

A vitamin for biological sewage treatment plants

By Dr. Alfons Anderl

According to a recent survey made in the U.S., some 65 per cent of aerobic biological sewage treatment plants were deficient in vitamins. Taking 71 selected plants the following deficiency was found (number of plants, type of vitamin):

(4) vitamin B-12; (4) vitamin B2; (7) pantothenic acid; (10) thiamine-; (21) folic acid. It is claimed that by additional feeding of the vitamins needed, the growth and assimilation rate of the microorganisms could be enhanced. This problem of vitaminizing and adding micronutrients has been the focus of interest in the U.S. for the last 20 years [1].

It is interesting to see that according to the above survey, folic acid is the most needed vitamin for biological sewage treatment plants. This vitamin seems to be absent or only available in minor amounts in the selected plants. The reason is because folic acid, although water-soluble could hardly be found in the influent of the biological sewage treatment plant. Microorganisms which would be able to synthesize folic acid are absent in the activated sludge. Natural sources of folic acid are in liver, spinach and the used up mycelium of penicilline. The substances are also hardly found in the biological sewage treatment plants [1]. Folic acid is converted inside the living cell into the citrovorum factor. This factor plays an important role in peptide- and nucleic acid assimilation [11]. The citrovorum factor, which is formed inside the living cell from folic acid, is converted into coenzym F [9]. The influence of folic acid on the rate of growth has been more closely examined on several microorganisms [7]. Also culture media from lactic acid bacteria [6][12] as far as the culture of animal cells [3] [8] contain folic acid. In two applications for patents from the USSR in the years 1976 and 1985 the addition of folic acid for biosuspension of waste treatment plants is mentioned [4][5]. The mechanism in which the increase of growth in the microorganisms through adding folic acid is induced has not yet been separately defined [7] [11]. Additional information is given here by measurement of the kinetic of oxygen consumption. How to dose correctly folic acid in solution or in substance has so far been quite difficult, as the vitamin is easily destroyed through the influence of oxidation, reduction, heavy metals, heat and light [2]. A double stabilized liquid preparation of folic acid has now been found in order to avoid these

difficulties in use [10]. This formula has been developed especially for the needs of biotechnology. The yellow folic acid crystals, susceptible to light, indispensable in animal feeding and human medicine are well known as a specific promoter of growth in industrial microbiology. Used in biological sewage treatment plants the folic acid can make a considerable contribution to environmental technology.

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