Water Supply.

When chemists apply the word pure, to water they of course only do so in a comparative sense, because perfectly pure water does not exist in nature. Even in its primary form of rain it contains some traces of amonia and nitrates derived from the atmosphere, and it always becomes more or less charged with earthy and saline matters before it reaches the streams. The rivers are charged with impurity and refuse from towns on their banks, and the water becomes gradually more dangerous, and although it is somewhat purified by oxidation and the absorbent action of vegetation, it requires the most conscientious and watchful care in the reservoirs of great communities.

All upland surface waters vary in quality in accordance with the nature of their surrounding conditions, but they are characterized as pure and accepted as satisfying all necessary conditions for drinking and household purposes, when they have no disagreeable taste or smell. When they are only of medium hardness and are free from excess of salt, and when they have no poisonous minerals and only a minimum of organic contamination.

In order to ascertain whether or not a given source of water realy fulfils the needed requirements it must be subjected to the closest scientific scrutiny, for little reliance can be placed on the public taste. Nothing less than the determination within reasonable limits of accuracy of the amount of matter in the water foreign to the water itself, and of the probable origin of the impurities is of much public value and this determination is only rendered possible by accurate chemical and biological examinations. It is no exaggeration to say, that from a sanitary standpoint, the difficulties in the way of assigning proper importance to the various ingredients discovered in an analysis are well nigh insurmountable. In fact so great are they that careful chemists invariably make their reports and conclusions only after comparing their own conditions and results with the results recorded for similar conditions over a long period of years by established authorities.

The main causes of perplexity and doubt are not the inorganic salts which all drinking waters contain in more or less abundance, but these complex and enigmatically bodies which have come to be classified under the heads of organized and unorganized matter. The real difficult in the analysis of water is to show, First, how far it is contaminated with bacteria or micro-organisms, and second, to what extent it is capable of affording nutrition to such organisms in the form of readily decomposing feeding material when these are known to exist to such an extent as to render the water unfit for domestic use. They may be so far removed although existing in alarming quantities, as to render it potable by a system of mechanical filteration which is now beyond an experiment, as shown by the careful and repeated analysis of water before and after filteration of the St. Thomas water supply, which is filtered. In some cases showing the wonderful reduction from 45 000 to 90 bacteria per cubic centimeter.

The city engineer in his report to the board of water commissioners of St. Thomas, endeavored to make a clear interpretation of the analysis of their water supply by different scientists, and suggests that: "Uniformity in reporting the results of chemical and biological examinations of the water of different public supplies is of such great value for comparison, that the legislature should prescribe a rule for all to follow".

There being no prescribed rule by which the interpretation of a purely chemical analysis of water can be made by the ordinary reader the mere publication of certain annalytical results even by the best authorities are practically without significance since they are commonly unaccompanied by any detailed, intelligible or popular explanations.

During the past five years there has been vast progress in biological science and the results of these analysis enables us to determine the extent of the vitality and approximate numbers of the organisms found in a water supply and from these we may deduct the value of the water as a nutrient medium for septic or other dangerous microbes that might gain access to it, but it does not tell us whether they are disease producing or innocuous, and we think that steps should be taken for the establishment of a prescribed rule setting forth all questions of importance in a plain and simple manner for the government of all scientists making analysis of public water supplies.

The following simple tests are easily performed, and are sufficient to determine whether any given water of unknown quality is safe for drinking purposes:

Pour a glass full of water into a decanter, cork it and shake it up violently for a minute or two. If it devolves a very bad smell after this operation, the water may be suspected of sewage or other animal contamination.

2. Add to a small glass full of the water two or three drops of dilute sulphuric acid and stir. Then pour in about two drops of a weak solution of permanganate of potasium or sufficient to color it a faint rose. Cover the glass with a saucer and leave it standing for ten miuutes then if the rose color has entirely disappeared the water is unwholesome and requires investigation.

3. Take a very clean dry glass and put into it a few drops of solution of nitrate of silver, and then pour in a couple of ounces of water, if it becomes milky, add to it a few drops of dilute nitric acid. If the milkiness does not now nearly all clear away, the water is proved to contain much chlorine, and unless it be taken from some source near the coast or near to salt springs is contaminated with sewage.

4. Take two eight ounce bottles with well fitting stoppers, and wash them thoroughly clean. Nearly fill one of them with the natural water and the other with the water after boiling it for thirty minutes. Now put into each bottle a teaspoonful of pure granulated sugar, shake them until the sugar disolves and then place them side by side at a temperature of about 80 F., and let them stand for three days. If the unboiled water rapidly clouds up and shows a marked fermentation emitting an odor faintly recalling rancid butter it probably contains phosphates and may be suspected of contamination with sewage. If the boiled water shows any signs of decomposition, the suspicion of serious contamination will be confirmed.

5. Pour a small quantity of water into a white saucer and carefully add to it one drop of sulphuric of ammonia. If a dark color is formed which immediately disappears on the addition of one or two drops of pure hydrochloric acid, iron salts are present. If the dark color does not disappear, the water contains other and probably poisonous metals and should at once be rejected.

Where all Agree.

All authorities agree that two rules must be followed in order to maintain good roads. First, take the water out; second keep the water out. With a properly constructed road, the materials must bind together so compactly that the surface will shed water like a roof, and stand the destructive wear of all kinds of tires, and weight of loads that it may properly be called upon to bear without injury. To properly build a macadam roadway, broken stones from one to two and one-half inches in diameter should be placed on the compacted bottom to a depth of three or four inches, and a ten or fifteen ton steam roller passed over it four or five times. Then more broken stones of the same size should be laid on to a depth of three or four inches in the centre of the roadway, and two to three inches at the sides. This should be rolled by the steam roller until a hard bed of stone three to four inches in diameter is formed. By proper under-drainage what would otherwise be poor material will make a good roadway. Broken stones or gravel may constitute the wearing surface. But a harder kind of trap-rock, such as is being used in New Jersey, Massachusetts and Switzerland, will wear more smooth and solid.—J. F. Beam, at the Central Farmers' Institute.

In Scotland the other day a deputation from the Labour party called on a town councillor and threatened him with opposition, when he cooly replied: "It's a richt; if there's to be a fecht I'm no gaun to tak' a lickin' lyin' doon. Bring oot your dowg!"