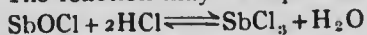


(iii) Reactions analogous to that between salt and brine.

In these reactions there is a solid in equilibrium with a liquid whose composition changes with the temperature. (See "saturated solutions" page 11.)

Antimony chloride and hydrochloric acid. To a boiling dilute solution of tartar emetic add hydrochloric acid drop by drop until the precipitate of oxychloride is just redissolved. On cooling the precipitate reappears, and is again dissolved on heating. If too much acid has been used, add a little water. The reaction may be represented thus:—



Antimony chloride and hydrogen sulphide. See page 39, d and e. Similar examples are easy to find.

(iv) Chemical equilibrium in gases and in solutions.

Nitrogen peroxide. At high temperatures and low pressures this gas is dark red in colour, and its "standard volume" weighs about 46 g, corresponding to the formula NO_2 ; but at low temperatures and high pressures it is almost colourless, and the weight of its standard volume approaches that required by the formula N_2O_4 . At ordinary temperatures and pressures the gas may be regarded as containing both substances in equilibrium



Ferric sulphocyanate. Approximately equivalent solutions of ammonium sulphocyanate and ferric chloride may be prepared as follows: (a) Ammonium sulphocyanate 7.5 grammes, water to make 200cc. (b) Commercial (basic) ferric chloride 6 g, conc. hydrochloric acid 25cc, water to make 200cc. Five cc of each are mixed in a large vessel, about two litres of tap water added, and the orange-coloured solution poured in equal quantities into four glasses.

To the	is added	The colour becomes	Reac'n
1st	5cc. sulpho. sol'n.	dark red	→
2nd	5cc ferric sol'n.	dark red	→
3rd	50cc am. chlor.	almost colourless	←

While the 4th is kept for comparison. Orange.

(By "am. chlor." is meant a saturated solution of ammonium chloride).

If the reaction be represented¹ by the equation

¹The use of chemical formulæ to represent the reactions of solutions is based on a number of conventions which cannot be discussed here. The experiments shew changes of colour, etc., when solutions are mixed (or let stand, see page 42), while the symbols in the equations represent compositions and quantities of solid chemical compounds. The employment of chemical formulæ to represent physical compounds is somewhat analogous to the use of structural formulæ in organic chemistry, as in both cases an attempt is made to include in a symbol an epitome of the reactions of the substance represented; but at best the representation is incomplete. for the direction and rate of the reaction depend on the concentrations of the solutions, which are ignored in the ordinary chemical equations. The most successful system of "structural formulæ" for aqueous solutions is founded mainly on electrochemical experiments, and is used throughout Ostwald's "Principles of Inorganic Chemistry," one of the books recommended for High School libraries.