Under these circumstances, it is worth while to examine the fundaments of the theory somewhat critically. The introduction of the indices into Eq. 2 is based on the so-called "kinetic view of chemical equilibrium," viz.: that in a system at equilibrium the two opposite reactions are still taking place, but at equal rates. According to this view the concentration function of Guldberg and Waage's equation is to be regarded as the quotient of two other concentration functions belonging to the kinetic equations of the two opposite reactions.

The consequences of this assumption have been subjected to a strict test in one case only[1] viz.: the Esterification-Saponification reaction, a reaction which in every respect behaves normally: the results were in accordance with the theory of kinetic equilibrium. The present research was undertaken with a view of ascertaining whether this theory may legitimately be extended to reactions whose rates can be accounted for only by assuming the existence of hypothetical "intermediate compounds."

The reaction selected for the trial was that between arsenious acid and iodine in acid solution. These substances react to form arsenic and hydriodic acids: the reaction is reversible, and under suitable conditions of temperature and dilution proceeds at a rate convenient for measurement.

The "ordinary" chemical equation representing this reaction is

$$H_3AsO_3 + I_2 + H_2O = H_3AsO_4 + 2HI.$$

Adopting the notation of the ion theory, this equation may be written[2]

$$\overset{\cdot\cdot\cdot}{AsO_3} + \overset{\cdot}{I_3} + \overset{\cdot\cdot}{H_2O} = \overset{\cdot\cdot\cdot}{AsO_4} + 3\overset{\cdot}{I} + 2\overset{+}{H}, \qquad \text{Eq. 3.}$$

and the condition of equilibrium is:

$$\text{Const.} = \frac{a.b}{x.y^3.z^2} \qquad \text{Eq. 4.}$$

(where a represents the concentration of the AsO_3, b that of the I_3, and so forth in the order of Eq. 3. The "concentration of the water" is constant).

This equation is in agreement with the experiments on equilibrium of Table XXXIII.

[1] ... Phys. Chem. 22, 248 (1897).

[2] Nothing certain is known as to the ions in a solution of arsenious acid. See page 391.