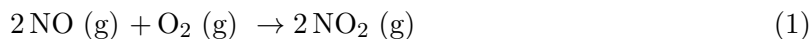Name and Block:_____

> The proposed mechanisms of some chemical reactions involve an elementary step that is reversible. Now that we have a general understanding of reversible reactions and equilibrium can write rate laws for these types of chemical reactions.
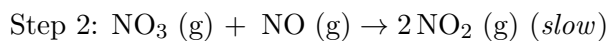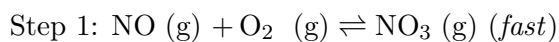
1. Let's consider the formation of NO_2 from NO and O_2:

$$2\,NO\ (g) + O_2\ (g)\ \rightarrow 2\,NO_2\ (g) \tag{1}$$

The experimentally determined rate law for this reaction is second order in NO and first order in O_2.

$$Rate\ =\ k[NO]^2[O_2] \tag{2}$$

One proposed mechanism has two elementary steps:

Step 1: NO (g) + O_2 (g) $\rightleftharpoons$ NO_3 (g) (*fast*)

Step 2: NO_3 (g) + NO (g) $\rightarrow 2\,NO_2$ (g) (*slow*)

Write a rate law that is consistent with this mechanism.