

## **APPENDIX G**

### **Platinum Electrode Tests**

The platinum electrodes used in the sixth and the seventh experiments were tested with ZoBell's solution (APHA, 1998) and deionized water immediately following the experiments and after cleaning. The test results are summarized in Table G-1. The measurements were made against the calomel electrode as done during the experiments. The potential of the ZoBell's solution at 25 °C is 183 mV. All the platinum electrodes both before and after cleaning yielded values very close to the theoretical potential, indicating that the electrodes were clean. However, before cleaning, each electrode measured a different value for deionized water contained in the same Erlenmeyer flask. One would expect to read the same potential from each electrode since the potential of one solution must be a single value. After they were cleaned, the results were much closer. This indicates that some poisoning of the electrodes was taking place while in the microcosms. A comparison of the results is shown in Figure G-1.

As a result of the observed differences, the author suggests testing the platinum and reference electrodes in a known, high strength standard solution, such as ZoBell's solution, and in a weak solution, such as deionized water. The results from testing in a high strength solution may not reveal the true condition of the platinum electrodes (as was observed here), and testing in a weak solution alone may not give useful information about the condition of the reference electrode because the true potential of the weak solution is normally unknown.

Bailey and Beauchamp (1970) calibrated their electrodes in distilled water—a low poised solution—and a  $\text{FeCl}_2\text{-FeCl}_3$  solution—a high poised solution. After their experiment, they needed to clean the permanently placed platinum electrodes several times to get the same readings in both solutions obtained at the beginning of the experiment.

Table G-1. Test of Platinum Electrodes with ZoBell's Solution and Deionized Water

Label	Before Cleaning		After Cleaning	
	ZoBell*	Deionized	Zobell*	Deionized
R1W	179.54	-	181.64	-
R1S	179.62	181.9	181.74	227
R2W	179.94	-	181.74	-
R2S	179.62	138.4	181.64	225.5
BW	179.44	-	181.84	-
BS	179.52	222.3	181.64	232.2

- The values were converted to 25 °C

Description

R1W = Sixth experiment solution electrode in Reactor 1  
 R1S = Sixth experiment sediment electrode in Reactor 1  
 R2W = Sixth experiment solution electrode in Reactor 2  
 R2S = Sixth experiment sediment electrode in Reactor 2  
 BW = Seventh experiment solution electrode  
 BS = Seventh experiment sediment electrode

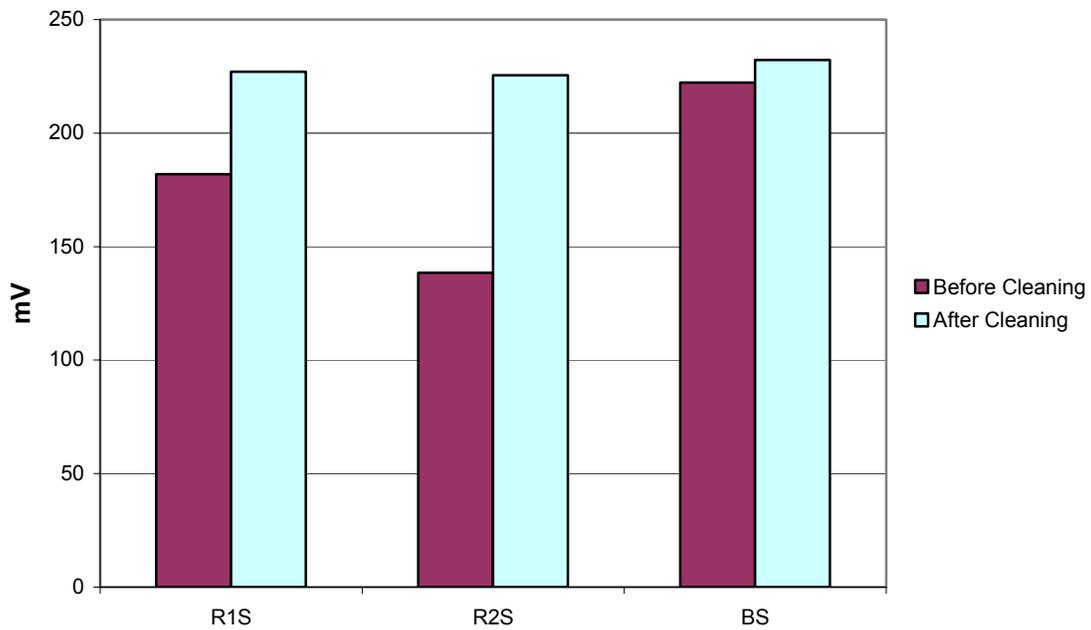


Figure G-1. Comparison between platinum electrodes before and after cleaning