ULTRASTRUCTURAL CHANGES IN DIATOM FRUSTULES ASSOCIATED WITH DISSOLUTION AND A REVIEW OF METHODS FOR PREPARING FRUSTULES FOR SURFACE AREA MEASUREMENT

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ABSTRACT

Laboratory cultured diatoms were killed by quick freezing using liquid nitrogen and placed in filtered sea water at 23°C and pH 8. As the frustules dissolved, the dissolved silica concentration, specific surface area and particulate silica concentration were monitored. Samples were also removed regularly and embedded for electron microscopic examination. The results indicate the formation of a high specific surface area porous layer on the outside of each frustule member. This porous layer migrates toward the center of the frustule member as particles break off of the outer portion and new porous material forms beneath the porous layer.

Several methods of removing the organic material from the diatom frustules were tried in order to find one which is effective in removing the organic material but which does not change the silica ultrastructure. Of the methods tried (hydrogen peroxide, sulphuric acid, high temperature ashing, and ultraviolet radiation) only the high temperature (550°C) ashing was satisfactory. The other methods either were ineffective in removing the organic material or produced changes in the diatom frustule ultrastructure which were unacceptable.