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Magnesium/Methanol: An Effective Reducing Agent for Peroxides

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Abstract:

Magnesium in methanol is an effective reagent for the chemoselective reduction of peroxides, including ozonides. Mg/MeOH is significantly more reactive than Me₂S or PPh₃ and somewhat more reactive than Zn/HOAc.

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figures (3) follow

Scheme 1. Reductions with Mg/MeOH^a Mg (5.0 equiv), 40 °C, 3 h.

Reagent	10b (X = H)	10c (X = OH)	10d (X = OMe)
Zn/HOAc	86	8	0
Mg/MeOH	0	70	12

Reagent	Solvent	T(°C)	t (h)	yield
Zn (5 eq)	HOAc	RT	18	18% (80% 8a)
Zn (20 eq)	HOAc	RT	36	29% (65% 8a)
Mg (5 eq)	MeOH	40	3	94%

Reagent	Solvent	T(°C)	t(h)	Yield
PPh ₃	CH ₂ Cl ₂	RT	48	- (92% 9a)
Me ₂ S	CH ₂ Cl ₂	RT	48	- (85% 9a)
Zn (5 eq)	HOAc	RT	18	80%
Mg (5 eq)	MeOH	40	3	73%

Scheme 2. Comparison with Other Reducing Agents