Joint group meeting problems

March 5th 2015

1. When the following reaction was carried out using Rh₂(OPiv)₄ (1 mol%) as the Rhodium source, a mixture of three different products (2,4, and 5) were isolated (10:10:80 NMR ratios respectively). Propose plausible mechanisms for formation of all three products.

$$\begin{array}{c} Ph \\ \hline N_2 \\ \hline 1 \\ \hline \end{array} \begin{array}{c} Rh(II) \\ \hline DCM, 40 \text{ min, rt} \\ \hline \end{array} \begin{array}{c} Ph \\ \hline \\ MeO_2C \\ \hline \end{array} \begin{array}{c} Ph \\ \hline \\ H \\ \hline \\ CO_2Me \\ \hline \end{array} \begin{array}{c} Ph \\ \hline \\ CO_2Me \\ \hline \end{array} \begin{array}{c} Ph \\ \hline \\ CO_2Me \\ \hline \end{array} \begin{array}{c} Ph \\ \hline \\ CO_2Me \\ \hline \end{array} \begin{array}{c} Ph \\ \hline \\ CO_2Me \\ \hline \end{array} \begin{array}{c} Fh \\ \hline \\ CO_2Me \\$$

2. Propose a plausible mechanism for the following transformation