

APPENDIX B

Laboratory Methods

Laboratory methods available for measurement of gas saturation are given below. It is essential that the proper sample collection and handling, discussed in Section 8, be followed to enable accurate results for analyses.

1. Gas Chromatography. The principal problem in the application of gas chromatograph in the measurement of gas saturation is the presence of extremely large quantities of water compared to the amount of gas present. Several methods are available to overcome this problem.

The historical method developed by Swinnerton et al. (1962) is still in use. A specially designed apparatus strips the gases out of the water before the gases enter the gas chromatograph. The advantages of this method are its simplicity and its ability to quantitatively strip the air from solution.

Commercially available devices based on the Bellar and Lichtenberg (1974) purge and trap method for volatile organic compounds in water could also be used. Nitrogen and oxygen will not be retained on the normal Tenax trap and a molecular sieve trap must be substituted.

A head space technique developed by Leggett (1979) uses the syringe sample described in Section 8. The precision of this analysis has been reported to be about \pm three percent and good agreement has been found between oxygen values obtained by this method and the Winkler titration.

2. Mass Spectroscopy. Mass spectroscopy has occasionally been applied to the measurement of gas saturation. A specific method developed by Dyck and Johansson (1977) required prior removal of oxygen and offers no improvement in precision over the gas chromatographic procedures.

3. Van Slyke Gasometric Technique. The Van Slyke gasometric technique has been used for dissolved gas measurements for many years and is still employed in a few laboratories. A detailed description of the method has been prepared by Beiningen (1973). A major disadvantage of this method, in addition to the excessive time and manpower required, is the large amount of mercury required.