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Conservation and Engineering

VI. Water Supply

The problems of water supply should concern chemical engineers, particularly those with an interest in conservation, for two reasons. First, it is probable that acute shortages of water, already familiar in some places, will soon become more widespread and more frequent. The most optimistic way to look at this prospect is to hope that such shortages may waken all of us to the potentially disastrous consequences of our persisting abuses of land and mineral resources as well as of water. Second, if any alleviation of the water shortage is to be found, it will undoubtedly come primarily from sound application of chemical engineering principles.

The magnitude of our water usage is staggering. It approximates 1,700 gallons a person a day, of which a little less than half is used for industry, the same amount for irrigation, and the small remainder for the household. Every trend points to greater per capita use, and the increasing population will raise the total consumption figures to the point where the most modern computer is overloaded. Nothing is going to increase our rainfall, and we persist in every action designed to reduce the rainfall available to us. Parking lots, housing developments, supermarkets, etc., play their parts in reducing water table, accelerating run-off, and silting up the existing reservoirs. This problem is bound to get worse everywhere, until it becomes critical in more and more places.

Cheap water almost certainly is about to disappear forever in this country, because the things which can be done to alleviate the problem of dwindling supply are expensive. That they can be done at all is a tribute to the excellent study and research carried out by chemical engineers throughout the years in heat transfer, water purification, ion exchange, and thermodynamics.

Conservation of water, primarily in its industrial uses, will be essential. It will no longer be tolerable to throw away water used only for cooling. Such water must be itself cooled in appropriate towers, the design of which is certainly well known in chemical engineering. Since some water leaves the system as vapor but none of the dissolved solids do, demineralization will be necessary. There are no technical reasons why this cannot be done to conserve water to an important extent, but it will be costly.

Conservation of water now devoted to process uses, such as rinsing, will also become essential. This is a rather more difficult problem than the recovery of cooling water, but it can be solved. Ion exchange, precipitation, thickening, and filtration are well enough understood to permit us to predict with confidence that rinse waters can be purified and recycled with great reduction in net water consumption. The studies already made, however, leave little doubt that the cost will be great.

New sources of water are unlikely except for the ocean. Many industrialists and academicians have been working assiduously on demineralizing sea water, recently with the great help of the Office of Saline Water, and success is in prospect. The large pilot plants being built will show the way to the most advantageous process for any site. Whether conventional, vapor-compression, or "flash" evaporation, freezing, or electrodialysis is adopted, it is the work of the chemical engineer which has made them all possible. Again, the cost will be considerable even at the often estimated figure of 50 cents a thousand gallons. It should also be noted that the promise of this process is clearly limited to the seashore or to those regions where brackish water is available.

When the coming crisis in water supply is upon us, the world should be thankful for the work chemical engineers have done. Even so, alleviation is all that can be promised, and that at a rather high price. If no stop is put to our burgeoning population, one foresees a hinterland starved for water and teeming, continuous cities along the seashores, perhaps (Heaven forbid!) with water only at licensed premises.

H. B.