**Comparison of Methods.**—More complete purification may be accomplished, either on intermediate sand filters, contact beds, percolating or trickling filters. The suspended and colloidal matter is mechanically retained by the filter material to be worked over by the biological life in the filter, which quickly forms in a new bed as a slimy coating on the surface of the particles of the filter material. The chemical change in the liquid is called nitrification or mineralization. When the bed becomes clogged, nitrification gradually ceases. In a sprinkling filter it is favored by the spraying of the liquid, which undoubtedly aids the oxidation process following. As a rule, more nitrates are formed in a sprinkling filter than in a contact bed, but less than in a sand filter.

The deeper the writer progresses into the field of sewage disposal, the more he realizes the amount of work that is still required to make it an exact science or art. The cooperation of biologists, entomologists, chemists, and sanitary engineers is required. The sanitary chemist is mostly concerned with the investigations of the biologic features, a thorough knowledge of which will materially aid in bringing about a better understanding of the facts already accumulated, as well as the solution of new problems. For the industrial chemist, the most fertile field for investigation is the ultimate solution of the sludge question. At present we are able to reduce the quantity of the sludge to a minimum, and to prevent offense, but we realize that certain constituents, even though small in quantity, may some day prove of commercial service. The economies to be obtained, however, will be available only in large plants where careful operation is possible.

## PURIFICATION OF WATER BY STORAGE.

In a paper read before the International Congress on Hygiene and Demography, held in Washington, September 24th, Dr. A. C. Houston gave a discussion on the purification of water by storage. He stated that the purification of water by storage is discussed under three main heads: (1) Sedimentation; (2) Equalization; (3) Devitalization. The following comprise the chief conclusions so far arrived at:

(1) Storage reduces: (a) the number of bacteria of all sorts; (b) the number of bacteria capable of growing on agar at blood-heat; (c) the number of bacteria, chiefly excremental bacteria, capable of growing in a bile-salt medium at blood-heat; (d) the number of coli-like microbes; (e) the number of typical B. coli; (f) the amount of suspended matter, color, ammonical nitrogen and oxygen absorbed from permanganate; (g) the hardness.

(2) Storage alters certain initial ratios, for example (h), it reduces the number of typical B. coli to a proportionately greater extent than it does the number of bacteria of all sorts; (i) the color results improve relatively to a greater extent than those yielded by the permanganate test.

(3) Storage, if sufficiently prolonged, devitalizes the microbes of water-borne disease, e.g., the typhoid bacillus and the cholera vibrio.

(4) Storage has a marked "levelling" or "equalizing" effect.

(5) An adequately stored water is to be regarded as a "safe" water, and the "safety change" which has occurred in a stored water can be recognized and demonstrated by appropriate tests.

(6) The use of stored water enables a constant check to be maintained on the safety of a water-supply antecedent to and irrespective of filtration.

(7) The use of stored water goes far to wipe out the gravity of any charge that a water-supply is derived from polluted sources.

(8) The use of adequately stored water renders any accidental breakdown in the filtering arrangements much less serious than might otherwise be the case.

## NATURAL GAS BELT IN WESTERN CANADA.

Some important finds of natural gas have recently been made in the Canadian West, within the limits of what seems to be a long, but narrow gas belt, running north and south, in the neighborhood of the 112th meridian. Mr. Aubrey Fullerton, in a recent issue of the "Mining and Engineering World," states that the latest strike was made in June at Tofield, near Edmonton, the capital of Alberta. At that point, after several borings had been made, a flow of gas was struck at a depth of 1,054 ft. The well was at once capped and the flow tested. It has since been gaining in volume, and gives every indication of being permanent, while the quality of the gas, for both lighting and heating purposes, is excellent.

Other towns in the surrounding district are arranging for borings of their own, in the belief that a great gas vein underlies the whole country. Indications of gas have been found at various times during recent years.

A great gas-tapping project is now under way at the southern end of this same belt, where the wells at Bow Island have been piped for a supply to the city of Calgary, 180 miles to the west. The pipe line, which was constructed by Corcoran & Co., of Pittsburg, has just been completed, and when the system is in full working order gas will be sold in Calgary at rates varying from 15 cents per thousand for the larger power consumers, to 35 cents for domestic use. The project represents a $3,000,000 investment.

The Bow Island wells are in the immediate neighborhood of Medicine Hat, whose natural gas system, now in use for some years, has made the town prominent. The town uses natural gas almost entirely for lighting and fuel, and an average householder's bill for both runs at from $20 to $30 a year.

In the northern section of the belt is the biggest gas well. The Athabasca River, for at least a good part of its course, runs through a country that seems to be underlain with gas, and a tract of 100,000 square miles is saturated with petroleum. At Pelican Rapids, at a point on the Athabasca River, 200 miles north of Edmonton, is a gas well that has been burning for fourteen years, and gives no sign of lessening in flow. A photograph taken last winter shows an immense gas jet whose flame is nearly 50 feet high, and of very substantial circumference.

The Pelican well was found in 1898, when the Geological Survey of Canada sent a party of oil-diggers into the north to see if the reported existence of petroleum was a fact. They got their outfit in over the wilderness trail, and set to work. When the drill reached a depth of 820 feet it struck gas. The flow was so great that it drove back the drill, and the noise of the escaping gas could be heard two or three miles away. After the survey party went away some one came along and lighted the jet, and it has been burning more or less continuously ever since.

The report to the Geological Survey in regard to the Pelican well recommended that a new bore at the depth of 820 feet, where the first large gas vein was encountered, "should be at least 10 inches in diameter; then it would be possible to reduce the casing four or five times, giving that many different lines of pipe to be used in getting by these gas veins." Meanwhile the search for oil was of necessity abandoned, and until the railroads get into the country there is little chance of this great natural resource being developed. The big gas jet is still blazing high and fiercely, but wastefully, and a great coal area further north is similarly on fire, and has been for many years, burning slowly from within. The whole region is a vast depository of natural fuel. Oil oozes out along the shores of Great Slave Lake and the Mackenzie River, and tar drips all summer long from the banks of the Lower Athabasca and Great Slave Rivers.