

ions. These atoms or atom-like particles are closely connected to one another, and do not exhibit the usual properties of the free elements except under special conditions. This peculiar form of separation is known as dissociation, and the ions differ from the elements in a free state in holding enormous electric charges. It is these charges which prevent the elements from behaving, when present as ions, as the free elements themselves do. The charges which the ions of sodium chloride hold are opposite and equal. The sodium is assumed to be positively charged, and the chlorine negatively. By reason of the equality of these charges the solution itself is electrically neutral.

In solutions of medium concentration some of the salt may not split up into ions, but may go into solution undissociated. With increasing dilution the amount of separation increases, and this holds good for all solutions which conduct electricity. Therefore, in a concentrated solution there may be comparatively little separation into ions, in medium concentration, a fair proportion of the ions and the undissociated salt, while at high dilution the salt may have dissociated to the extent of 90-100 per cent.

With the exception of the stronger acids, sulphuric, nitric and hydrochloric, the other acids dissociate incomparably less than their salts. A comparison of sodium chloride and an organic acid, such as cinnamic acid, shows that while the former is practically completely dissociated when its molecular weight in grams is dissolved in 1,000 litres of water, cinnamic acid has but 17.0 per cent. of its molecules split up into the corresponding ions.

Mercuric chloride is a typical example of an antiseptic which is used in aqueous solution, and at comparatively high dilution. The aqueous solutions of this salt used for antiseptic purposes range from 1-1000 to 1-10,000. In the former case the concentration is one molecular weight in 270 litres, while with the latter the concentration is one molecular weight in 2,700 litres. Both these dilutions fall in the range of high dilution, and it might be expected that a large percentage of the salt would be dissociated. This is the case, for at the strength of 1-1,000, mercuric chloride is well dissociated, while at 1-10,000 practically complete separation into ions has taken place.

Considering this to be so, the conclusion naturally follows that any effects experienced in the use of mercuric chloride must be due to the ions themselves, and not to the undissociated salt. As sodium chloride is ineffectual as an antiseptic although dissociated in aqueous solution, no antiseptic action can be ascribed to the chlorine ion.