

S4 Table. Reactant(s) and product(s) of each step in the Ras activation intermediate pathway and the reaction rate equations.

Steps 2 and 4 are irreversible mass action reactions, which are approximated by reversible mass action kinetics. κ_i ($i \in \{Step\}$) in the reaction rate equations represent the reaction rate constants, K_x ($x \in \{Reactant(s), Product(s)\}$) is the thermodynamic constant of each species, and q_x ($x \in \{Reactant(s), Product(s)\}$) is the concentration amount of each species.

Step	Reactant(s)		Product(s)		Reaction rate equation (law of mass action)
1	<i>RasGDP</i>	<i>RShcGS</i>	<i>RasShcGS</i>	---	$\kappa_1(K_{RasGDP} \cdot q_{RasGDP} \cdot K_{RShcGS} \cdot q_{RShcGS} - K_{RasShcGS} \cdot q_{RasShcGS})$
2	<i>RasRShGS</i>	---	<i>RasGTP</i>	<i>RShGS</i>	$\kappa_2(K_{RasRShGS} \cdot q_{RasRShGS} - K_{RasGTP} \cdot q_{RasGTP} \cdot K_{RShGS} \cdot q_{RShGS})$
3	<i>RasGTP</i>	<i>GAP</i>	<i>RasGAP</i>	---	$\kappa_3(K_{RasGTP} \cdot q_{RasGTP} \cdot K_{GAP} \cdot q_{GAP} - K_{RasGAP} \cdot q_{RasGAP})$
4	<i>RasGAP</i>	---	<i>GAP</i>	<i>RasGDP</i>	$\kappa_4(K_{RasGAP} \cdot q_{RasGAP} - K_{GAP} \cdot q_{GAP} \cdot K_{RasGDP} \cdot q_{RasGDP})$
5	<i>RasGTP</i>	---	<i>Ras</i>	---	$\kappa_5(K_{RasGTP} \cdot q_{RasGTP} - K_{Ras} \cdot q_{Ras})$