Appendix B

ICP-MS Characterization of REMP Catalysts

ICP-MS Measurements

Approximately 30 mg of supported molecular REMP catalysts **B.1** – **B.3** were precisely weighed in plastic vials using a Sartorius BP110S balance, digested with 1 mL distilled 68% nitric acid at 20 °C overnight on a IKA KS 260 shaker with a shaking speed of 100 motion/minute. After digestion, samples were diluted with 50 mL deionized water purified by Milli-Q system to a final acid concentration of about 2%. Samples were analyzed using an Agilent 8800 Triple Quadrupole inductively coupled plasma mass spectrometer (ICP-MS). The intensities of ruthenium isotopes 99, 100, 101, 102 and 104 were measured, and the intensity of pure 2% nitric acid was subtracted to give the net intensities. The net intensities were compared with that of ruthenium standard solutions obtained by diluting a ruthenium standard (99.60 ppm ruthenium in 2% HCl, purchased from VeriSpec) with 2% nitric acid. The numbers provided indicate the average concentration of the five isotopes measured (Table B.1).
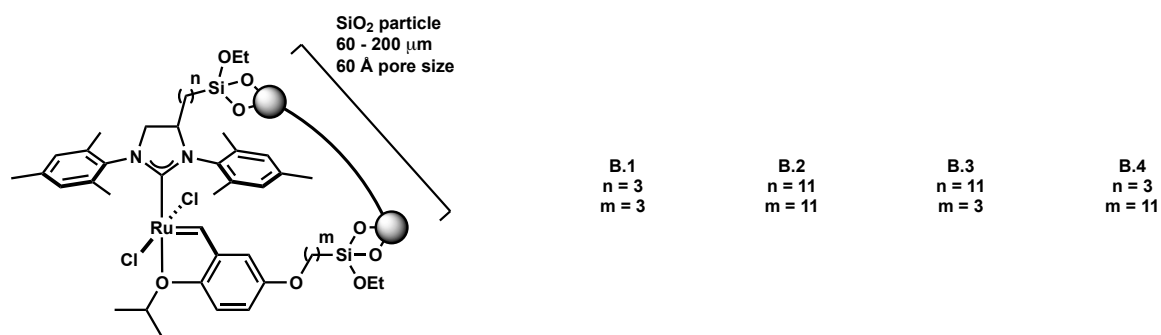

B.1	B.2	B.3	B.4
n = 3	n = 11	n = 11	n = 3
m = 3	m = 11	m = 3	m = 11

Figure B.1 | Supported molecular REMP catalysts used in this dissertation.

Table B.1 | Ruthenium content for catalysts **B.1** – **B.3**

Entry	Target Ru (μmol/g SiO_2)	Actual Ru (μmol/g SiO_2)
B.1	20	3.22±0.11
B.2	20	3.79±0.24
B.3	20	2.74±0.11
B.4	20	-

These are the correct values for the actual Ru content in catalysts B.1 – B.3 used for all experiments described in this dissertation. This data was acquired three days before the submission deadline and there was insufficient time to correct the preceeding chapters. The actual catalyst loading for all REMP catalysts was actually more than 5x lower than is reported throughout this dissertation; e.g.: "0.01 mol% **B.3** loading" should read "0.00137 mol % **B.3** loading" throughout this dissertation. Future discussions of this research will use the corrected values shown above (Table B.1). Insufficient supply of **B.4** at the time of these measurements precluded quanitification of actual Ru content.