TABLE 3. PRINCIPAL SLIME FORMERS

PHYLA	ROUGH DIVISION OF PHYLA
Algae	Single celled, sometimes forming slimy sheets. Many celled in either sheets or fronds.
Fungi	*Bacteria* (Schizomycetes) frequently forming slimy surface coatings. *Slime Molds* (Myxomycetes) forming slimy sheets as one stage of their life history. *Sac fungi* (Ascomycetes) of which one division, the yeasts, occasionally form slimy aggregates. The alga-like fungi (*Phycomycetes*) and the stalked fungi (Basidomycetes) rarely form slimes but their filaments may hold together the slimes of other organisms.

All thallophyta are of universal distribution and many of them are slime-forming. Of the five divisions of algae, only three (the green, the blue-green, and the diatoms) are found in fresh water. Of the five divisions of fungi, all may occur in fresh water, the principal slime formers being indicated in Table 3.

The methods of analysis commonly used in the sanitary examination of a water have, as their principal object, to identify and count pathogens.

Most slime-forming organisms are not pathogens. When a water is subjected to a biochemical analysis for the purpose of evaluating its slime producing characteristics, tests, widely different from sanitary bacteriological tests, must be made. Tests upon the water itself are seldom satisfactory, and true indications of the sliming characteristics of a water can only be determined by the analysis of deposits on surfaces having a temperature that approximates the operating temperature range of the final design equipment. The results of such tests are commonly used for selecting proper preventive measures.

Slime and algae micro-organisms are capable of rapid multiplication and, if not controlled, can cause shut-down or permanent damage to equipment. They can be controlled by chemical treatment of the water or in certain cases by mechanical cleaning of the surfaces affected. The chemicals used are usually toxic, and should therefore be handled only by trained personnel having a full understanding of the quantity required and their effect on operators as well as surfaces.

Chemical treatment is usually preferred to mechanical cleaning par-

TABLE 4. DATA TYPIFYING THE DELETERIOUS GAS CONTENT OF DIFFERENT ATMOSPHERES

Name of Gas	Chemical Formula	AIR				FLUE GASES					
		RURAL		METROPOLITAN		BITUM. COAL		FUEL OILS		NATURAL GAS	
		% by Volume	Partial Pressure, psia	% by Volume	Partial Pressure, psia	% by Volume	Partial Pressure, psia	% by Volume	Partial Pressure, psia	% by Volume	Partial Pressure, psia
Oxygen	O_2	21	3.143	21	3.143	2	0.299	7	1.048	10	1.497
Carbon Dioxide	CO_2	0.03	0.004	0.06	0.009	15	2.245	13	1.946	10	1.497
Sulphur Dioxide	SO_2	None	None	0.003	0.004	0.07	0.010	0.03	0.004	0.0001	0.0015

ticularly where surfaces are inaccessible for cleaning or where a shut-down of the operation is necessary for mechanical cleaning.

Condensates

All condensates are caused by the cooling of vapor. Condensates resulting from the cooling of water vapor in air are *dews*, *sweats*, *rain*, and *snow*, while those formed in steam-condensing apparatus are termed condensates or return water.

In the heating and ventilating field, the biological characteristics of condensates are likely to be of concern *only* where the condensate is used

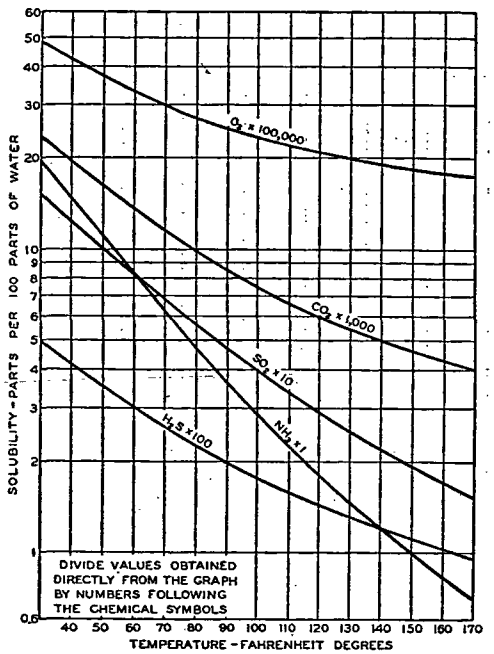

FIG. 1. SOLUBILITY OF GASES AT PARTIAL PRESSURE OF 1 PSI

as cooling water in recirculating systems. The deleterious gas contents of condensates, however, very often create serious corrosion troubles.

The data in Table 4 typify the chemical composition of the atmosphere in rural and metropolitan areas, and of stack gases when various types of common fuels are used. The curves in Fig. 1 disclose the solubility of the major deleterious gases present in such atmospheres in otherwise pure water, when the partial pressure of the gas is one psia.

The most common deleterious gases entrained by steam are oxygen and carbon dioxide. In rare instances, hydrogen sulphide, sulphur dioxide, or ammonia are present.

In most steam condensing equipment,[7,8] the non-condensable gases entrained with steam accumulate so that the amount present in the vapor space is several hundred times higher than in the incoming steam and