In 2011, Wing-Yiu Yu from The Hong Kong Polytechnis University reported a very interesting three component reaction. The reaction and its mechanism are shown below.

\[
\begin{align*}
\text{Ar}^1\text{CO}_2\text{Me} + \text{Ar}^2\text{Bpin} + \text{R-Br} & \xrightarrow{[\text{Rh(cod)OH}]_2, \text{KO}^\text{t}\text{Bu}} \text{MeO}_2\text{C}-\text{R} \\
\text{MTBE, 40 }^\circ\text{C, 4 }\text{h} & \rightarrow \text{Ar}^1\text{Ar}^2
\end{align*}
\]

The proposed mechanism:

- \([\text{Rh(cod)OH}]_2 \rightarrow 2 ([\text{Rh}]-\text{OH})\)
- \([\text{Rh}]-\text{Bpin} \rightarrow \text{transmetalation}\)
- \([\text{Rh}]-\text{Ar}^2 \rightarrow \text{metal carbene formation}\)
- \([\text{Rh}]-\text{O}^\text{t}\text{Bu} \rightarrow \text{transmetalation}\)
- \([\text{Rh}]-\text{Bpin} \rightarrow \text{transmetalation}\)
- \([\text{Rh}]-\text{Ar}^2 \rightarrow \text{migratory insertion}\)
- \([\text{Rh}]-\text{Ar}^1\text{CO}_2\text{Me} \rightarrow \text{metal ion exchange}\)
- \([\text{Rh}]-\text{K}^\text{O}^\text{t}\text{Bu} \rightarrow \text{metal ion exchange}\)

Based on this mechanism, please draw the product structure for a similar reaction.

\[
\text{Ar\text{CO}_2\text{Me} + Me\text{CO}_2\text{AlkylBr } \rightarrow \text{MeO}_2\text{C} + \text{Ar\text{CO}_2\text{Alkyl}}}
\]

\[
\text{Angew. Chem. Int. Ed., 2015, 54, 7891–7894.}
\]

In order to make an interesting compound, the researchers ran the following reaction,

\[
\text{Ph\text{CO}_2\text{Br} + HO\text{AlkylTIPS } \rightarrow \text{Compound X}}
\]

\[
\text{Chemical Formula: C}_{21}\text{H}_{30}\text{O}_2\text{Si}} \quad \text{Exact Mass: 342.2015}
\]

The researchers was trying to make a compound bearing a lactone structure, however what they really made is Compound X. Compound X don't have any chiral center, but the molecular formula is the same with what they want. Please propose the structure of Compound X based on the information we have. Explain why Compound X formed instead of the desired compound.

\[
\]

Desired Compound

\[
\text{Instead of C-attack at the alkyl bromide, O-attack happened.}
\]

Compound X