



**Report of
Sediment Settling Rate Analyses**

Prepared For

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Atlantic Geoscience Centre
Bedford Institute of Oceanography
Dartmouth, Nova Scotia**

DSS Contract No. 23420-2-M393/01-OSC

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**ACER Publication No. 26
March, 1993**

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SEDIMENT SETTLING RATE ANALYSES

Methodology

Four bulk sediment samples, provided by EMR, were subsampled, split, and wet sieved through a 64 micron mesh in order to remove the sand fraction. The remaining finer sediment fraction was added to seawater of varying salinities and to varying initial sediment concentrations, and, after thorough mixing, the variation in suspended sediment concentration was measured over time. Settling rates were measured in glass settling columns at five salinities ranging between 13 and 31 ppt and at five initial sediment concentrations ranging between 2 and 40 grams per-liter. The settling column consisted of a 40 cm high, 6 cm dia cylinder. Changes in sediment concentration with time were measured by reference to fluid density with a calibrated hydrometer. Hydrometer measures were taken at intervals of 1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 45 and 60 min after initiation of each experiment. The water temperature of each experiment was between 20 and 22 °C.

Results

A total of 25 settling rate measurements were carried out on each sample. In general there was very little difference between samples. Sediment concentration versus time showed an exponential decrease that appeared to be bimodal; an initial rapid drop in concentration within several minutes was followed by a much slower rate of settling that took place over several hours. Figures of all time series are presented in Appendix I. There was no clear relationship between salinity (Fig. 1) or initial sediment concentration (Fig. 2) and the inflection point separating the two modes of settling.

The slope (K1 and K2) of each curve separating the two modes of settling was calculated for each sample using a linear model and plotted against both salinity and initial sediment concentration. Salinity had little influence on either slope (Figs. 3 and 4). Initial sediment concentration, however, had a marked effect on the slope of the initial settling phase (K1); at sediment concentrations <20 grams per liter the slope decreased with increasing sediment concentration, but at concentrations >20 grams per liter the slope remained constant (Fig. 5). The slope of the second settling phase was independent of both salinity (Fig. 5) and initial sediment concentration (Fig. 6).

Appendix II contains isopleths for each sample illustrating the variation in inflection point and K1 with salinity and initial sediment concentration.

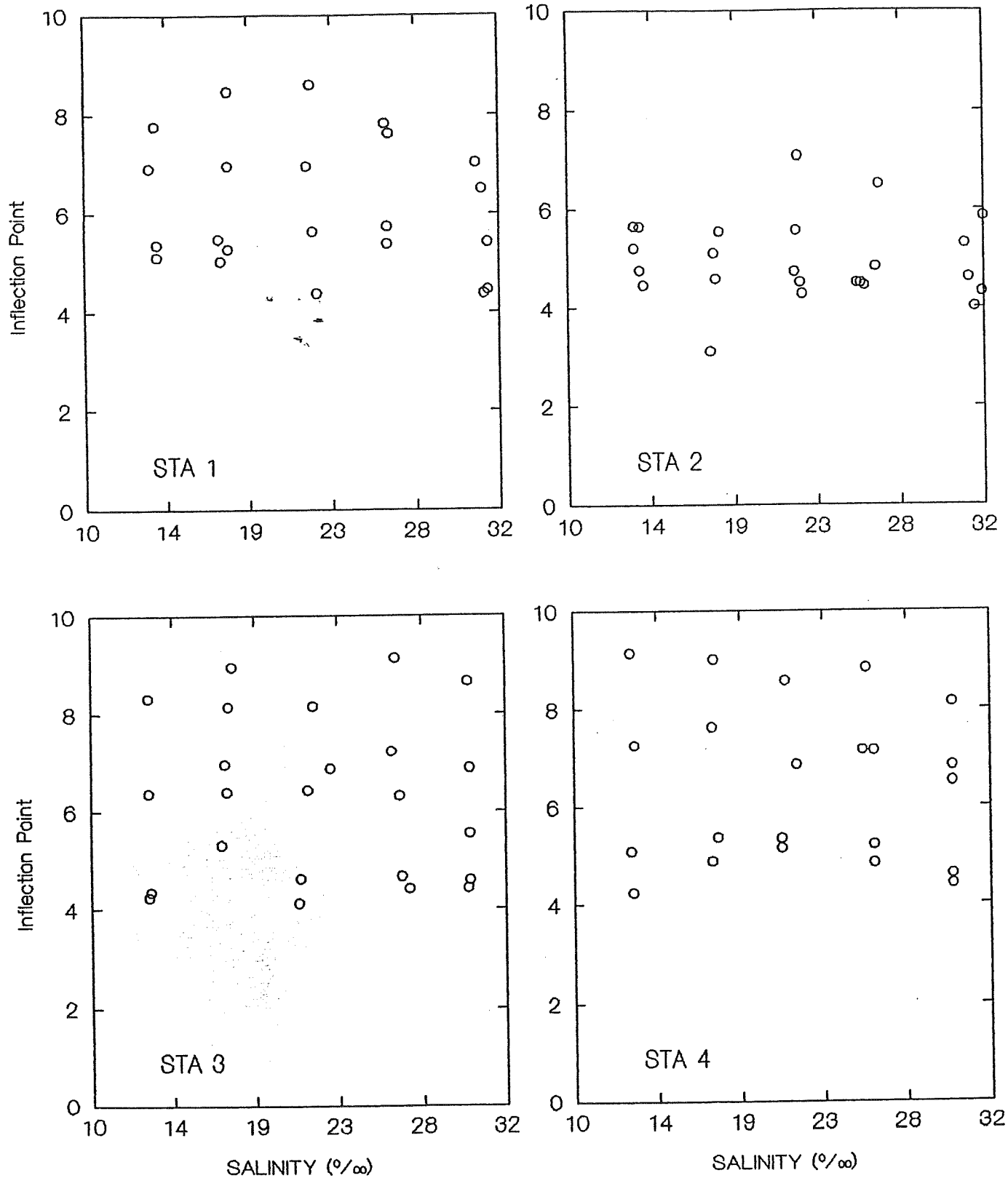


Figure 1. Relationship between salinity and the inflection point separating the two modes of settling.

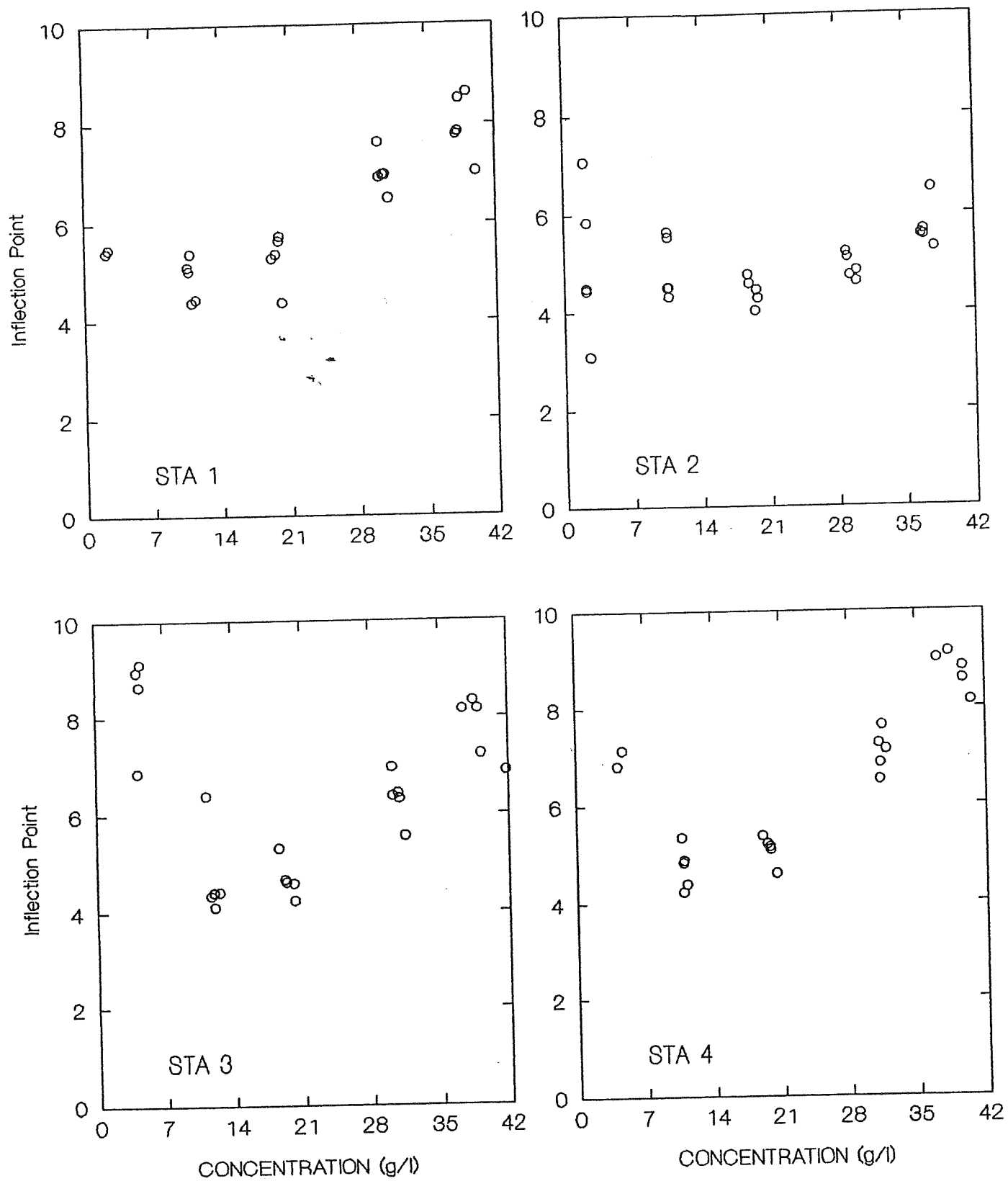


Figure 2. Relationship between initial sediment concentration and the inflection point separating the two modes of settling.

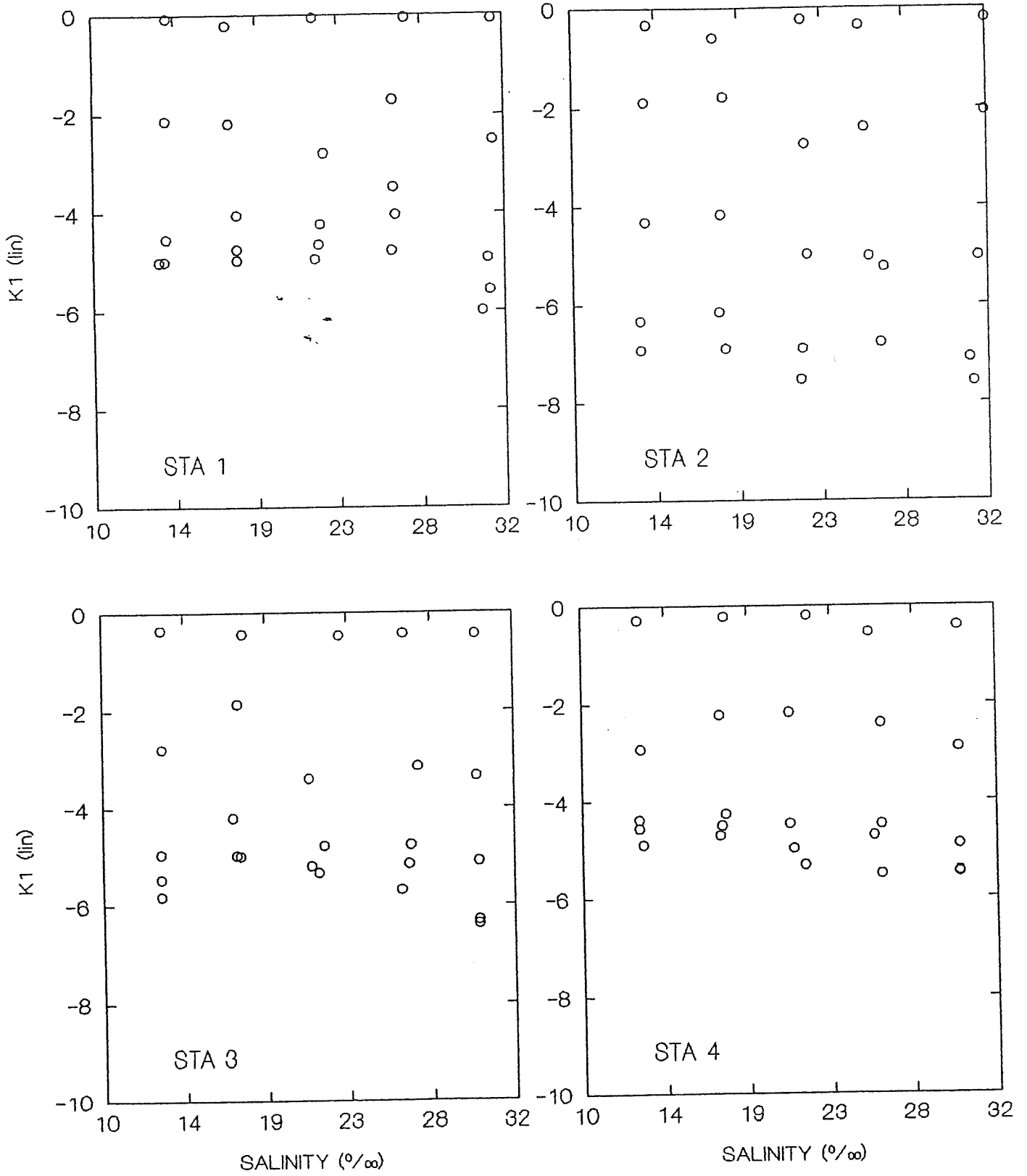


Figure 3. Relationship between K1 and salinity.

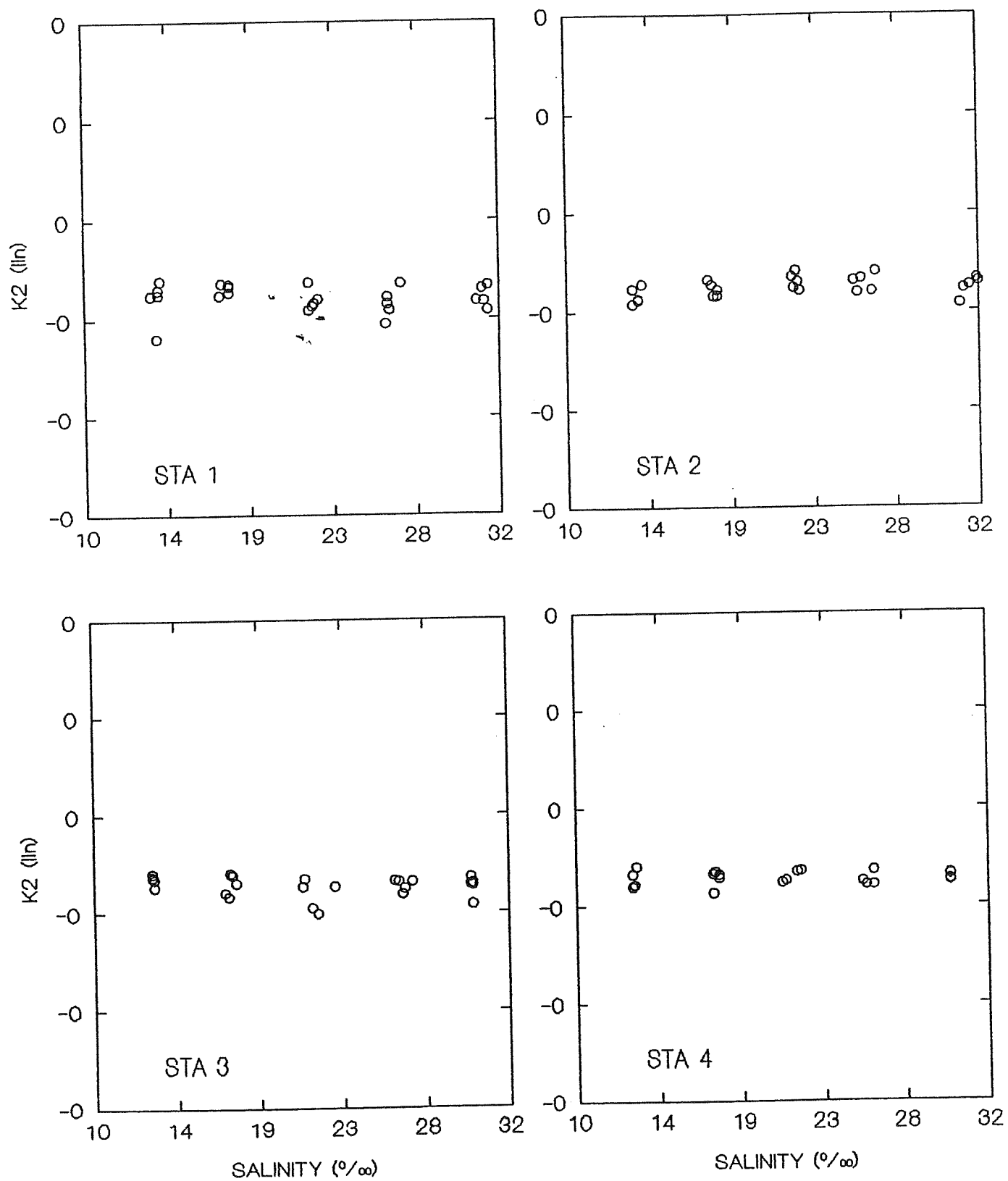


Figure 4. Relationship between K1 and initial sediment concentration.

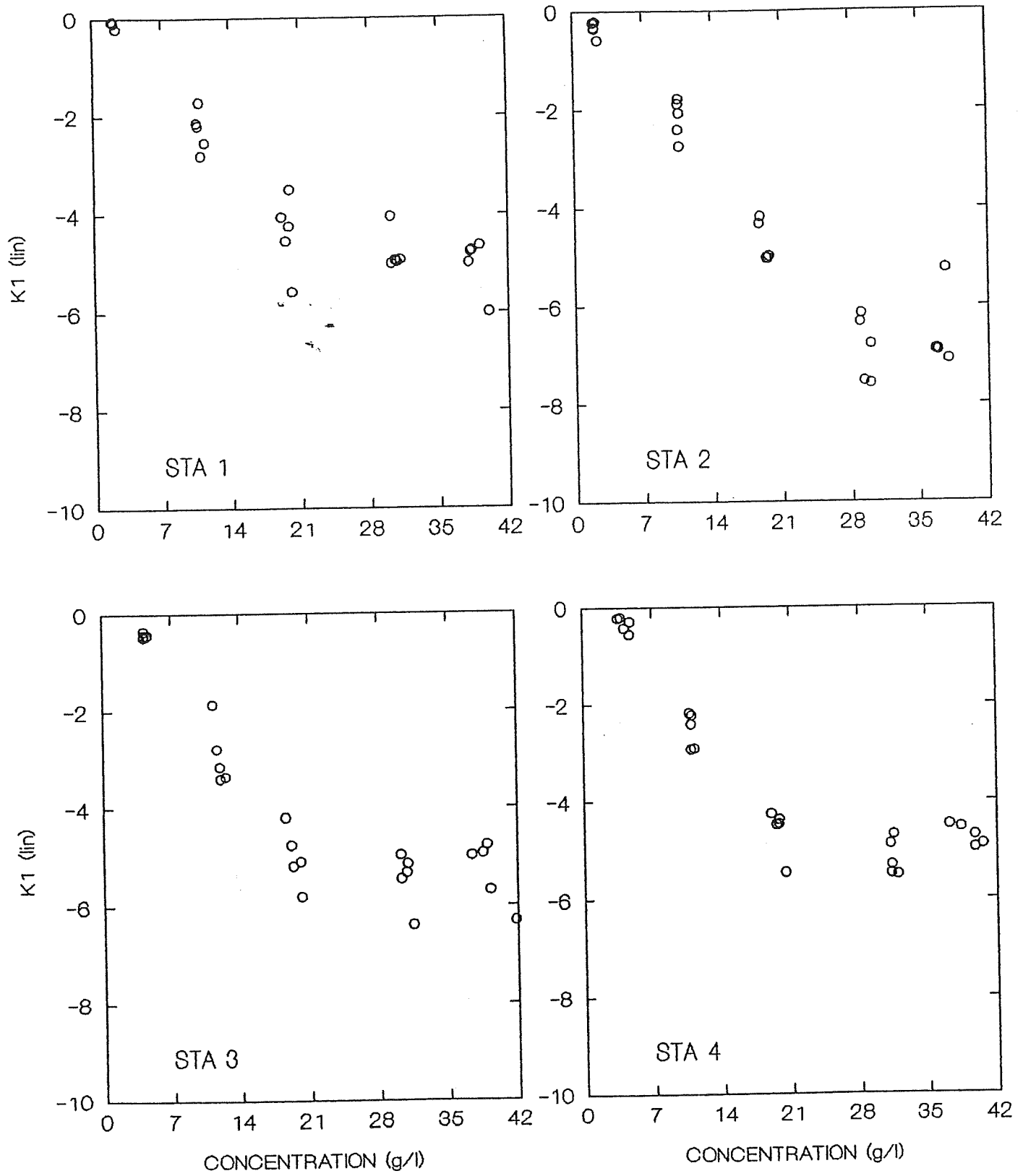


Figure 5. Relationship between K2 and salinity.

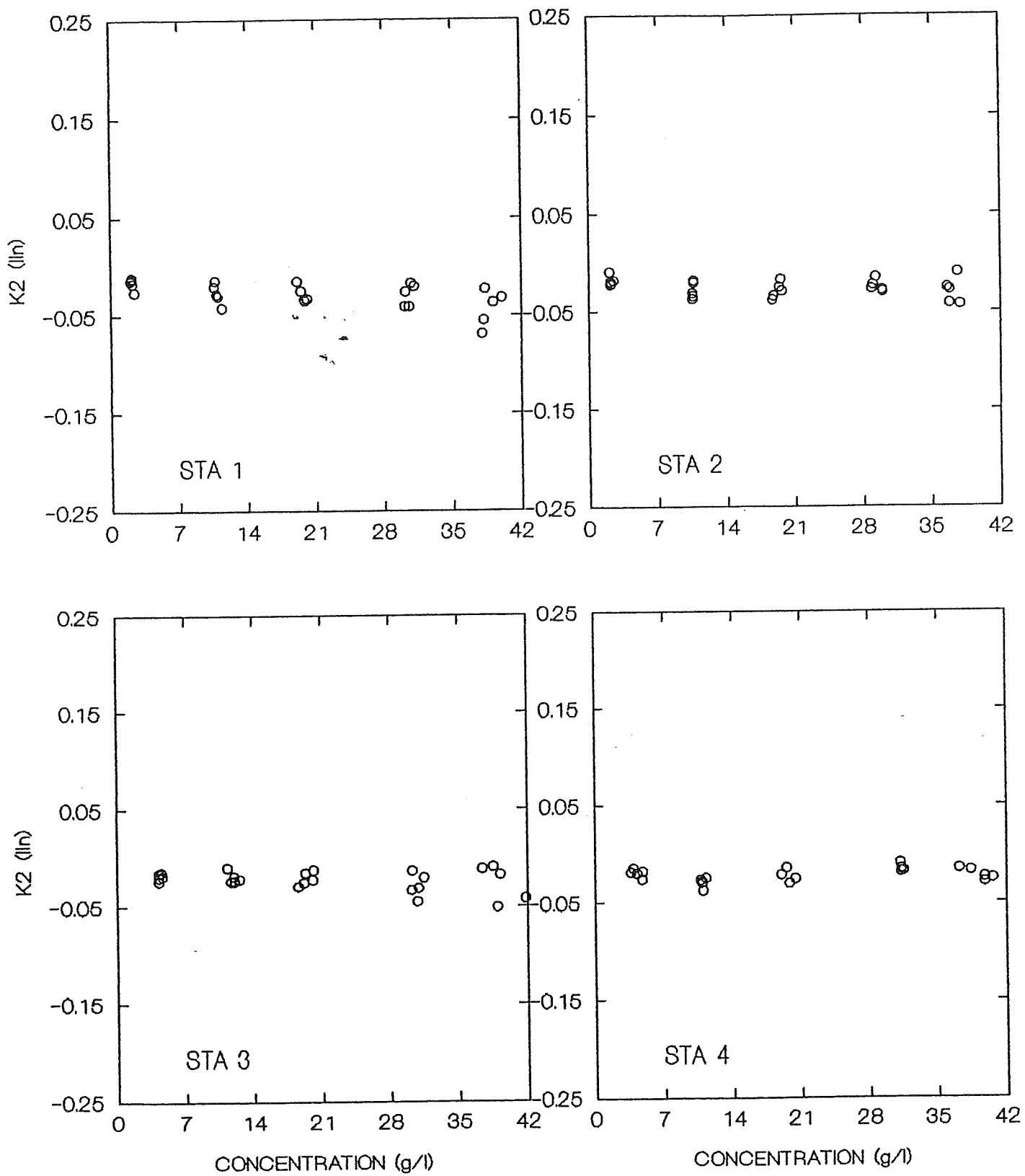
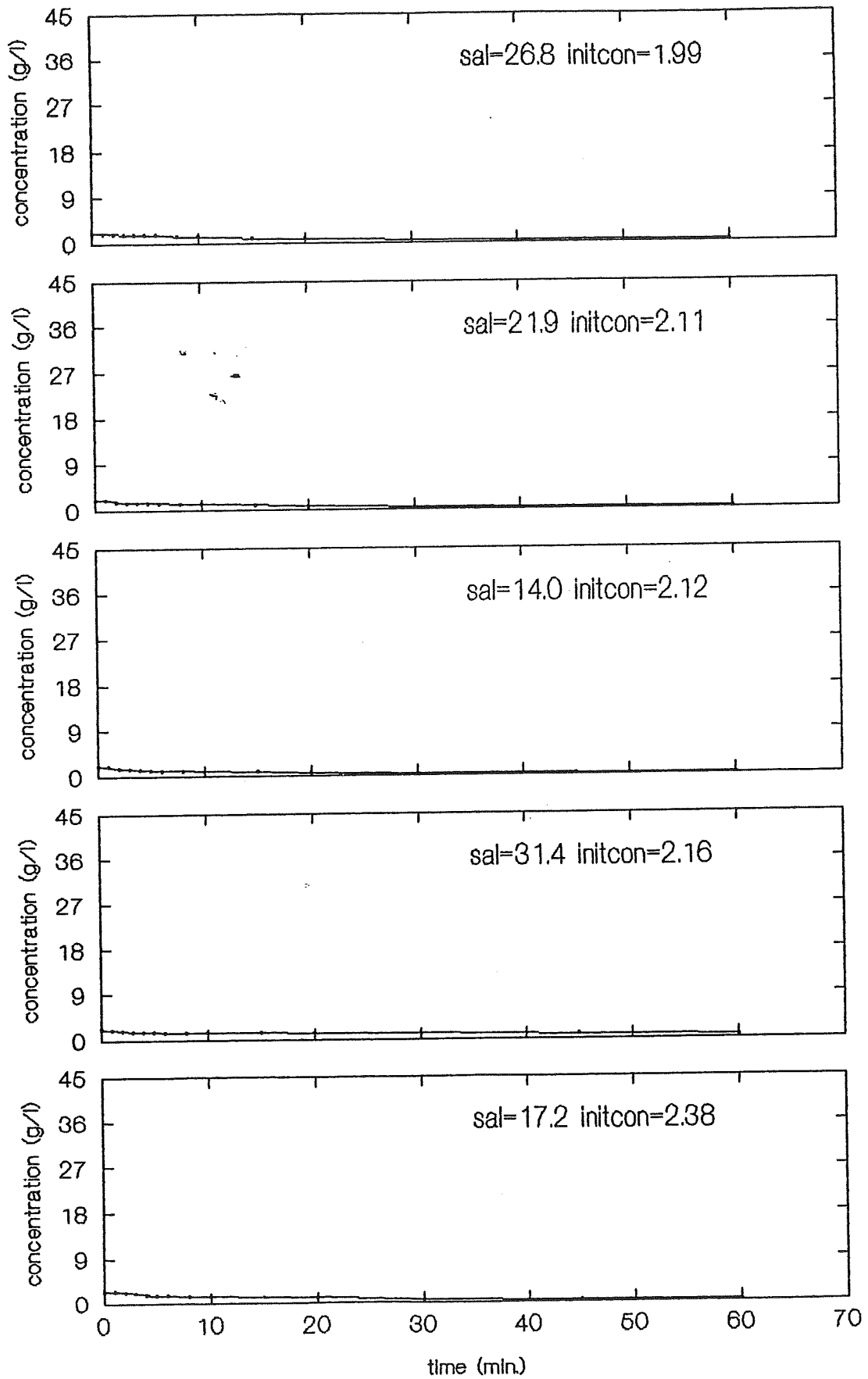
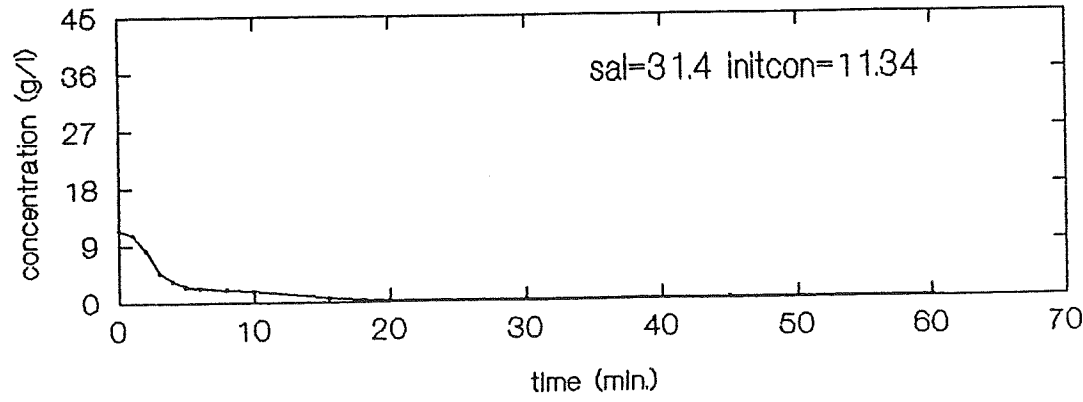
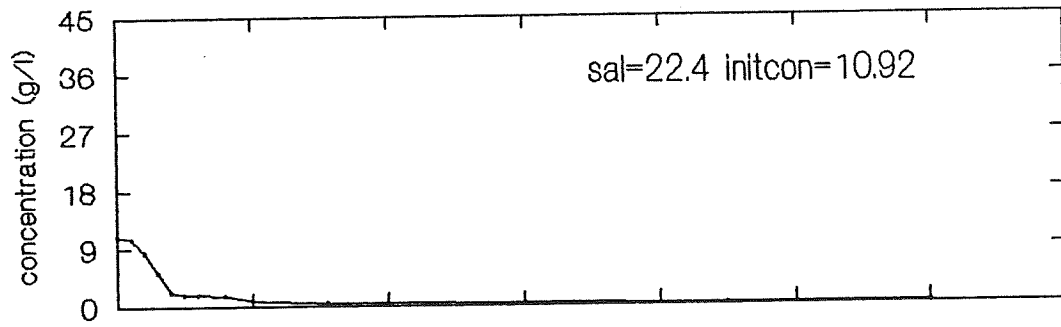
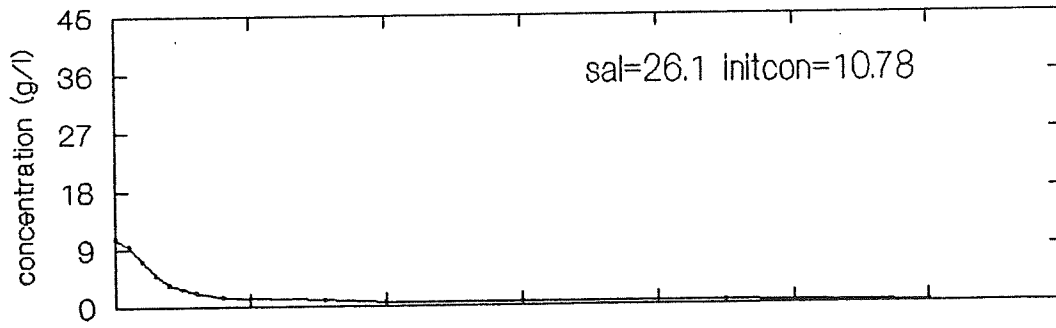
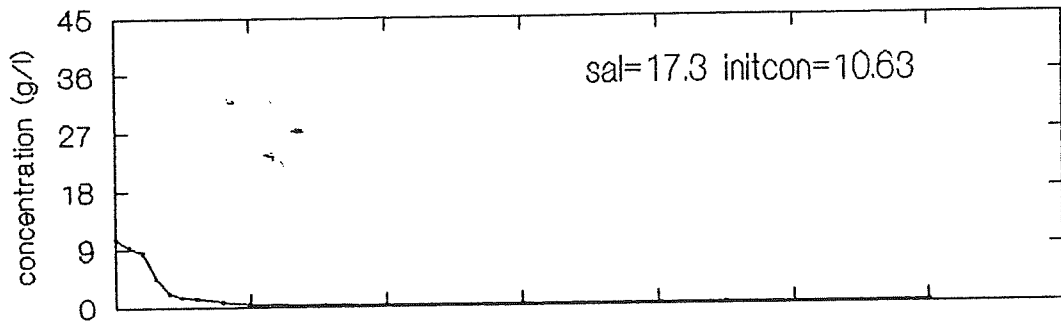
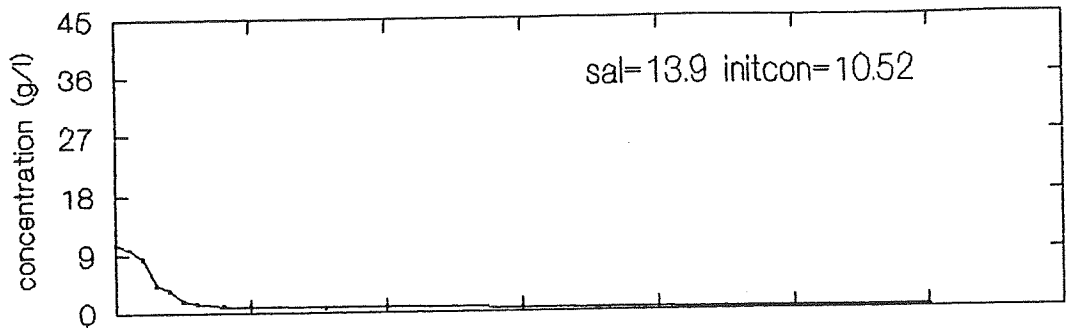
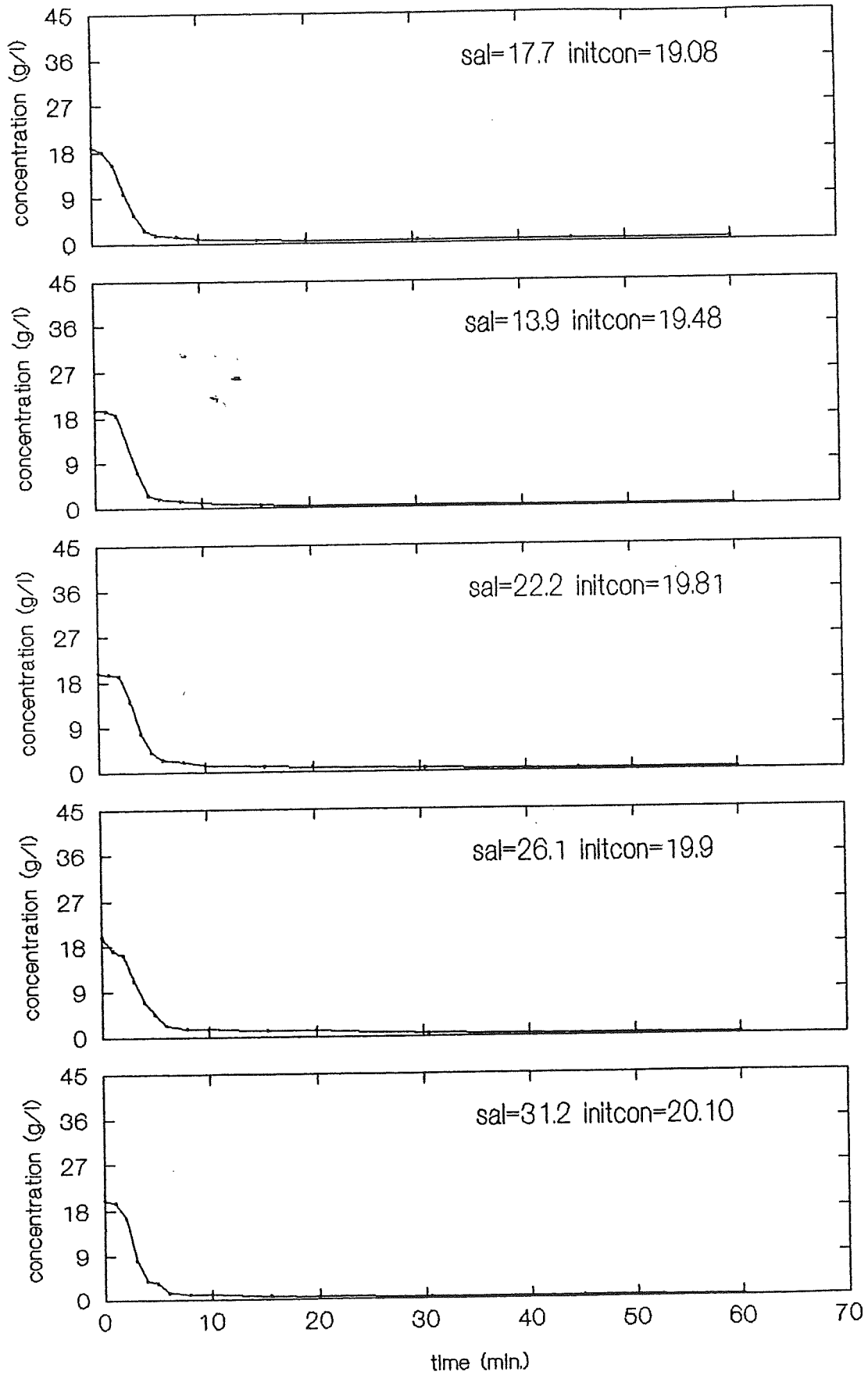


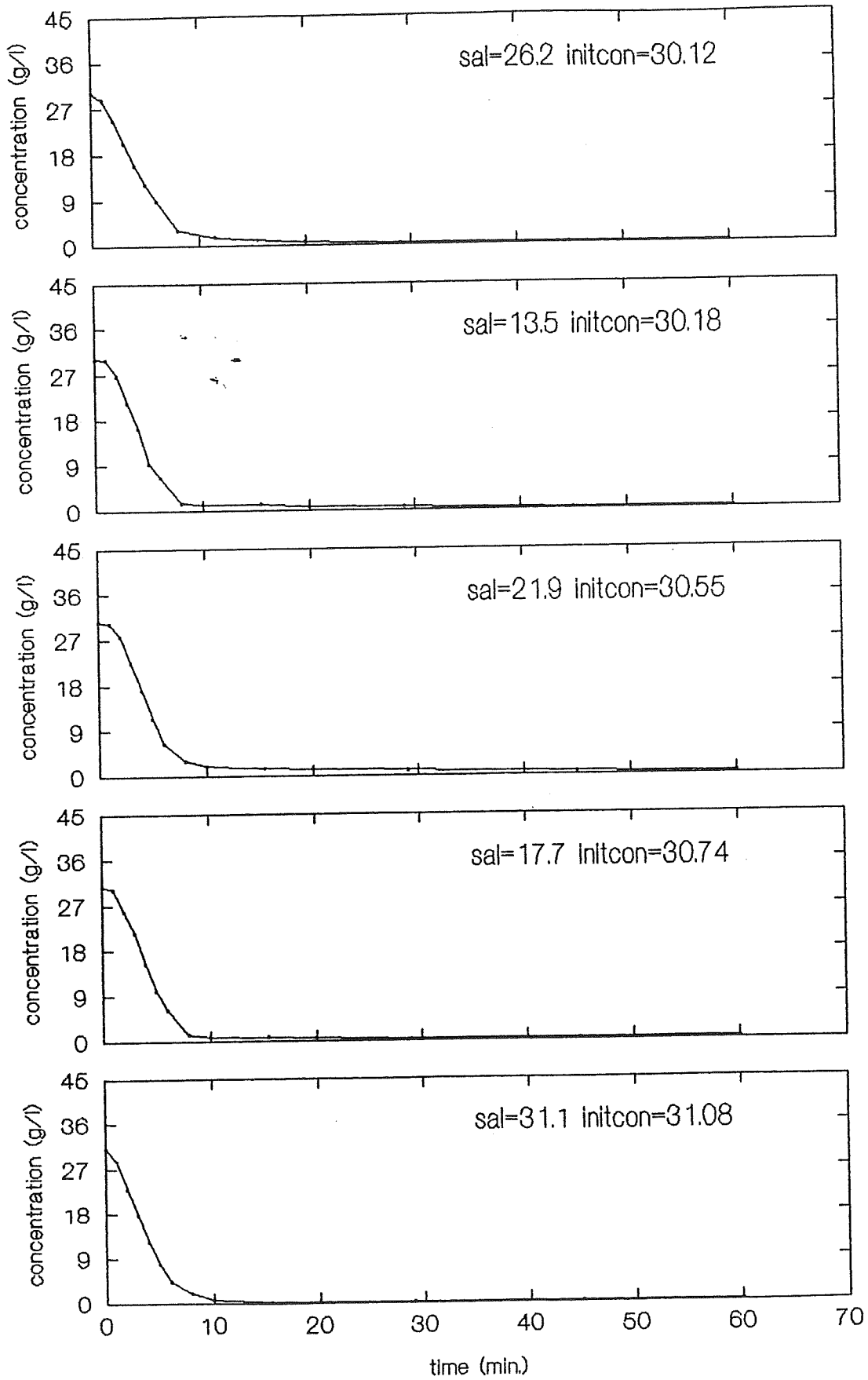
Figure 6. Relationship between K2 and initial sediment concentration.

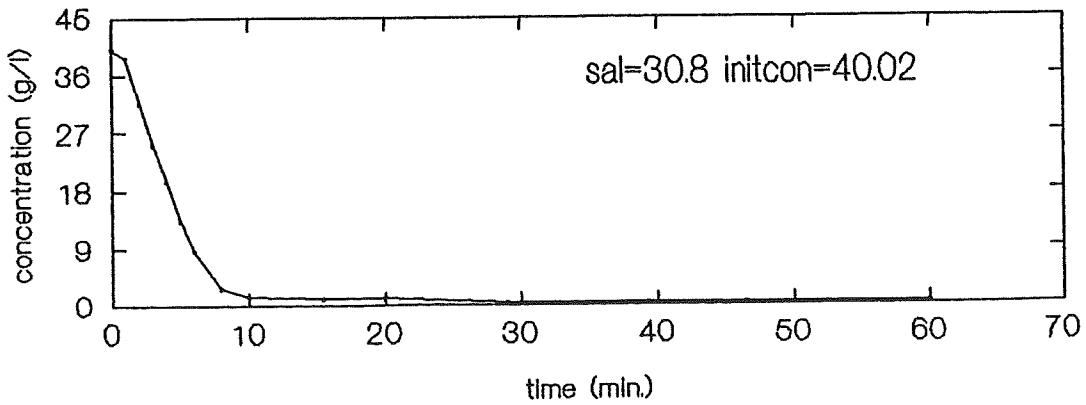
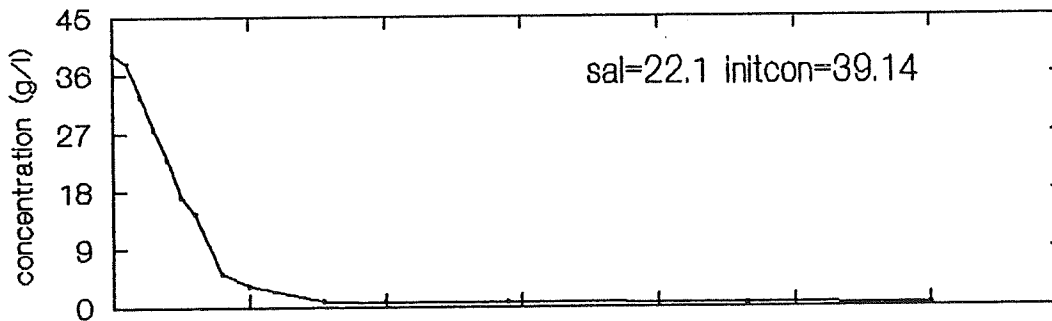
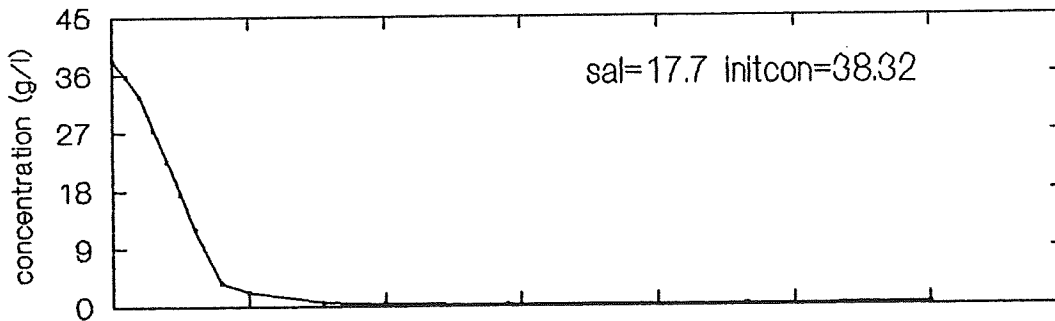
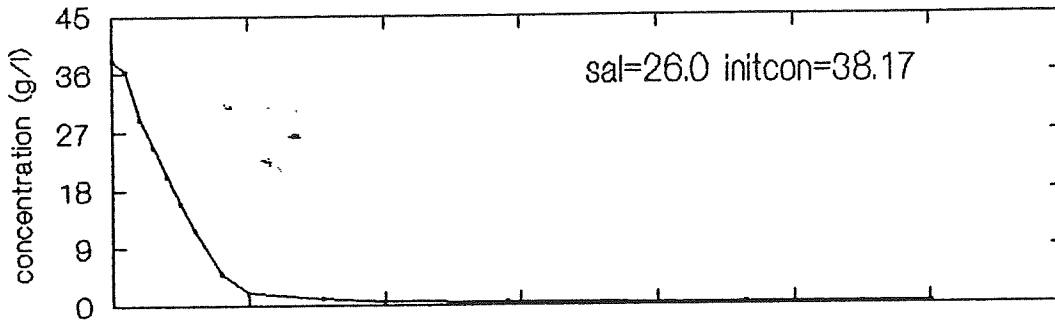
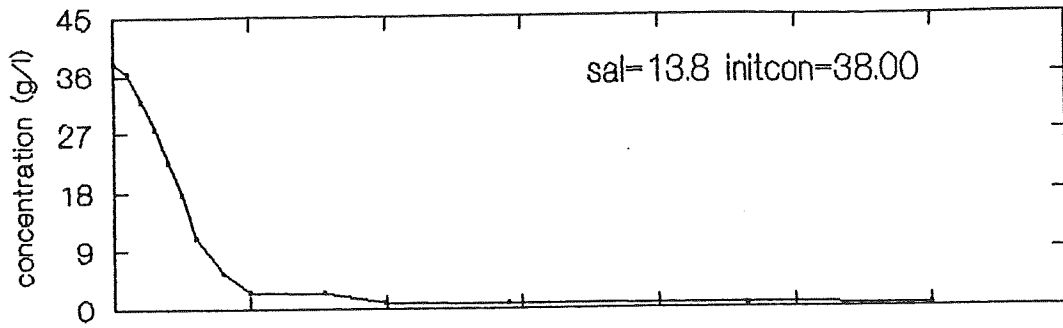
APPENDIX I



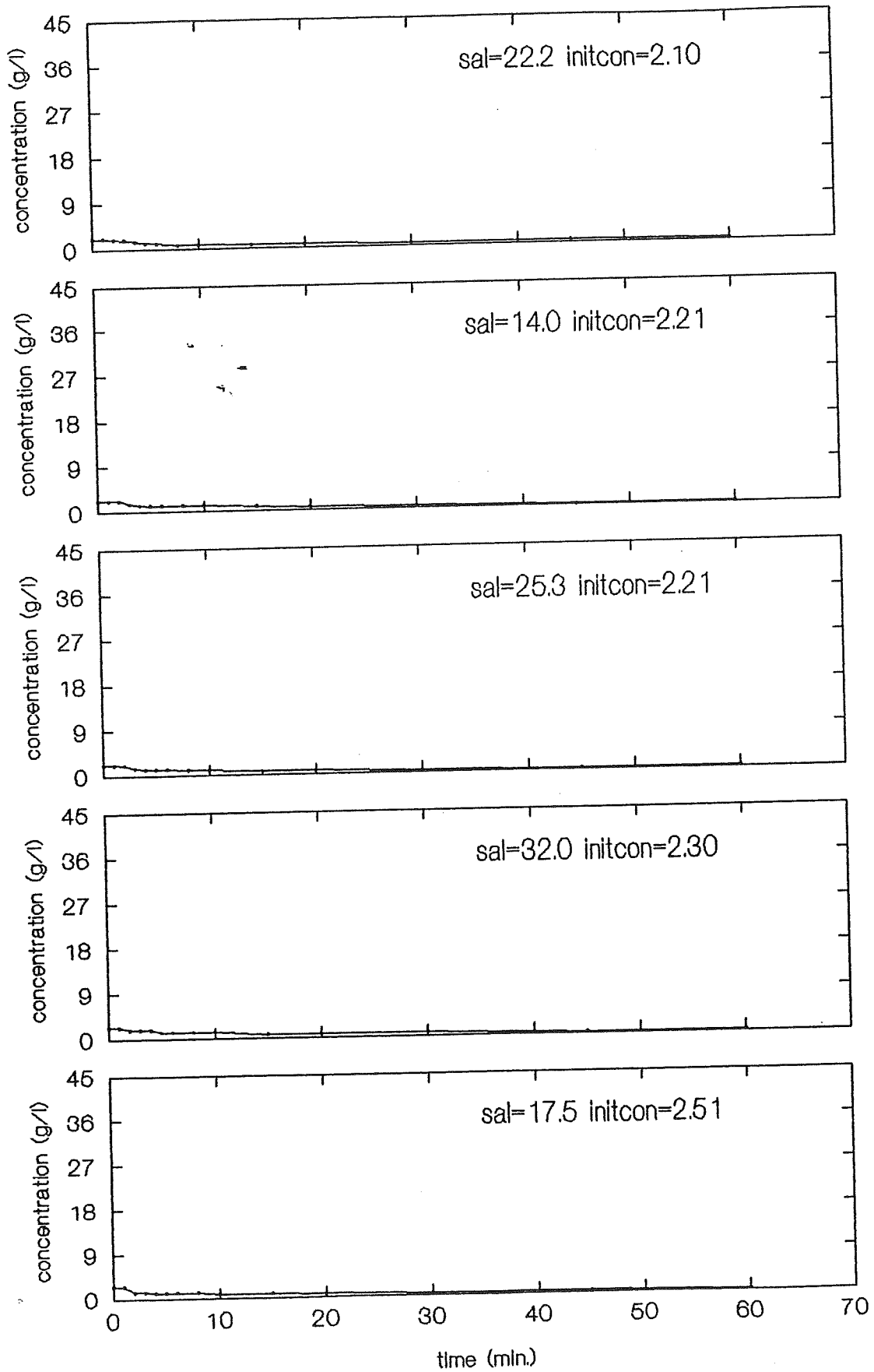


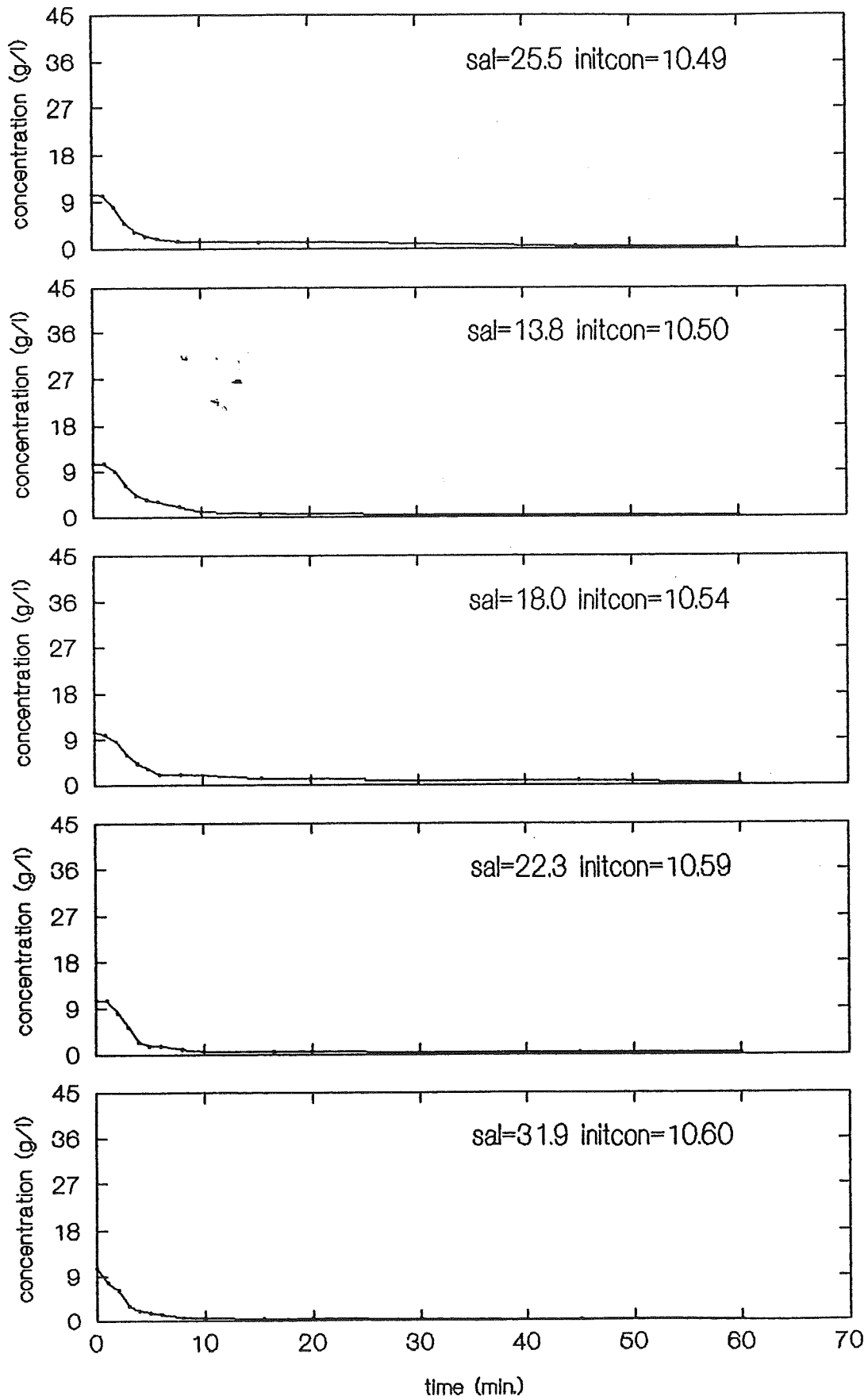




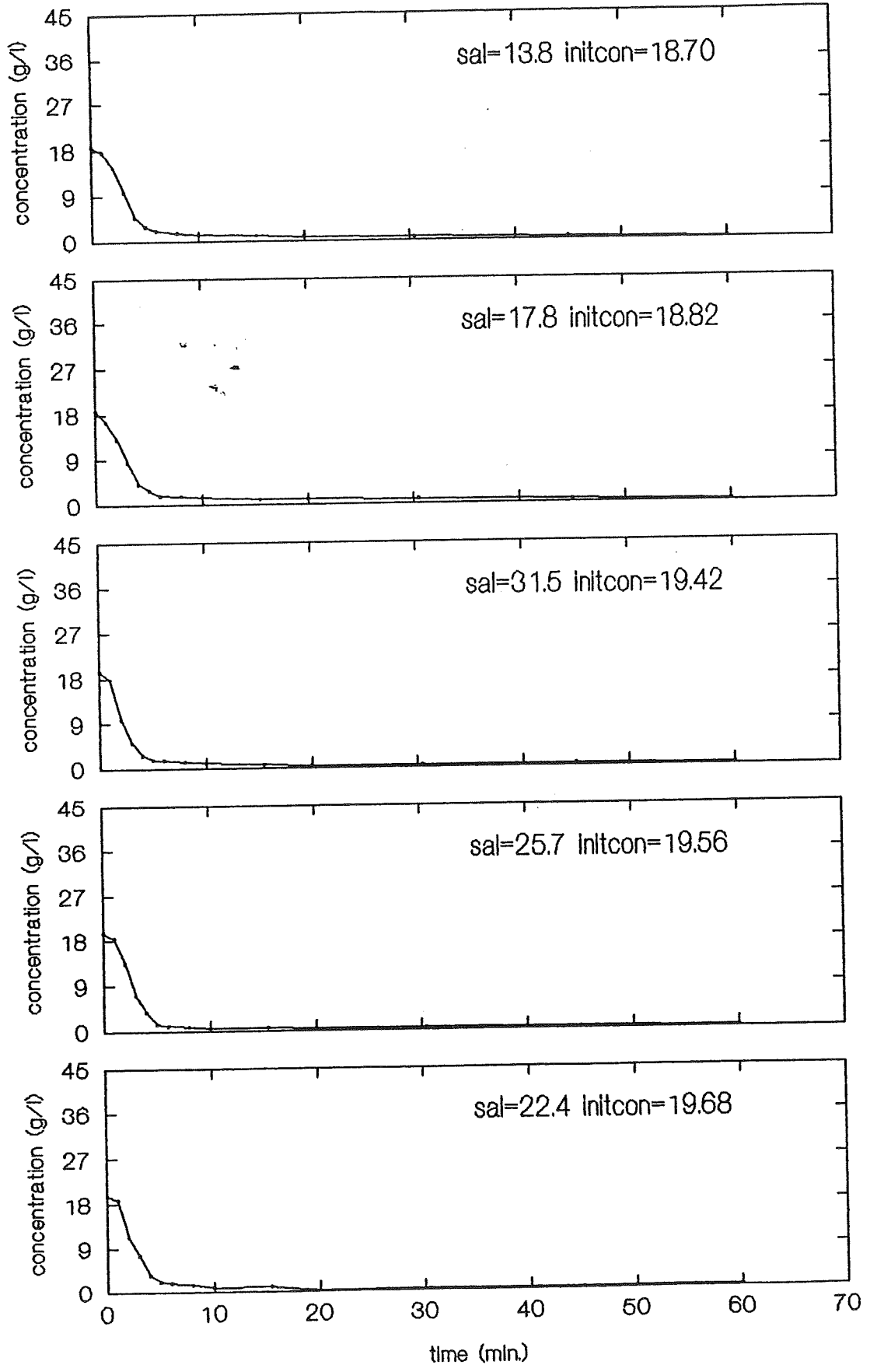


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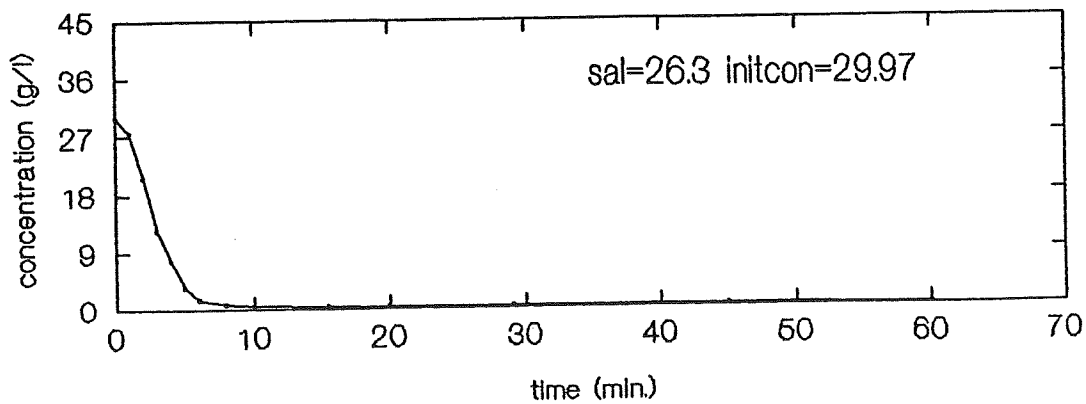
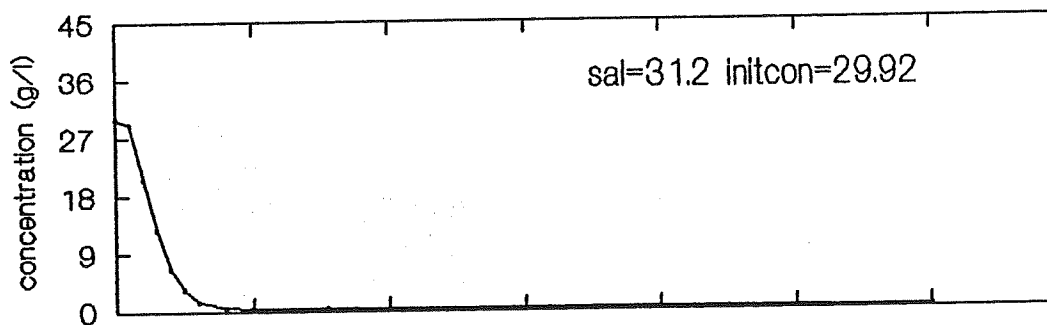
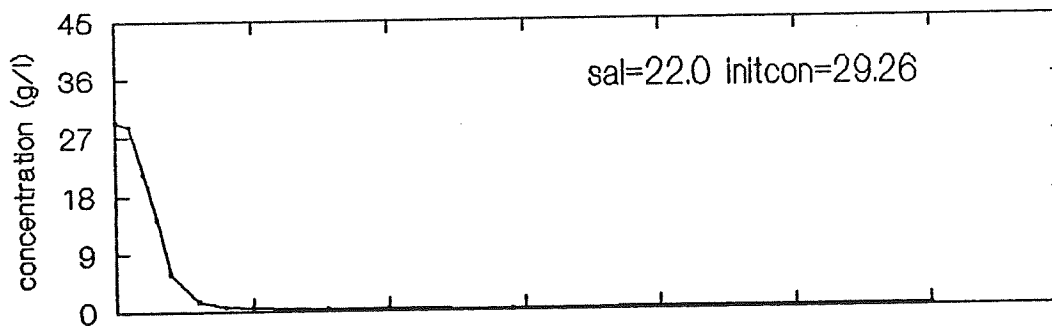
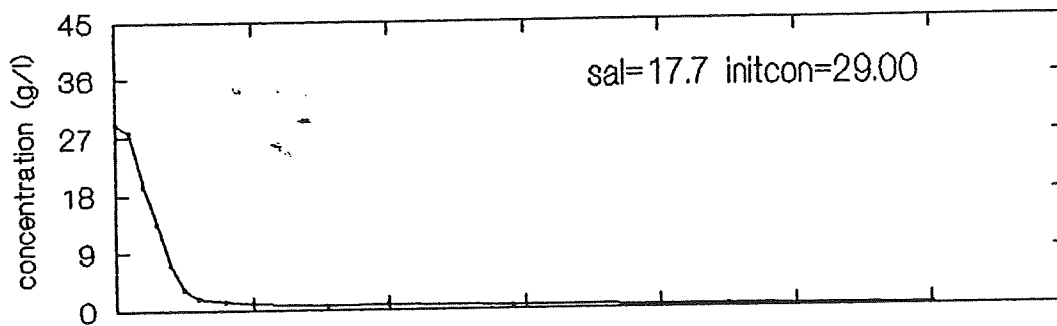
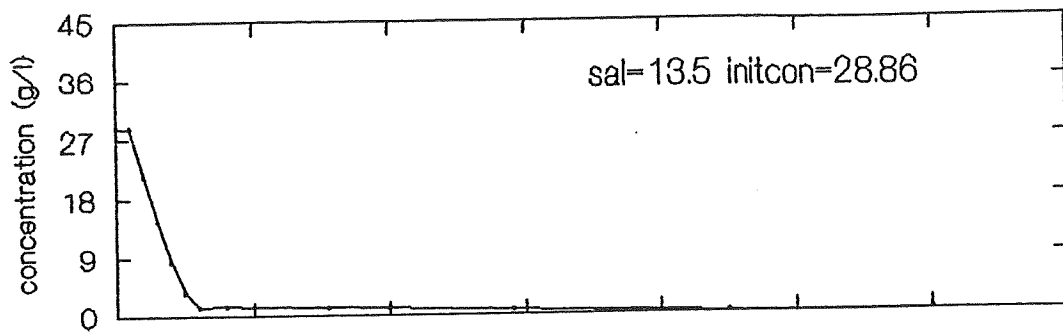




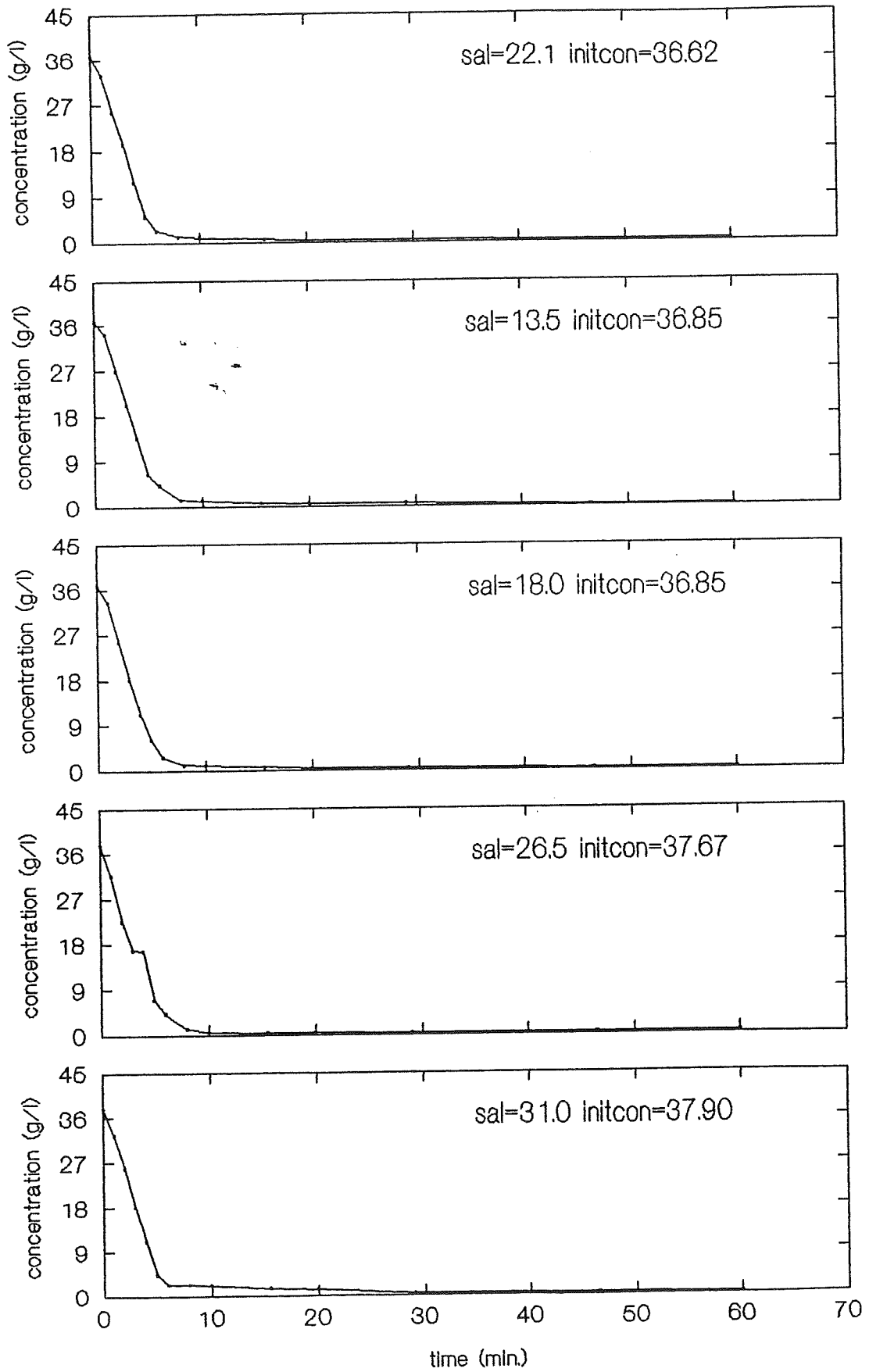
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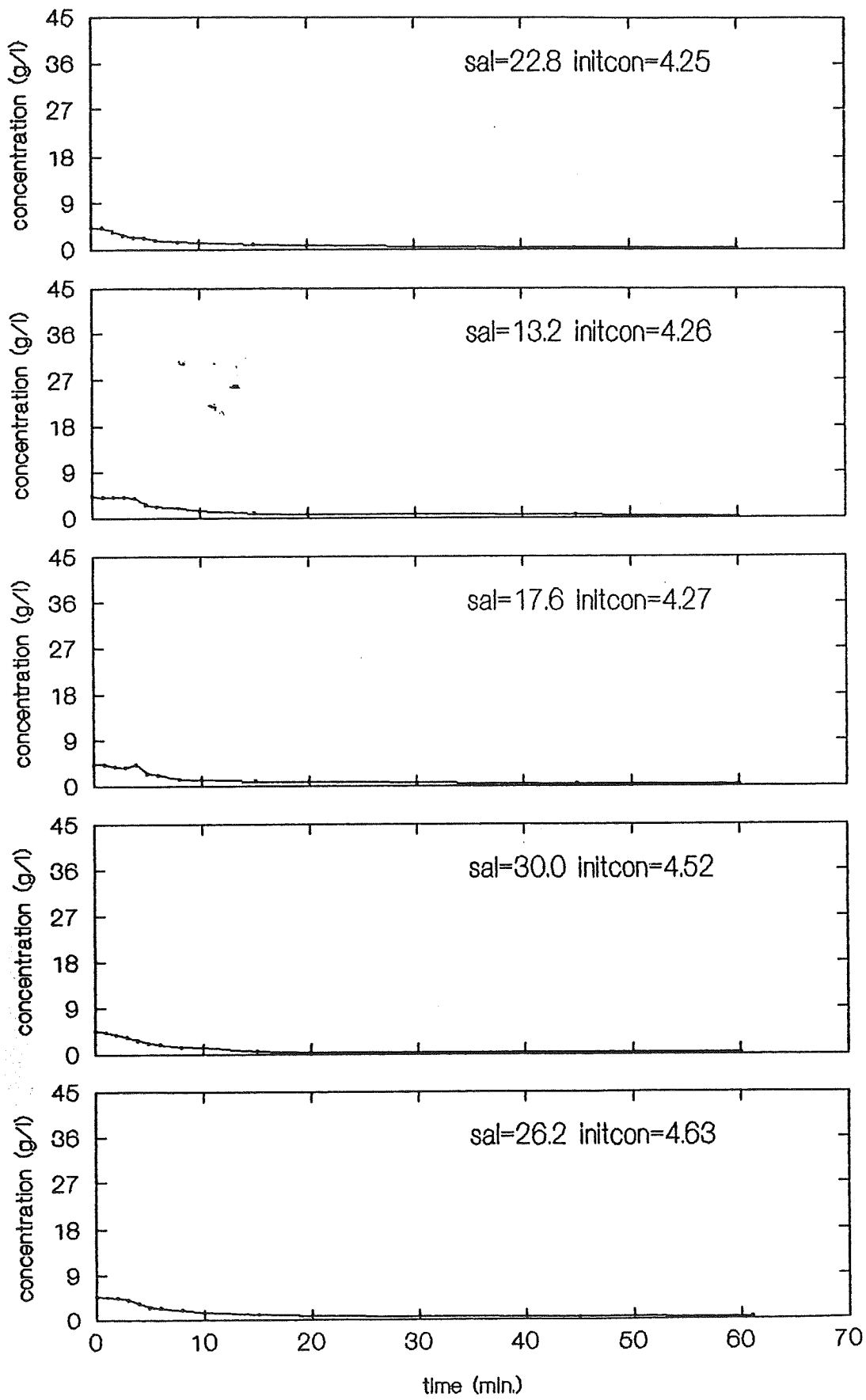


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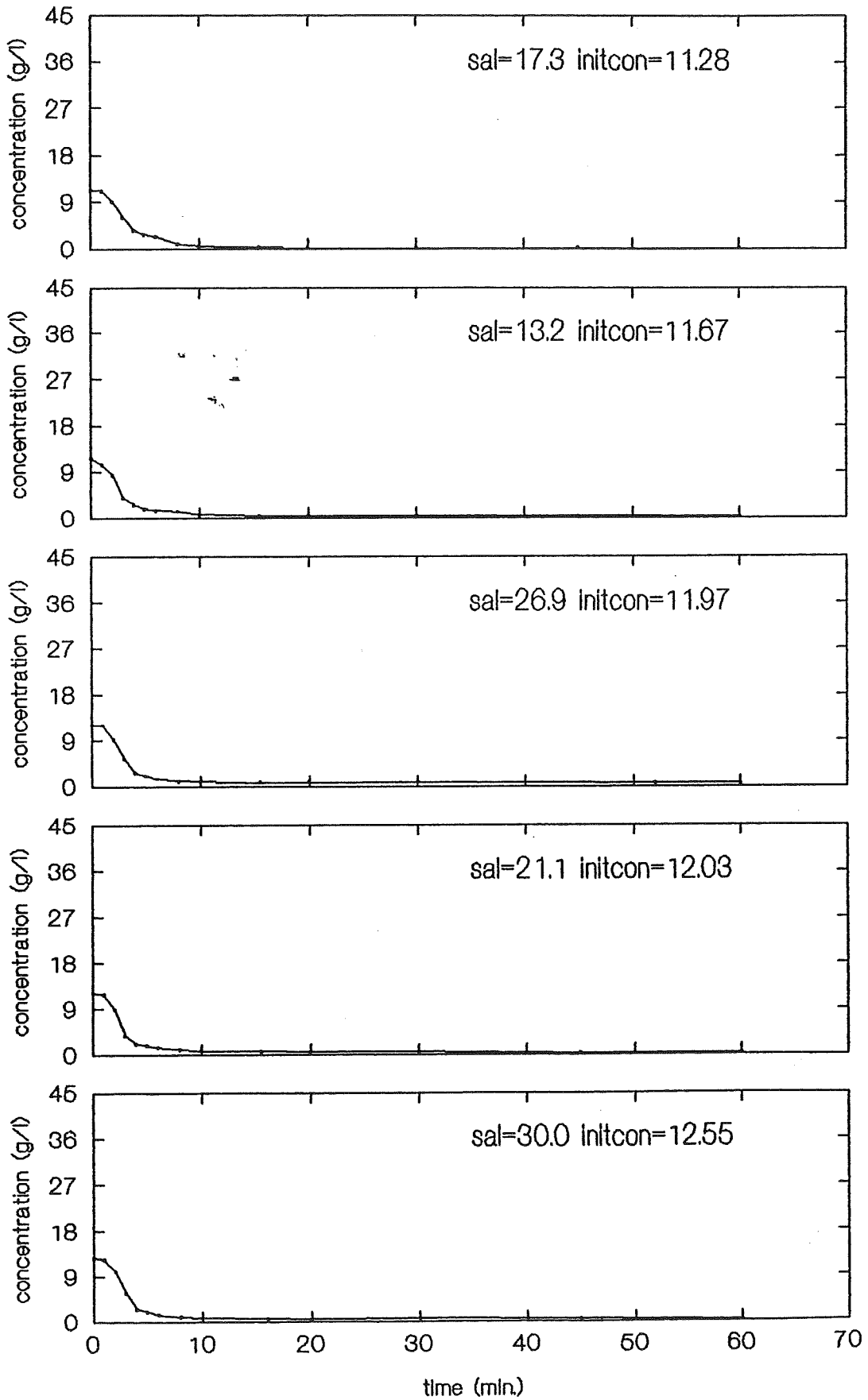


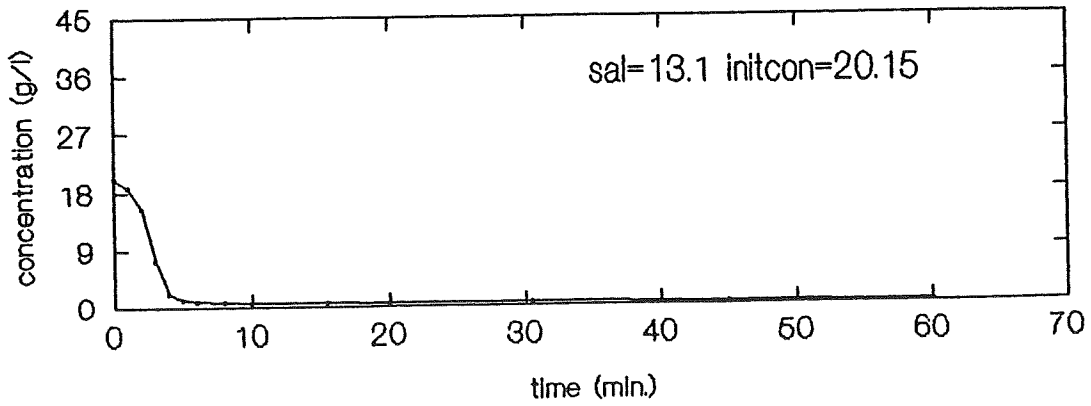
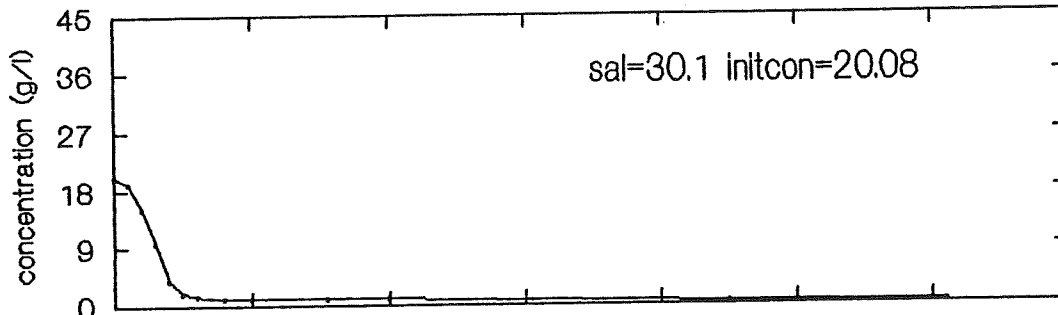
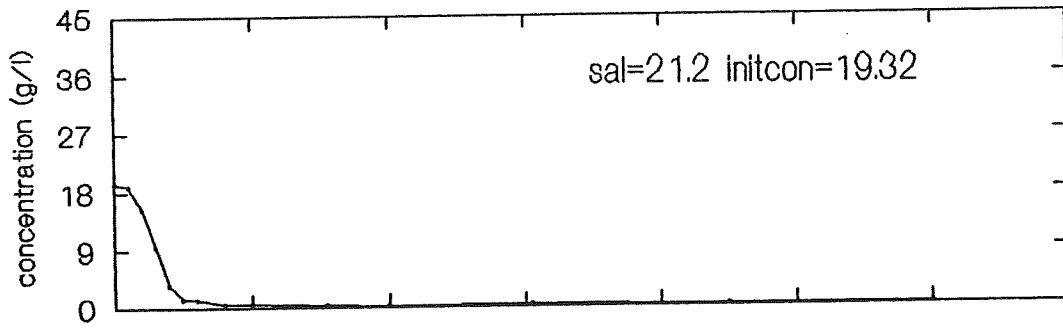
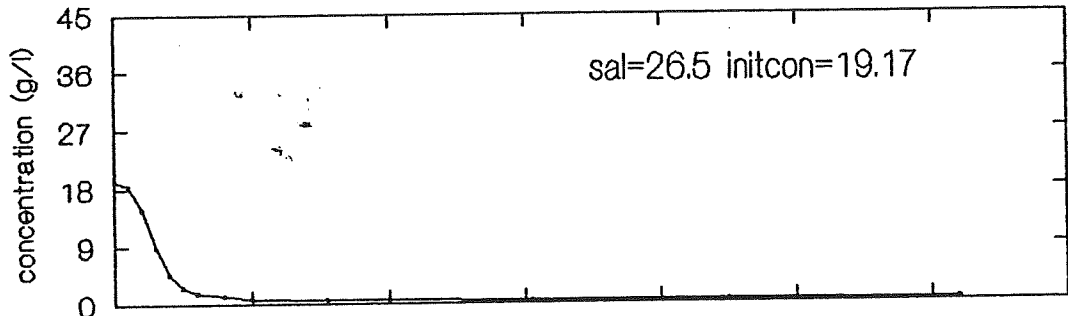
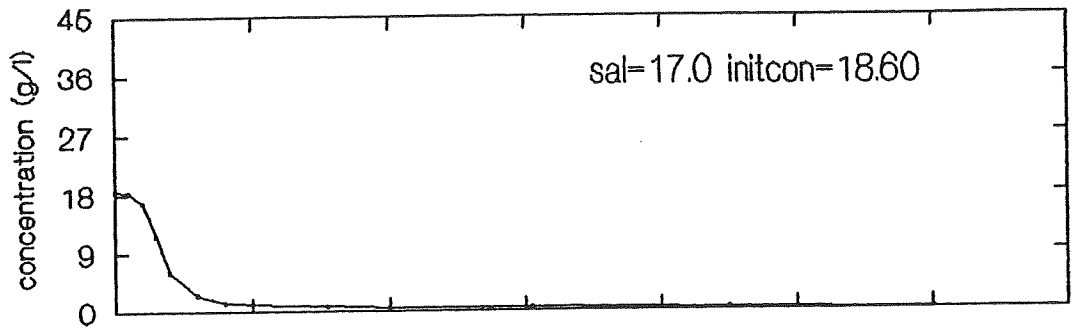
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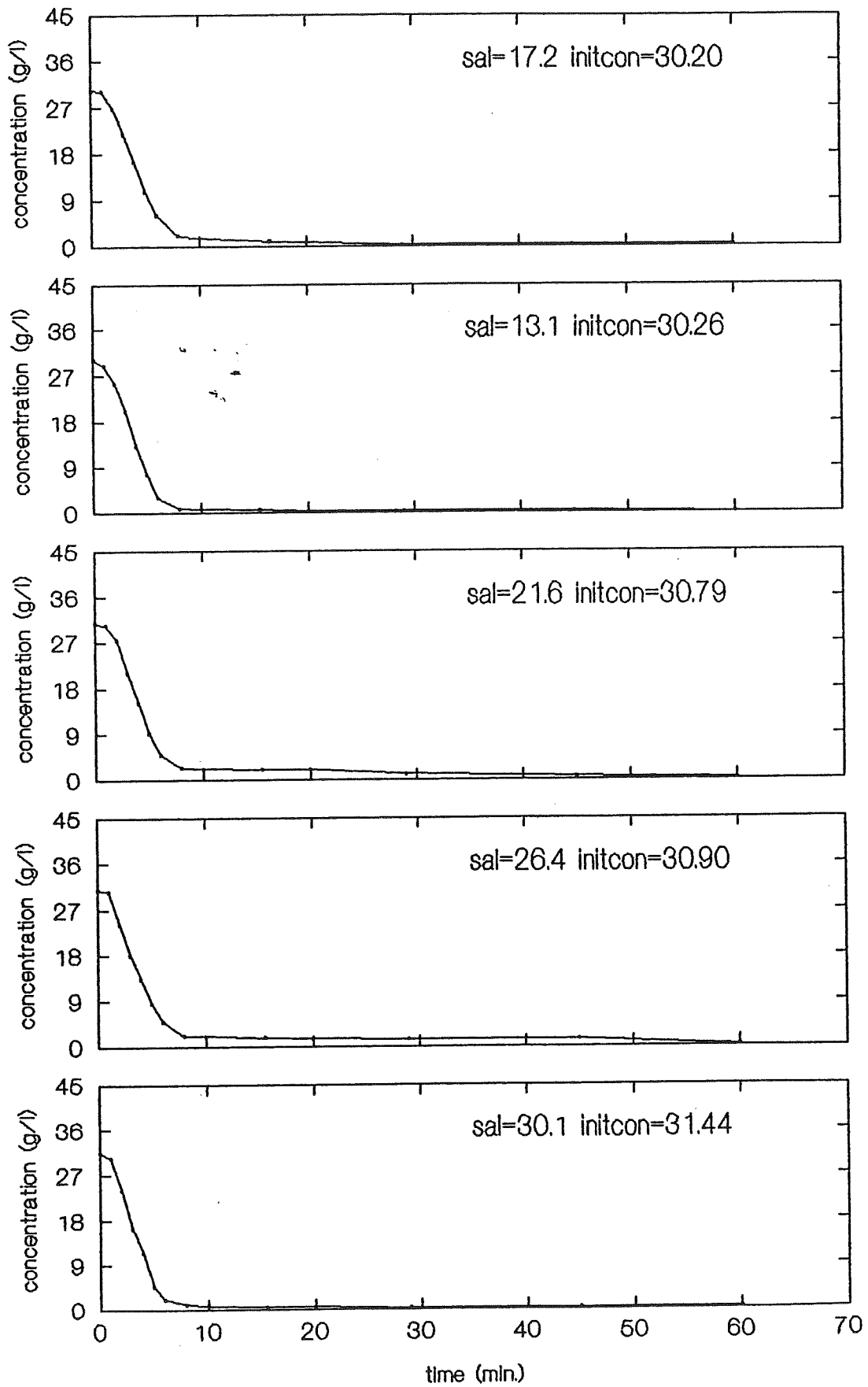




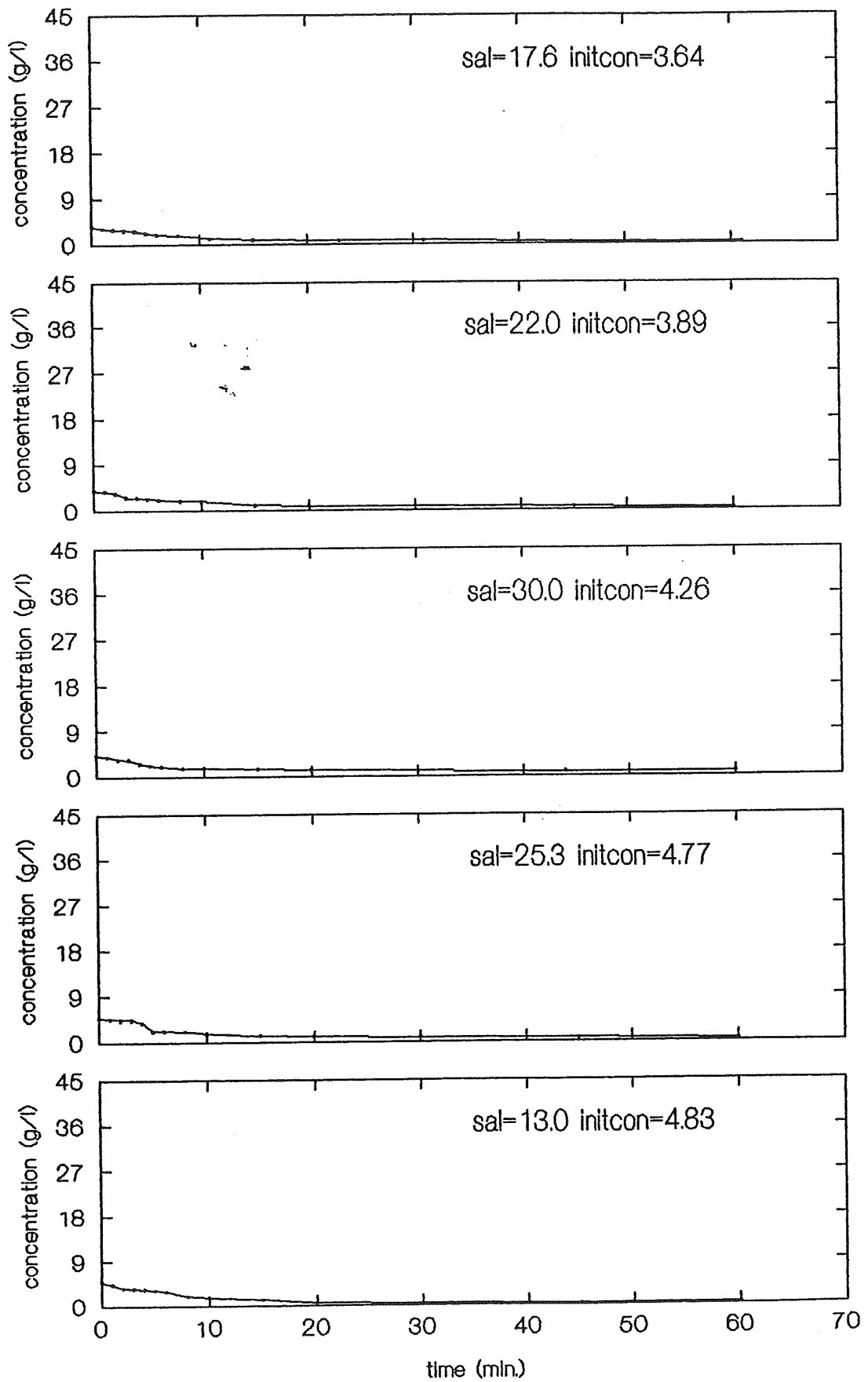
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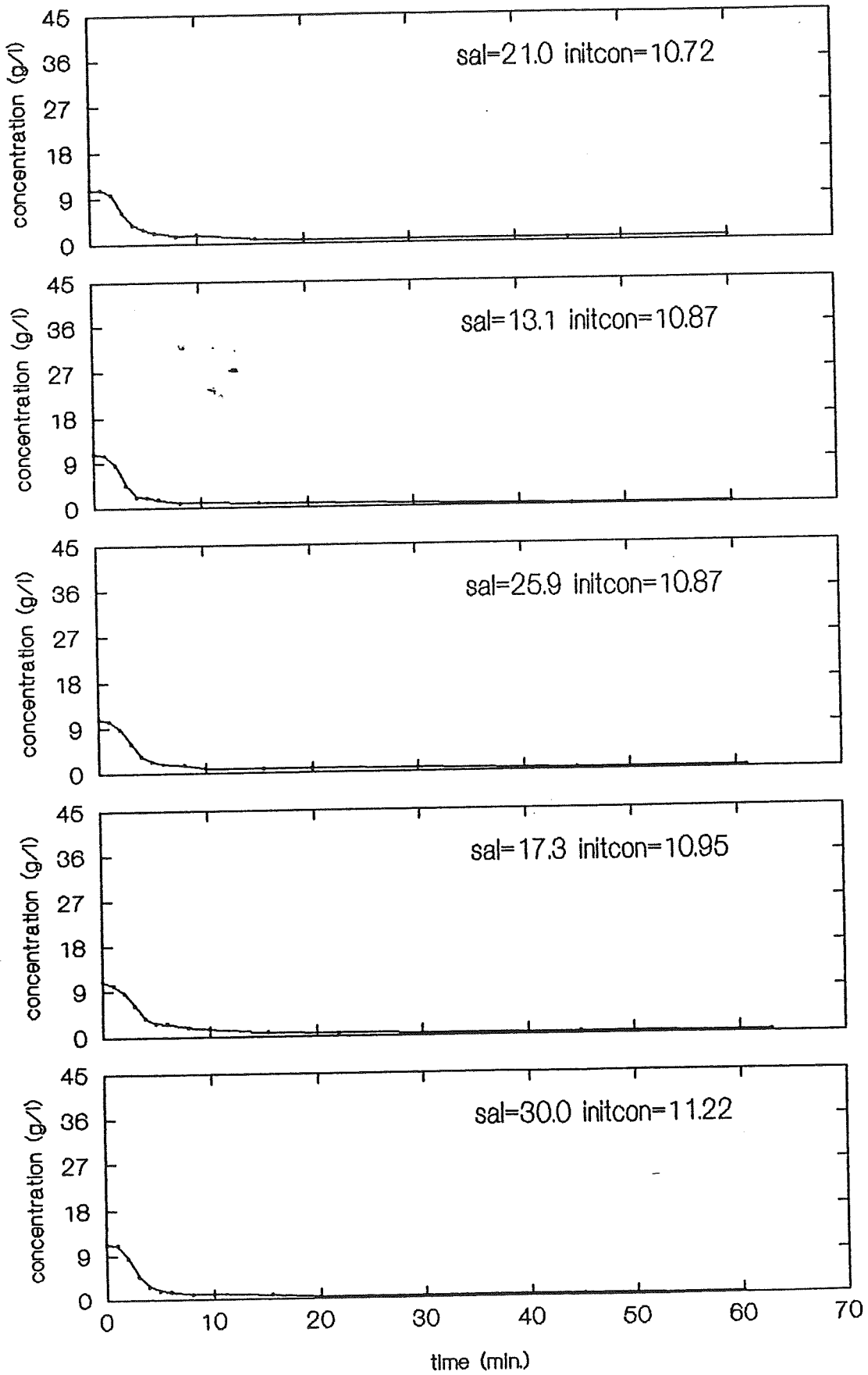


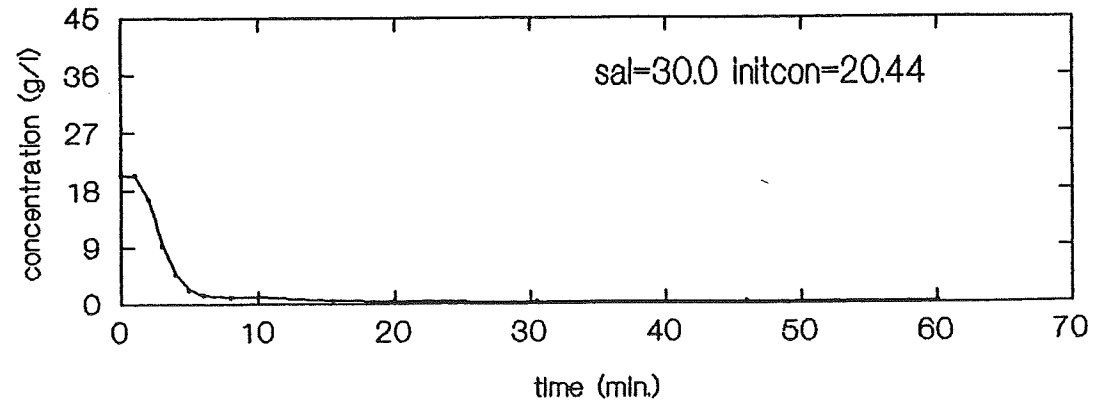
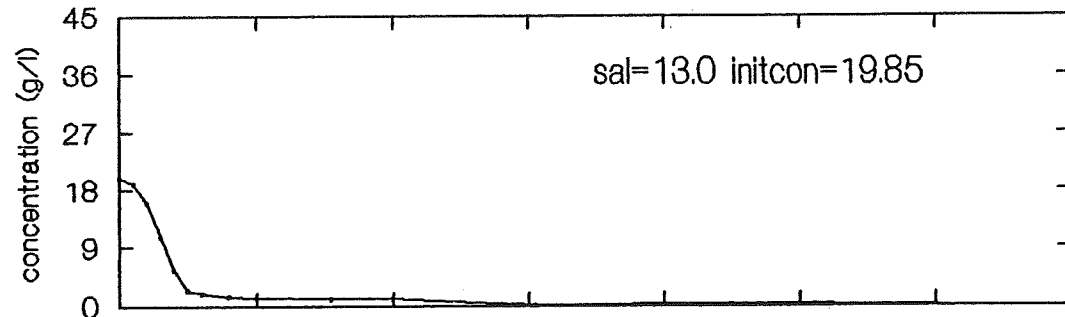
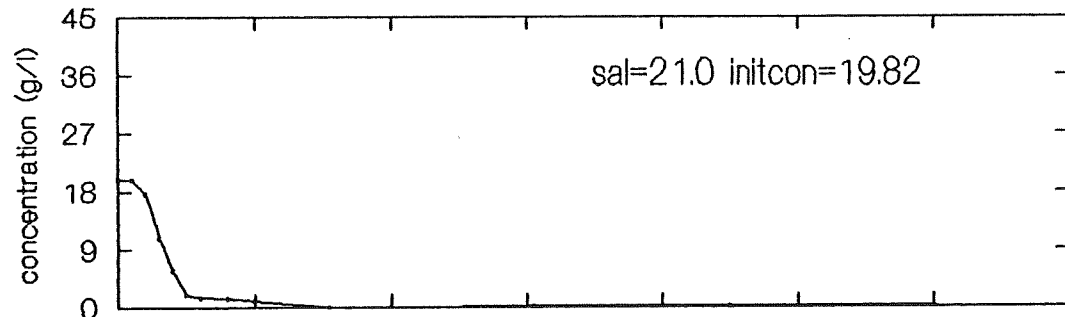
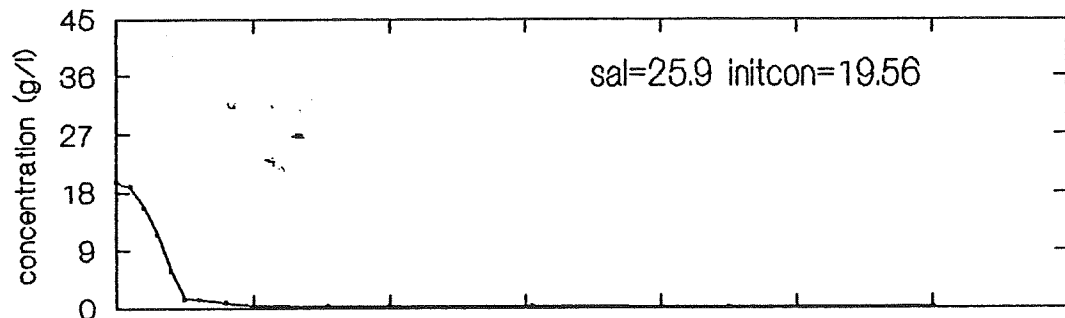
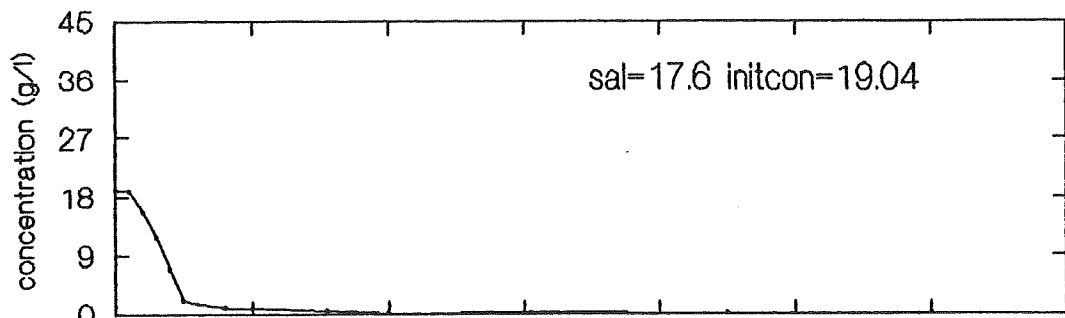


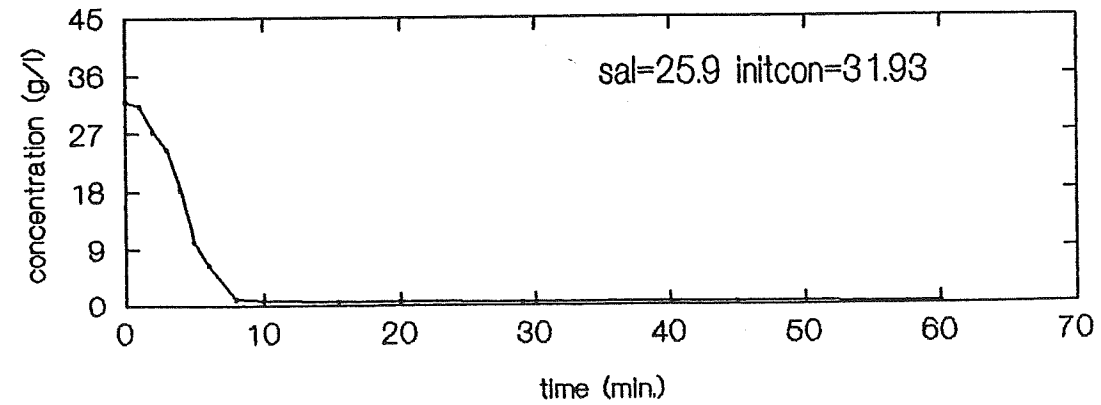
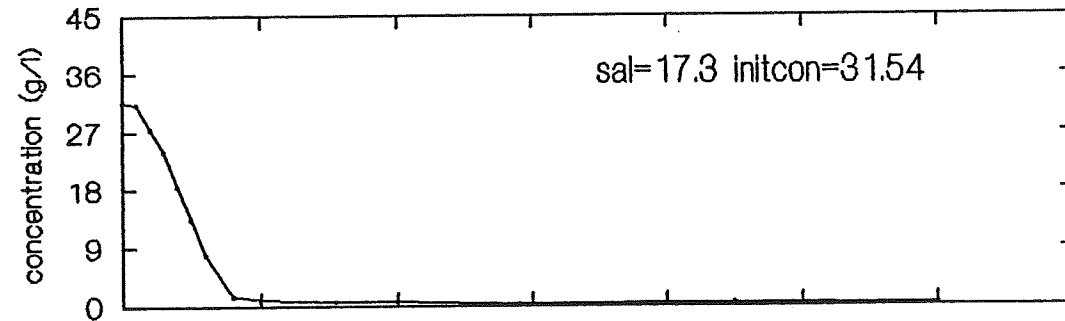
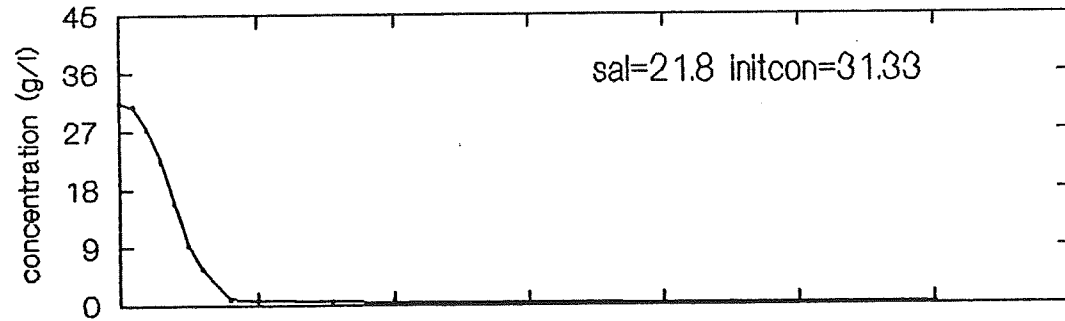
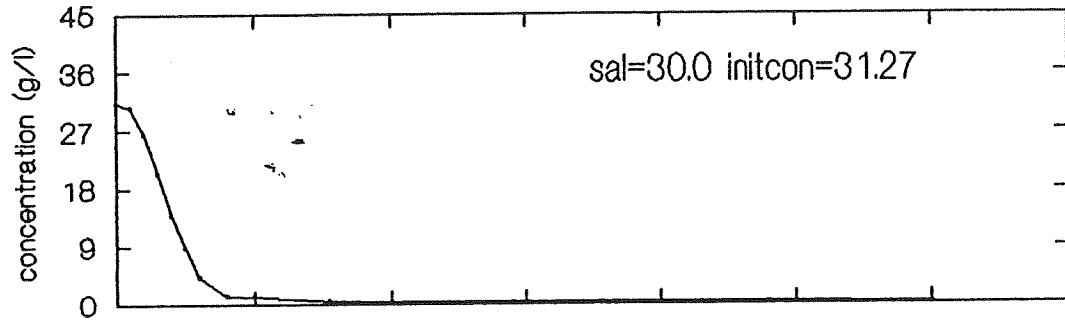
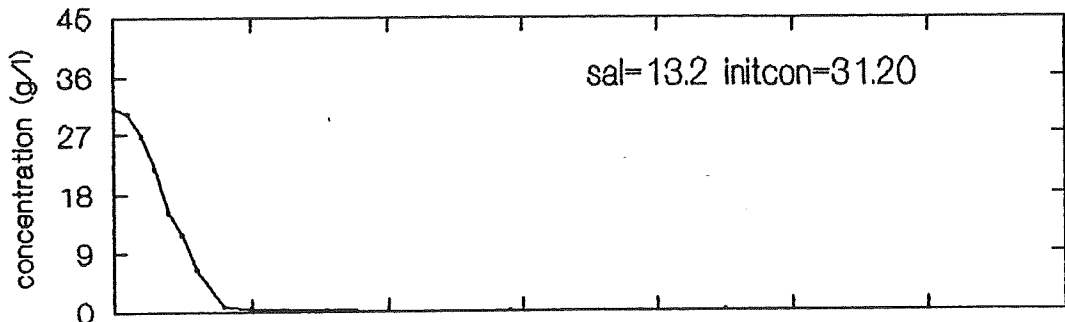


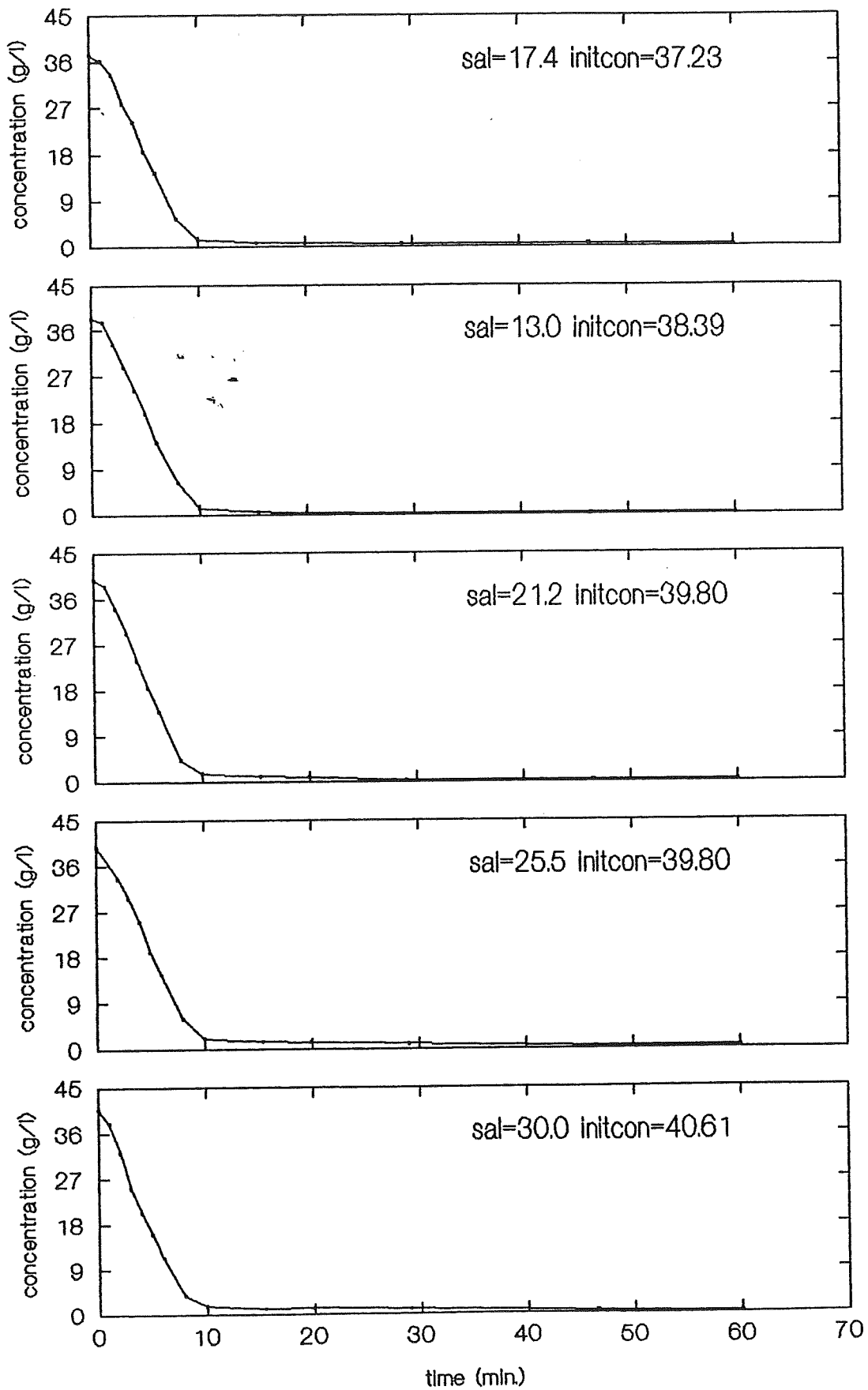
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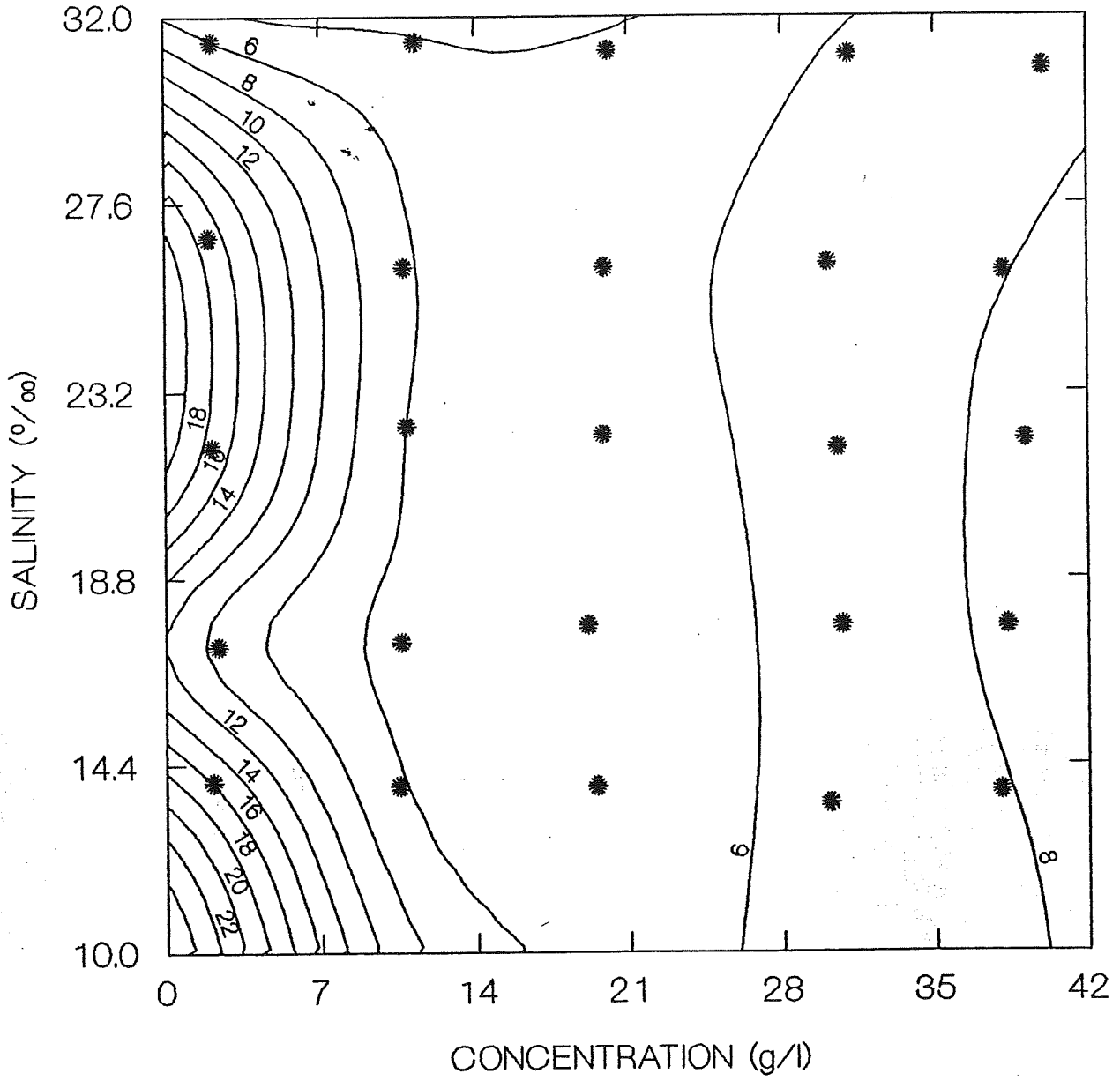




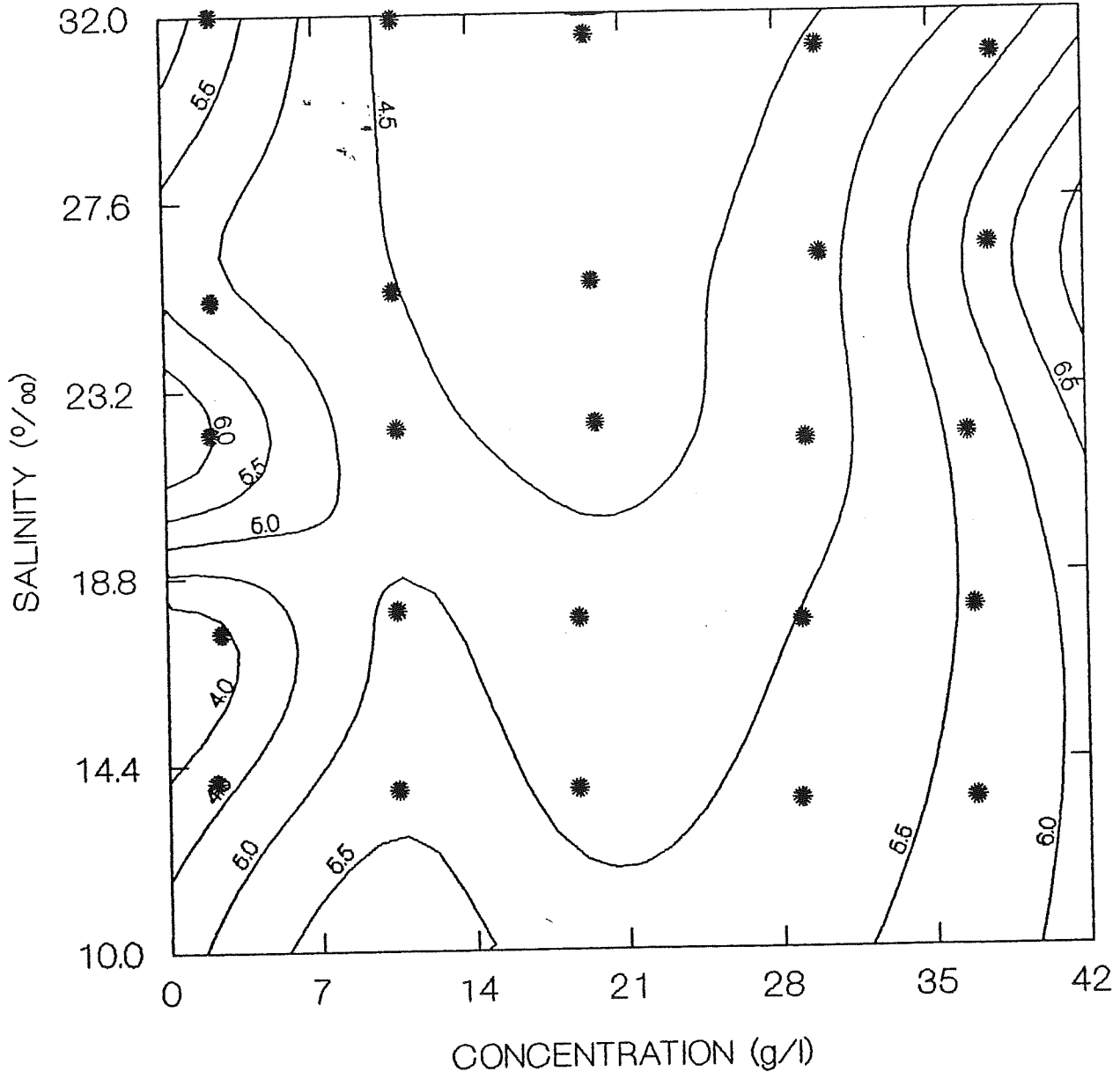


APPENDIX II

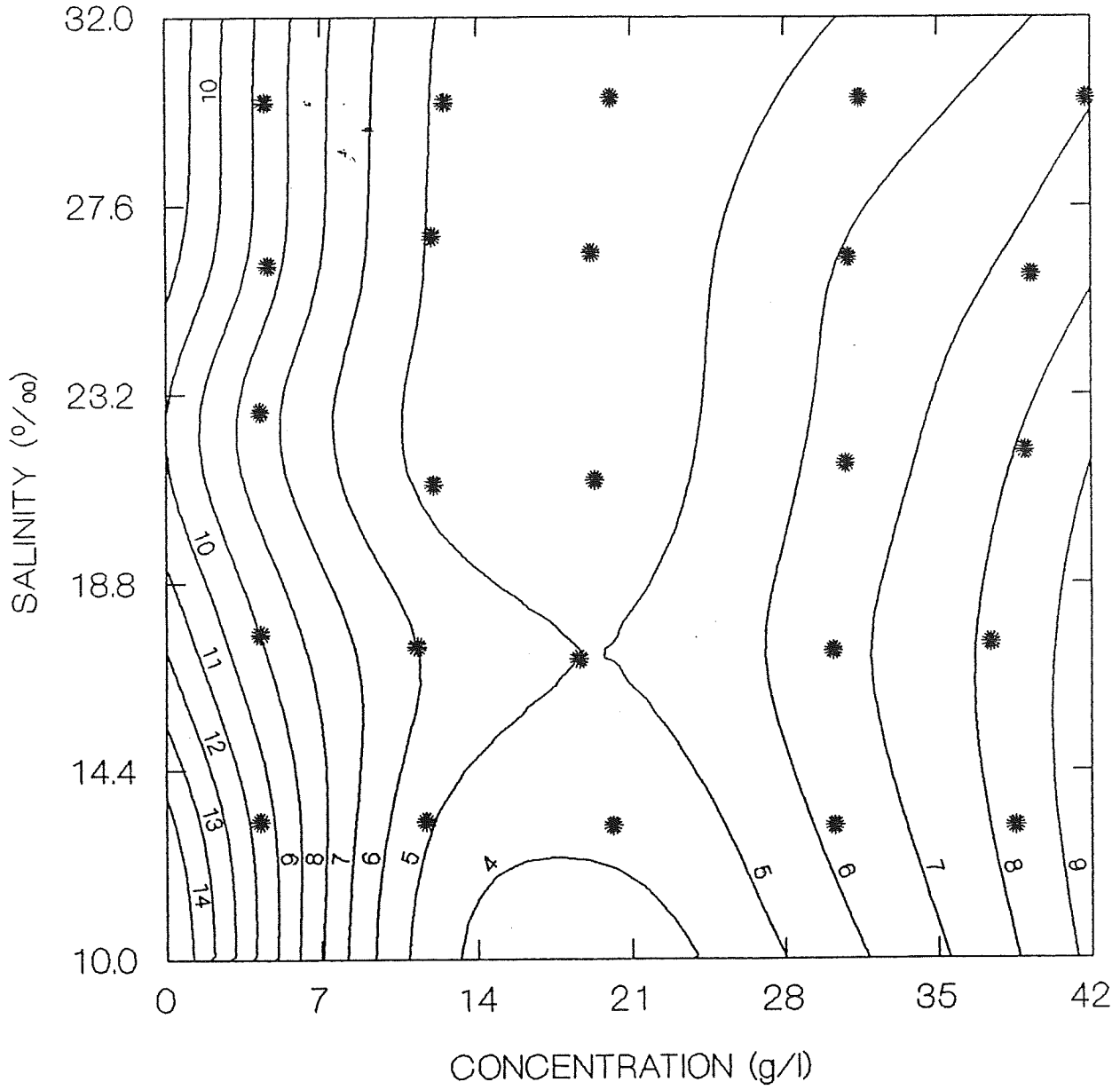
STA 1 - Inflection Point



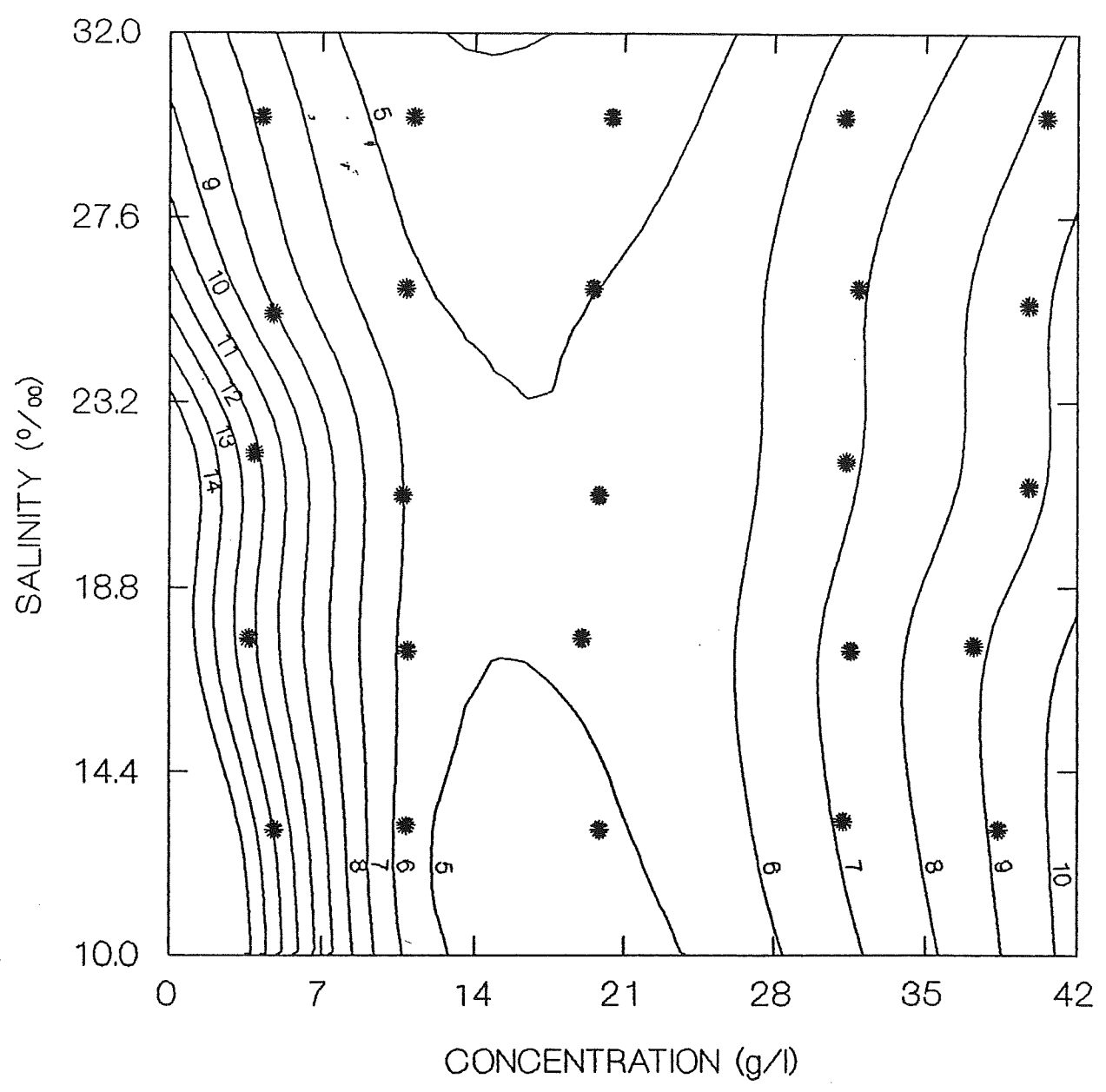
STA 2 - Inflection Point



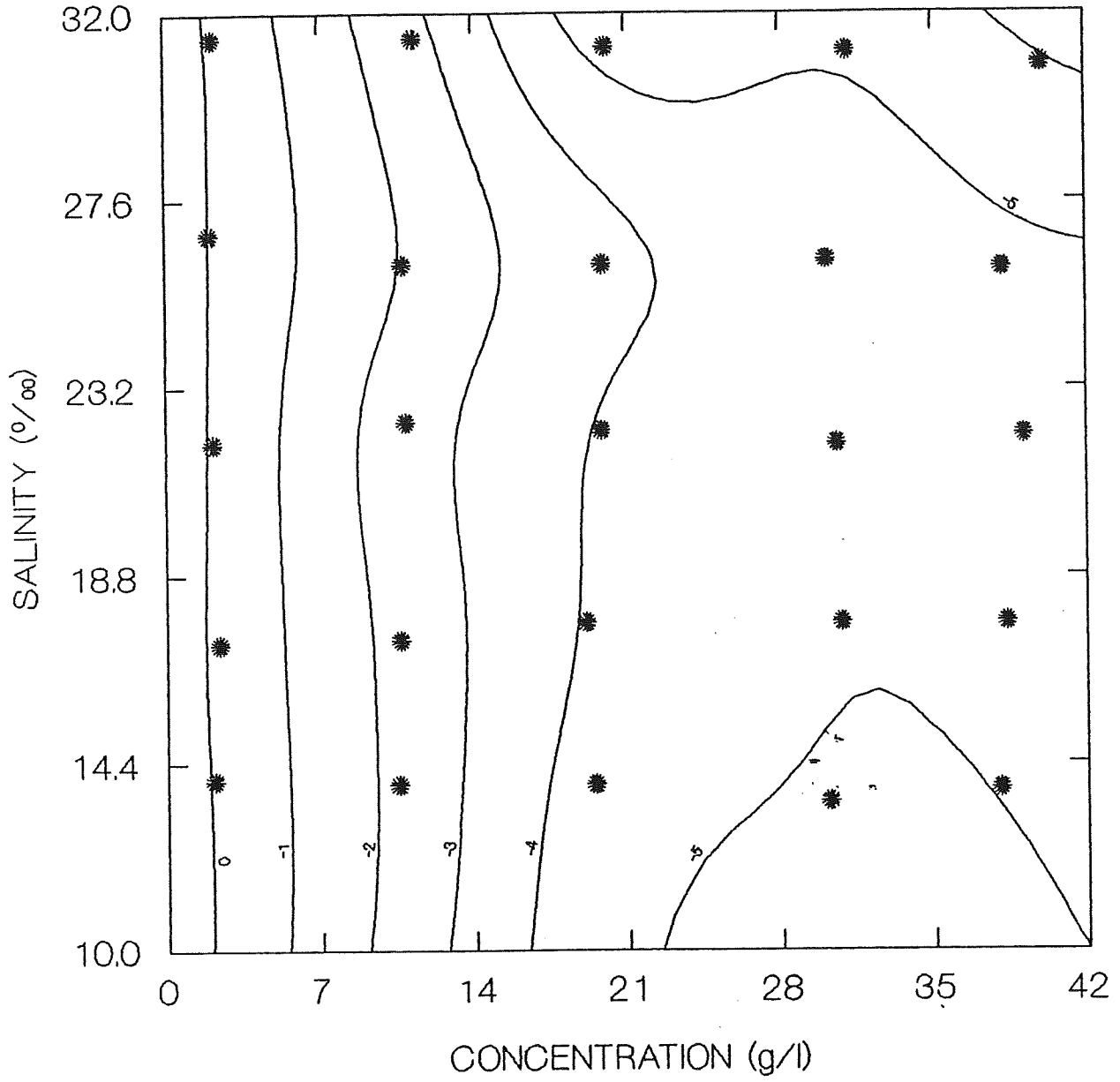
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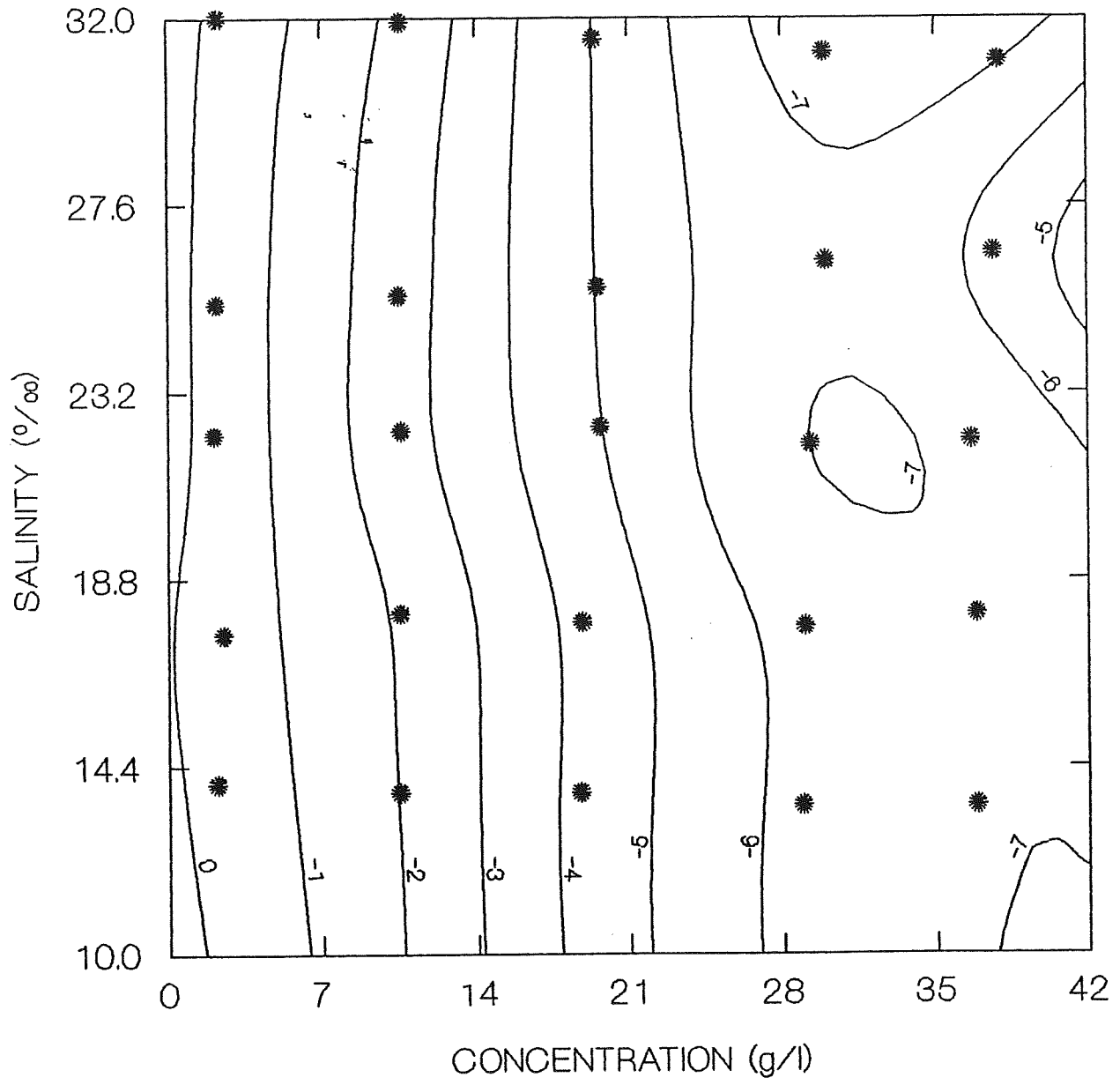
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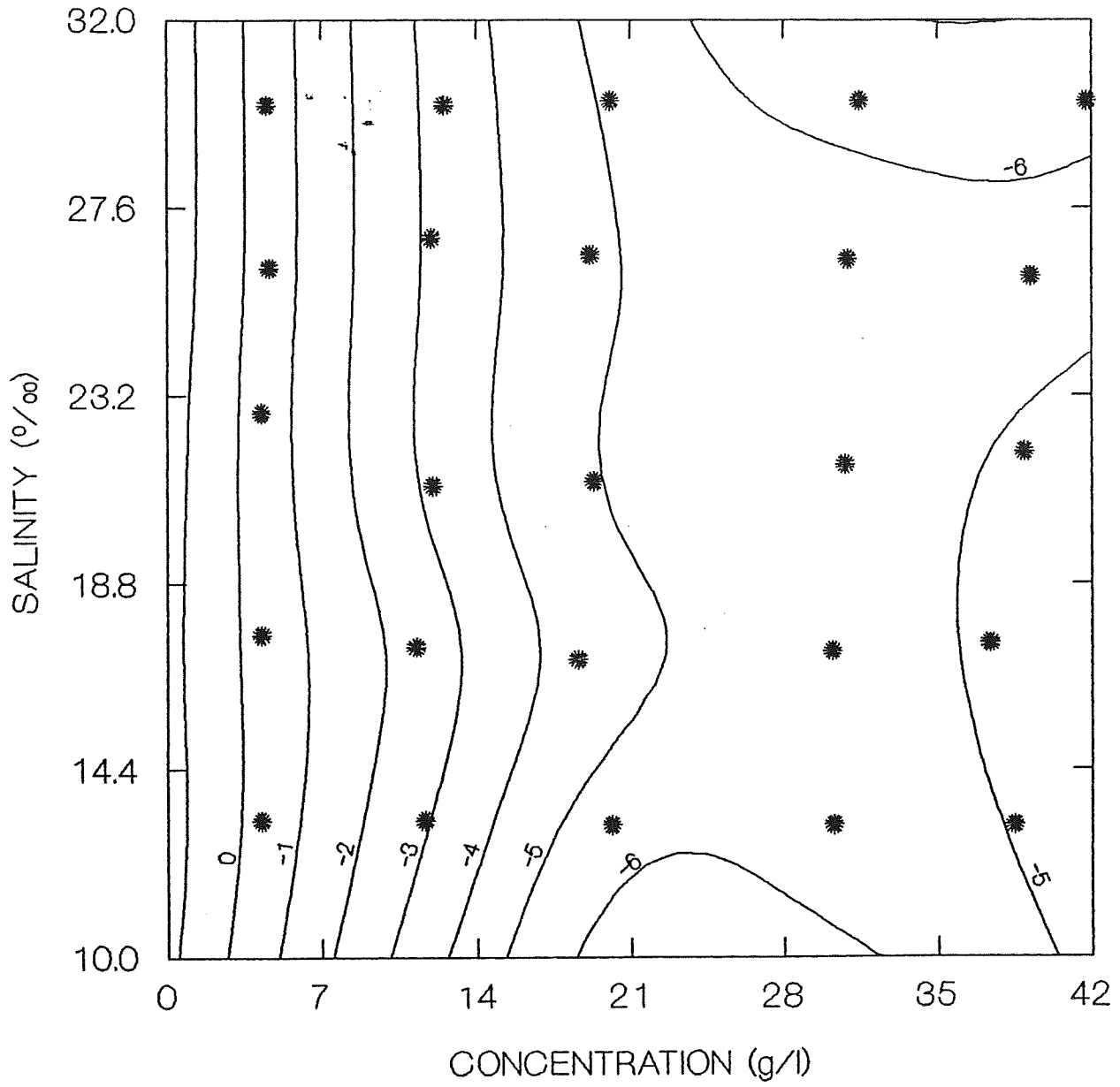
STA 1 - K1



STA 2 - K1



STA 3 - K1



STA 4 - K1

