High activity, stabilized formulations, efficient synthesis and industrial use of Mo- and W-based metathesis catalysts

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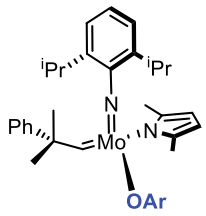
Despite the lack of literature precedents, Mo and W based metathesis catalysts excel in extreme low catalyst loadings. Feedstock quality granted loadings of 6 – 50 ppm (by mole) are common.

Regular industrial processes require large amount of catalysts, so the synthesis of kilogram quantities of a MAP complex (e.g. **1**) has been developed. The starting materials for the Mo- and W-catalysts, Na_2MoO_4 ($19 per kg) and WCl_6 ($60 per kg), are cheap. In the multistep synthesis[1] individual yields are high (82-97%) and the overall yield exceeds 60%. Use of industrial solvents and telescoping techniques which enable the avoidance of sensitive intermediates' isolation render a simple, scalable procedure and thus an affordably priced catalyst.

Industrial use of our own complexes has been demonstrated with ton quantities in cross metathesis and with 20 kg in ethenolysis.

We have found different means to overcome moisture and oxygen sensitivity of these catalysts, which makes working without a glove box a routine matter. It was discovered that several MAP catalysts are stable under atmospheric air in crystalline form for hours or even days. Others are protected as 10-20% paraffin solutions, giving pre-weighted, easy to use solid pellets. And other MAP catalysts are used as stable, chelated (Furstner kind)[2] complexes 2 with an interesting new user friendly twist/tweak.



ArO: *e.g.* tetraphenylphenoxy, subst. BINOL / octahydro-BINOL

1