Supporting Information

E-H Bond Activation Reactions (E = H, C, Si, Ge) at Ru: Terminal Phosphides, Silylenes, and Germynes

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Figure S2. $^{1}$H-$^{29}$Si HSQC spectrum of 13 of upfield peak in d$_8$-THF.
Table S1. Kinetic data for Eyring plot.

<table>
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<th>T(K)</th>
<th>rate constant (1/hr)</th>
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<td>293.2</td>
<td>0.0164(4)</td>
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<tr>
<td>303.2</td>
<td>0.0463(15)</td>
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<tr>
<td>313.2</td>
<td>0.138(4)</td>
</tr>
<tr>
<td>323.2</td>
<td>0.383(17)</td>
</tr>
</tbody>
</table>
Figure S3. Eyring plot for the decay of 5.
Figure S4. Typical decay behavior of $5$ vs $d_{30}-[\text{SiP}^\text{Ph}_3]\text{Ru(PPh}_2)$ at 35°C.
Figure S5. NMR spectra for 4.

$^1$H at -20 °C in $d_8$-THF.

$^1$H at RT in $d_8$-THF.
$^{13}\text{C} \{^1\text{H}\}$ at -20 °C in $d_8$-THF.

$^{13}\text{C} \{^1\text{H}\}$ at RT in $C_6D_6$. 
$^{31}\text{P}\{^1\text{H}\}$ at -80 °C in $d_8$-THF.

$^{31}\text{P}\{^1\text{H}\}$ at RT in $d_8$-THF.
Figure S6. NMR spectra for 5.

$^1$H at RT in C$_6$D$_6$.

$^{13}$C{$^1$H} at RT in C$_6$D$_6$. 
$^{31}\text{P} \{^1\text{H}\} \text{ at RT in C}_6\text{D}_6.$
Figure S7. NMR spectra for 8.

$^1$H at RT in C$_6$D$_6$.

$^{15}$N{$^1$H} at RT in C$_6$D$_6$. 
$^{31}P\{^1H\}$ at RT in $\text{C}_6\text{D}_6$. 
Figure S8. NMR spectra for 9.

$^1$H at -20 °C in $d_8$-THF.

$^1$H at RT in C$_6$D$_6$. 
$^{13}$C$\{^1$H$\}$ at RT in C$_6$D$_6$.

$^{31}$P$\{^1$H$\}$ at RT in C$_6$D$_6$. 
Figure S9. NMR spectra for 10b.

$^{1}$H at RT in C$_6$D$_6$.

$^{13}$C {$^{1}$H} at RT in C$_6$D$_6$. 
$^{29}$Si\{H\} at RT in C$_6$D$_6$.

$^{31}$P\{H\} at RT in C$_6$D$_6$.
Figure S10. NMR spectra for 12.

$^1$H at RT in C$_6$D$_6$.

$^{31}$P{$^1$H} at RT in C$_6$D$_6$. 
**Figure S11.** NMR spectra for 13.

$^1$H at RT in $d_8$-THF.

$^{13}$C{$^1$H} at RT in $d_8$-THF.
$^{29}\text{Si} \{^1\text{H}\} \text{ at RT in } d_8\text{-THF.}$

$^{31}\text{P} \{^1\text{H}\} \text{ at RT in } d_8\text{-THF.}$