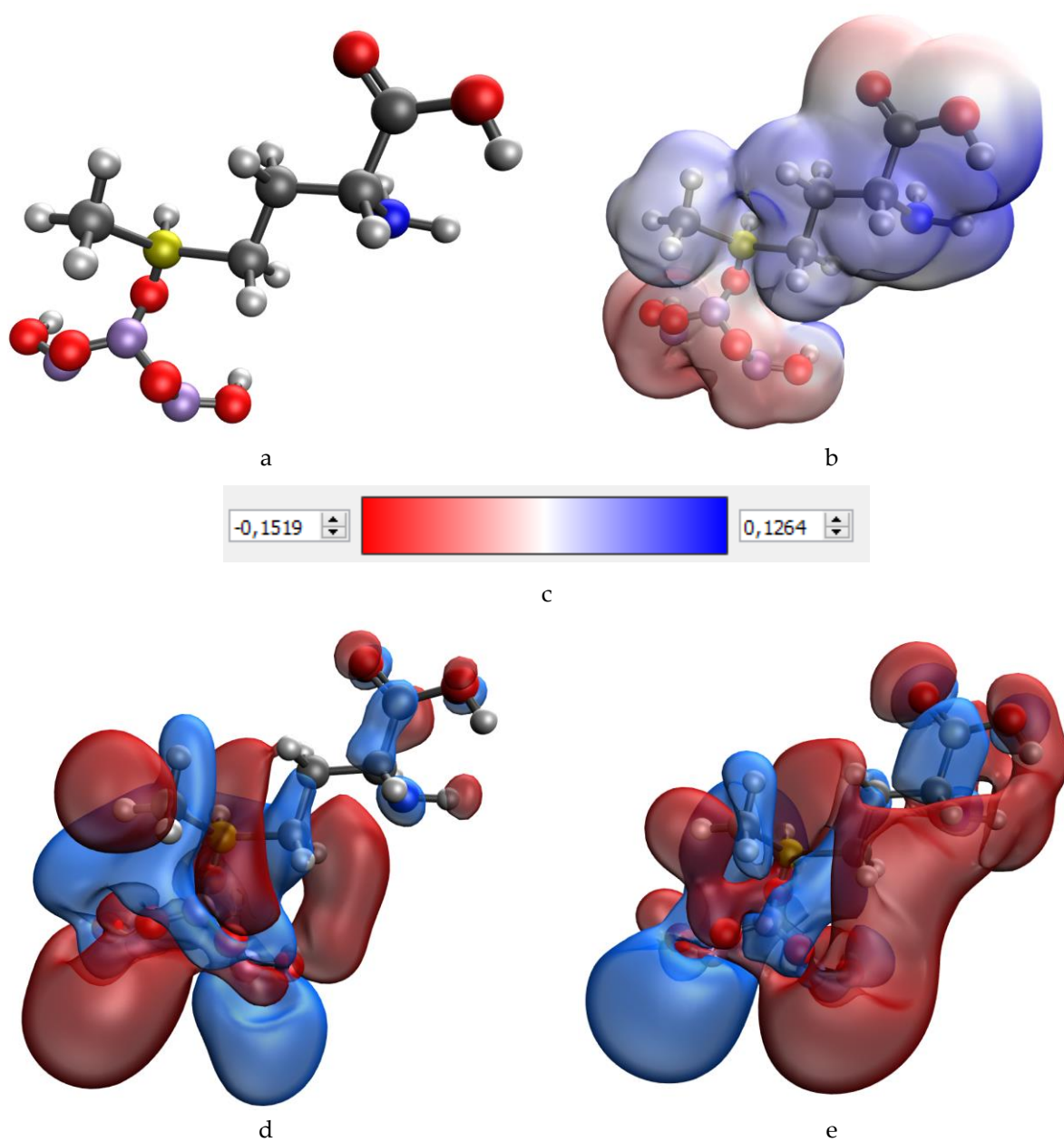


**Figure S8.** Interaction of the amino group of methionine sulfoxide and the hydroxo group of the extreme manganese atom of  $\text{Mn}_3\text{O}_4$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

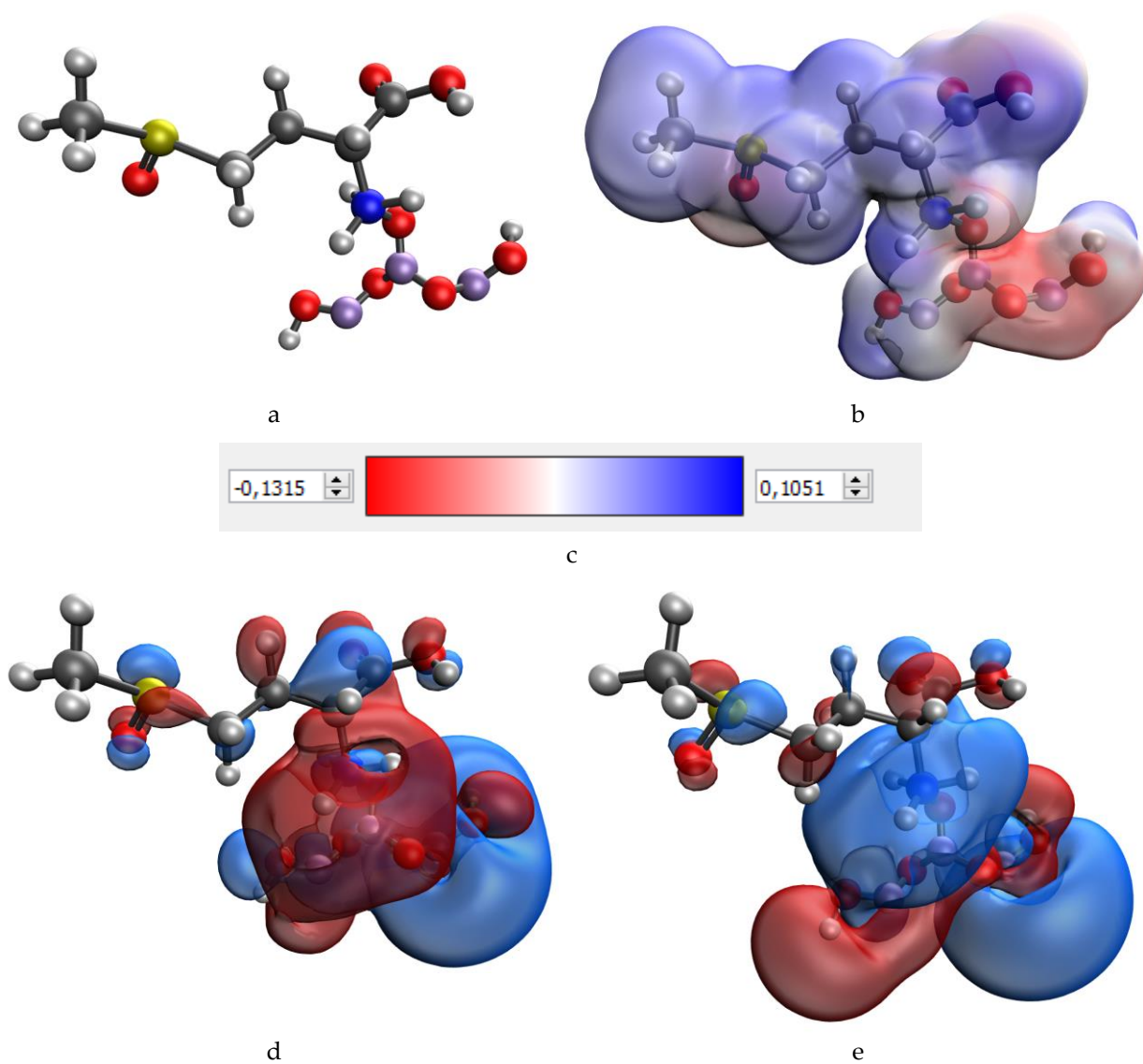




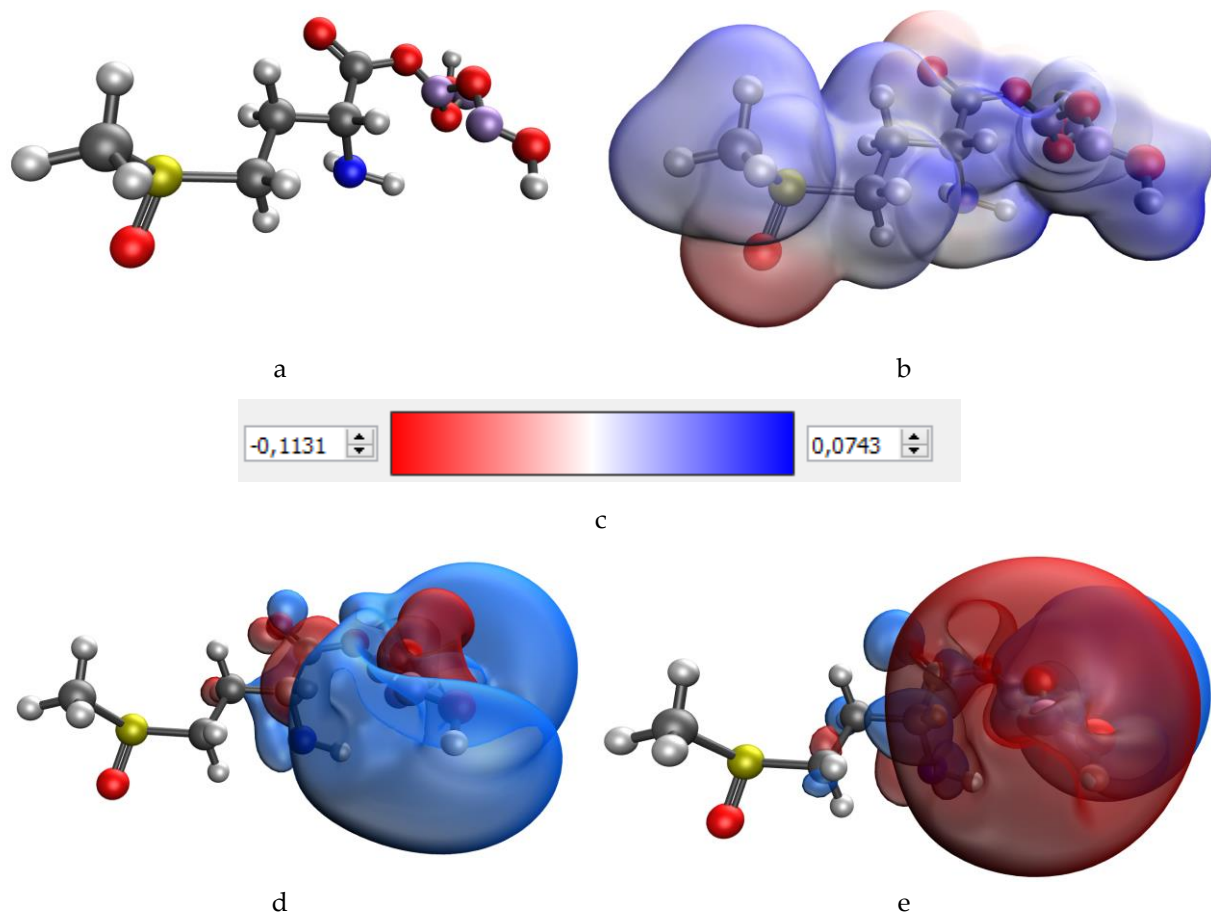
**Figure S9.** Interaction of the carboxyl group of methionine sulfoxide and the hydroxo group of the extreme manganese atom  $\text{Mn}_3\text{O}_4$ ; model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)



**Figure S10.** Interaction of the oxygen of the sulfogroup of methionine sulfoxide and the hydroxo group of the middle manganese atom of  $\text{Mn}_3\text{O}_4$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

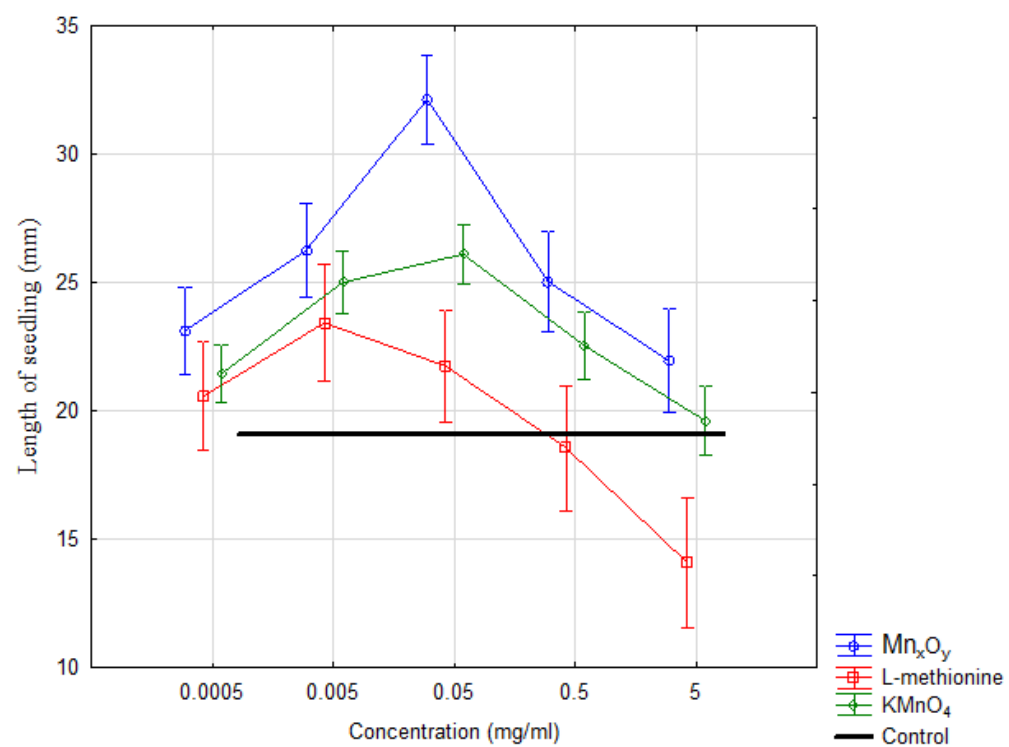


**Figure S11.** Interaction of the amino group of methionine sulfoxide and the hydroxo group of the middle manganese atom of  $\text{Mn}_3\text{O}_4$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

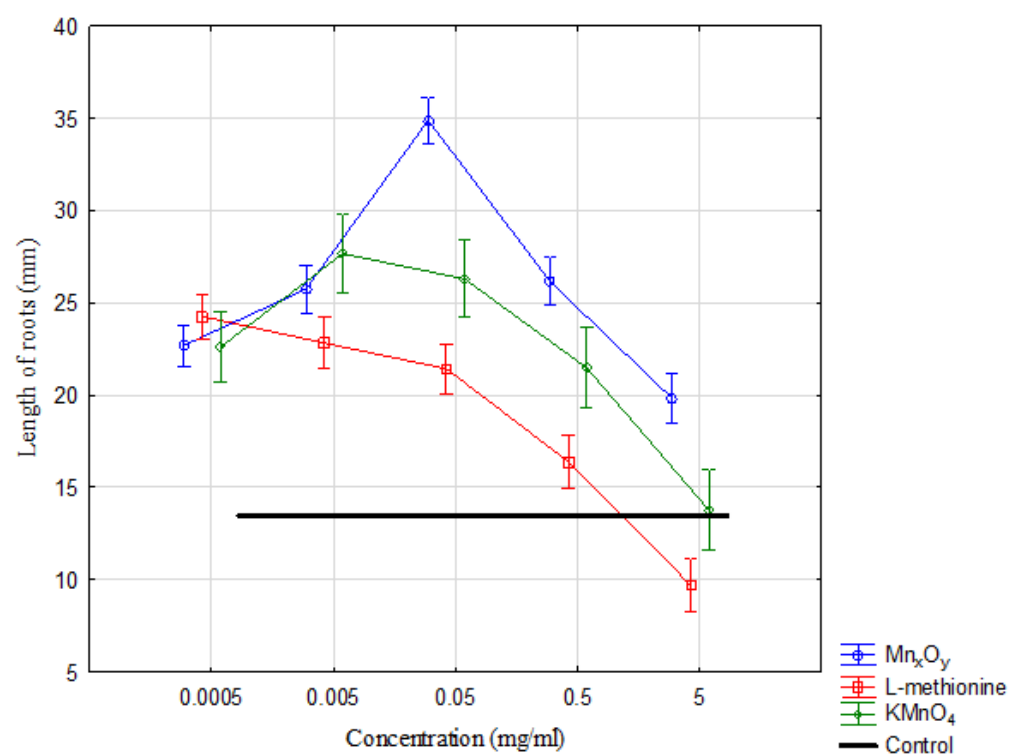


**Figure S12.** Interaction of the carboxyl group of methionine sulfoxide and the hydroxo group of the middle atom of  $\text{Mn}_3\text{O}_4$ : model of the molecular complex (a), electron density distribution (b), electron density distribution gradient (c), HOMO molecular orbital (d), LUMO molecular orbital (e)

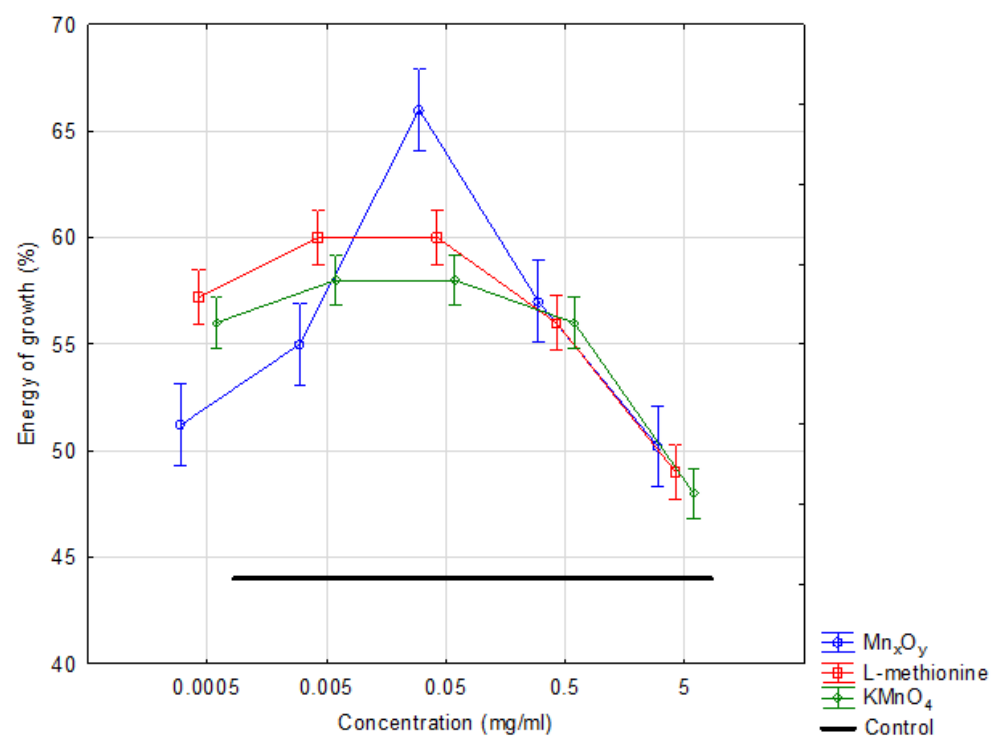




**Figure S13.** Dependence of distribution of length of seeding on concentration of substances (72 h incubation)



**Figure S14.** Dependence of length of roots on concentration of substances (72 h incubation)



**Figure S15.** Dependence of distribution of germination energy on concentration of substances, (72 h incubation)