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## Oxidative Glutathione Conjugation and Its Novel Role in Activation of the Organophosphorus Insecticide Prothiofos

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**Abstract:**

The reaction of prothiofos oxon *S*-oxide (*S*-oxide) with glutathione (GSH) by computational chemistry formed GS(EtO)P(O)OC<sub>6</sub>H<sub>3</sub>Cl<sub>2</sub> and PrS(O)(HO)P(O)OC<sub>6</sub>H<sub>3</sub>Cl<sub>2</sub> (desethyl *S*-oxide). Both were produced from (*R*)*p*-*S*-oxide. From the reaction of prothiofos oxon (oxon) with partially purified resistant housefly glutathione *S*-transferase under oxidation, 2,4-dichlorophenyl phosphate was detected and it was suggested that desethyl *S*-oxide was produced by *in vitro* metabolism. Desethyl oxon showed insecticidal activity toward the housefly on injection and inhibited bovine erythrocyte acetylcholinesterase oxidatively, thus showing that desethyl *S*-oxide, too, was an activated compound. It has become apparent that GSH conjugates the ethyl group of *S*-oxide to form desethyl *S*-oxide, and it shows insecticidal activity with *S*-oxide. © Pesticide Science Society of Japan

**Keywords:**

S<sub>N</sub>2 reaction by computational chemistry, desethyl *S*-oxide of prothiofos oxon, oxidative activation of *S*-alkylphosphorothiolate, oxidative glutathione conjugation of *S*-alkylphosphorothiolate, phosphorylated AChE by desethyl *S*-oxide

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