

The Effect of Salinity on the Toxicity of Syndets

by

Hans Mann

Institut für Küsten- und Binnenfischerei, Hamburg



During the past years the significance of synthetic detergents has greatly increased. New possibilities of their use in household and industry resulted in a rapidly increasing consumption. This involves dangers, which also threaten fisheries. With the sewage from household and industry detergents get into the waters; one will notice them in running water by their frothing.

The presence of syndets in waters gave rise to a study on how they affect fish. The results of these studies can be summarized as follows: as far as the "hard" alkylbenzolsulphate (ABS) is concerned the limits of the detrimental effect lie between 10 and 20 mg/l; the extent of it varies according to the fish species. The new biologically decomposable alkylbenzolsulphate is more poisonous, as 4 to 7 mg/l already have a lethal effect on many fish species. These values can also be applied to a certain limit to other kinds of animals in fresh water.

As you will know, the effect of a toxin is influenced by external factors like temperature, oxygen content and others. It must be taken into account that in the near future sewage from households and industry will pass into the coastal region and with it syndets will get into salt water and brackish water. It should, therefore, be studied whether the toxicity of syndets is affected by the salinity. In studies carried out by Eisler (1965) it is mentioned for the first time that "the salinity of the medium affects toxicity of the syndet". On the strength of this we have carried out a number of experiments on cel, which were kept in water of different salinity. Syndets were added to the water in such quantities that the following concentrations resulted: 10; 15; 20; 25; 30 and 35 p.p.m. For our experiments we used

alkylbenzolsulphonate, which was biologically difficult to decompose, but only thus the content of syndets could be kept constant during the experiment. The following salinities were examined: 3,25; 6,55; 9,63; 12,92; 20,03; 25,79; 32,67 ‰.

The experiments were observed over a period of 24 hours. During all experiments it was found that the toxicity of the syndets increased with increasing salinity. The weaker concentrations of 10 and 15 p.p.m. did not have a lethal effect within 24 hours and at a salinity up to 20 ‰, only beyond 20 ‰ a detrimental effect on eel was noticed; at 32 ‰ some animals died after 24 hours and at a concentration of 15 p.p.m. This applied to all concentrations of syndets. As an illustration, the toxicity of a solution of 25 p.p.m. is represented in Fig. 1. In order to compare the various values the cumulative per cent mortality (Eisler, 1965) was calculated from the time of death and the number of dead fish. Fig. 1 shows that the toxicity remains constant up to a salinity of about 10 ‰, and then increases considerably.

From these studies follows that the existing data on the toxicity of syndets regarding fresh water fish must not be applied to fish in brackish or sea water, but special experiments must be carried out on both.

