

 $^{12}CH_{4} \xrightarrow{k} ^{12}CH_{4}$   $^{13}CH_{4} \xrightarrow{^{13}\alpha \cdot k} ^{13}CH_{4}$   $^{12}CH_{3}D \xrightarrow{^{2}\alpha \cdot k} \xrightarrow{^{12}CH_{3}OH}$   $^{12}CH_{2}DOH$   $^{13}CH_{3}D \xrightarrow{\gamma \cdot ^{13}\alpha \cdot ^{2}\alpha \cdot k} \xrightarrow{^{13}CH_{3}OH}$   $^{13}CH_{2}DOH$