Fundamental Chemistry of the $Re(CO)_3(H_2O)_3^+$ Synthon

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One-pot reactions of pyridine-2-carboxaldehyde, o-, m- and p-phenylenediamine with $Re(CO)_3(H_2O)_3^+$ or other rhenium source gives expected products for m- and p-derivatives. Surprisingly, they o-phenylenediamine reactions give four products. Compound 6 is the expected product; 7 results from electrocyclic C-C bond; 4 and 5 result from benzimidazole formation; 5 then has additional reaction of a pyridine-2-carboxaldehyde. Work is underway to uncover the cause of this surprising reactivity.