

I. *Qualitative*.—The most useful tests are the following :

SUBSTANCES SOUGHT FOR.	REAGENTS TO BE USED AND EFFECTS.
Reaction	Litmus and turmeric papers—Usual red and brown reactions.
Lime	Oxalate of Ammonium—white precipitate.
Chlorine	Nitrate of Silver and dilute Nitric Acid—White precipitate becoming lead colour.
Nitrous Acid	Iodide of Potassium and Starch in solution and dilute Sulphuric Acid—A blue colour.
Ammonia	Nessler's Solution—A yellow color or yellow-brown precipitate.
Nitric Acid.....	Sol. of Sulphate of iron and pure Sulphuric Acid—Olive colored zone.
Oxidisable matter including organic matter ...	Permanganate of Potassium—Red colour disappears.

II. *Quantitative*.—1st, Determination of chlorine: Prepare a solution of Nitrate of Silver by dissolving 17 grammes in one litre of water. Take 100 C. C. of the water to be examined, place it in a white porcelain dish. Add enough solution of yellow chromate of potash to make it just yellow. Then add the nitrate of silver solution from a burette and stir. A red colour is produced which disappears as long as any chlorine is present. Stop when the least red tint is permanent, then read off the number of C. C. of nitrate of silver used, each of these represents 3.55 milligrammes of chlorine. Multiply by 10 to give the amount per litre, and this again by .07 for grains per gallon. Chlorine in water is very suspicious of the presence of the liquid excreta of men or animals. If in addition we find nitric and nitrous acid, ammonia and phosphoric acid the evidence is very strong. Chlorine however may be due to strata containing chloride of sodium or calcium. In this case the water is alkaline from sodium carbonate. In some cases the chlorine is due to impregnation from sea water. It is then large in quantity, there is also magnesia, and little evidence of organic matter.

2nd, *Hardness*.—This is estimated by Clarke's soap test and by it we determine—

1st, *Total hardness*, representing the aggregate earthy salts and free carbonic acid.