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Catalytic neutralization of organophosphate simulant over undercoordinated Fe, Cu, Co, and Zn on SiO₂

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Background
• Organophosphates (OP) inhibit normal breakdown of neurotransmitters

Hypothesis
Low-coordination transition metals on SiO₂ will catalyze the hydrolysis of OP

EDTA mass loss correlates to loading
• Ligand mass loss as metal loading proxy
• Metal loadings of 0.6–2.4 wt%
• Surface density of 0.16–0.64 nm²

EDTA promotes metal dispersion
• Higher dispersion relative to M-nitrates

Catalytic OP neutralization w/ H₂O₂
• No reaction without H₂O₂
• No activity-precursor relations
• No selectivity-precursor relations
• ~ 1-to-1 reaction a to reaction b
• Activity increases Co = Fe < Zn < Cu

Homogeneous reaction of OP with •OH

References

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