

VITA

The author, Mr. Virach Rojanakul pregraduated from Saint Gabriel's College, Bangkok in 1964 and graduated with a Bachelor Degree in Civil Engineering, from College of Engineering, Kasetsart University in 1968. After graduation until writing this thesis, he is serving as a civil engineer at the Port Authority of Thailand.

REFERENCES

- American Public Health Association, American Water work Association and Water Pollution Control Federation (1965) "Standard Methods for the Examination of Water and Wastewater", 12th Ed., Am. Publ. Hlth. Ass. Inc., New York
- Brother Joseph Me. Cabe, F.S.C. and W.W. Eckenfelder Jr., (1955) "Biological Treatment of Sewage and Industrial Wastes". V. 1 (1955)
- Dawson, P.S.S. and S.H. Jenkins, (1949) "Sewage Works Journal" V. 21, no. 4 p. 643
- Eckenfelder, W.W. (1959) "Proc. 14th Industrial Waste Conference", Purdue University
- Eckenfelder, W.W. and D.L. Ford (1968) "New Concepts in Oxygen Transfer and Aeration", Water Resources Symposium No. 1, Gloyna and Eckenfelder. p.p. 216, 220
- Eckenfelder, (1966) "Industrial Water Pollution Control.", Mc. Graw - Hill Book Co. Inc. N.Y.
- Eckenfelder, W.W. and D.J. O' Connor (1954) "Proc. 9th Industrial Waste Conference" , Purdue University
- Eckenfelder, W.W. and D.J. O' Connor (1961) "Biological Waste Treatment", New York.
- Escritt, L.B. (1967) "Sewerage and Sewage Disposal", London, p. 411

- Escritt, L.B., (1972) "Sewerage and Sewage Disposal", London,
p. 426
- Gaden, E., (1956) "Biological Treatment of Sewage and Industrial Wastes", Vol. I (Ed. by Mc. Cabe, B.J. and Eckenfelder, W.W.), Reinhold Publ. Corp., New York, N.Y.
- Hardenbergh, W.A. and E.R. Rodie, (1961) "Water Supply and Waste disposal", International Textbook Company Scranton, Pennsylvania. p. 334
- Haslam, R.T., et. al (1924) "Industrial Engineering Chemistry", V. 16, p. 1225
- Hawkes, H.A., (1960) "Waste Treatment" (Ed. by Isaac, P.), Pergamon Press, Oxford.
- Helmens, E.N; et. al. (1951) "Sewage and Industrial Wastes", V.23, no. 7 p. 834
- Heukelekian, H., et. al. (1951) "Sewage and Industrial Wastes" J., V. 23, no. 7, p. 945
- Hoover, S.R. and N. Porges (1952) "Sewage and Industrial Wastes", V. 24, no. 3, p. 306
- Hoover, S.R. et. al. (1952) "Sewage and Industrial Wastes", J.,V. 24, no. 9,p. 1144
- Ingol, R., (1955) "Sewage and Industrial Wastes", V. 27, no. 12, p. 26
- Jasewicz, L. and N. Porges (1956) "Sewage and Industrial Wastes", V. 28, no. 9, p. 1130

- Karl Imhoff, et. al. (1971), "Disposal of Sewage and other Water - Borne Wastes", London. pp. 64, 127, 219, 226
- Kehr, R.W. (1938) "Sewage Works Jour.", V. 10, no. 2, p. 228
- King, H.R. (1955) "Sewage and Industrial Wastes", V. 27, no. 10, p. 1123
- Mc Kinney, R.E. and R.S. Englebrect. (1957) "Sewage and Industrial Wastes", V. 29, pp. 1350 - 62
- Pasveer, A., (1954) "Sewage and Instrial Wastes", V. 26, no. 1, p. 28.
- Sawyer, C.N. (1955) "Sewage and Industrial Wastes", V. 27, no. 8, p. 929
- Sawyer, C.N. and R.L. Mc. Carty (1964) "Chemistry for Sanitary Engineering", Mc. Graw - Hill Book Company, Inc., New York.
- Sawyer, C.N. and W.O. Lynch (1954) "Sewage and Industrial Wastes", V. 26, no. 10, p. 1193
- Streeter, H.W., et. al. (1936) "Sewage Works Journal", V. 8, no. 2, p. 282
- Symons, J.M. and R.E. Mc. Kinney (1958) "Sewage and Industrial Wastes", V. 30, no. 7, p. 874
- Tamiya, H. (1935) "Material and Energy Balances of Biological Synthesis", Actualities Scientifiques et Industrielles, 214, Exposes de Biologie.
- Warberg see Hober, Hitchcock et. al. (1950) "Physical Chemistry of Cells and Tissues Blakiston Pub. Co., New York

Weston, R.F. (1938), "Sewage Works Jour.", V. 10, no. 2, p. 228

Wilke, C.R. (1949) "Chemical Engineering Process", V. 45,

p. 218

APPENDIX

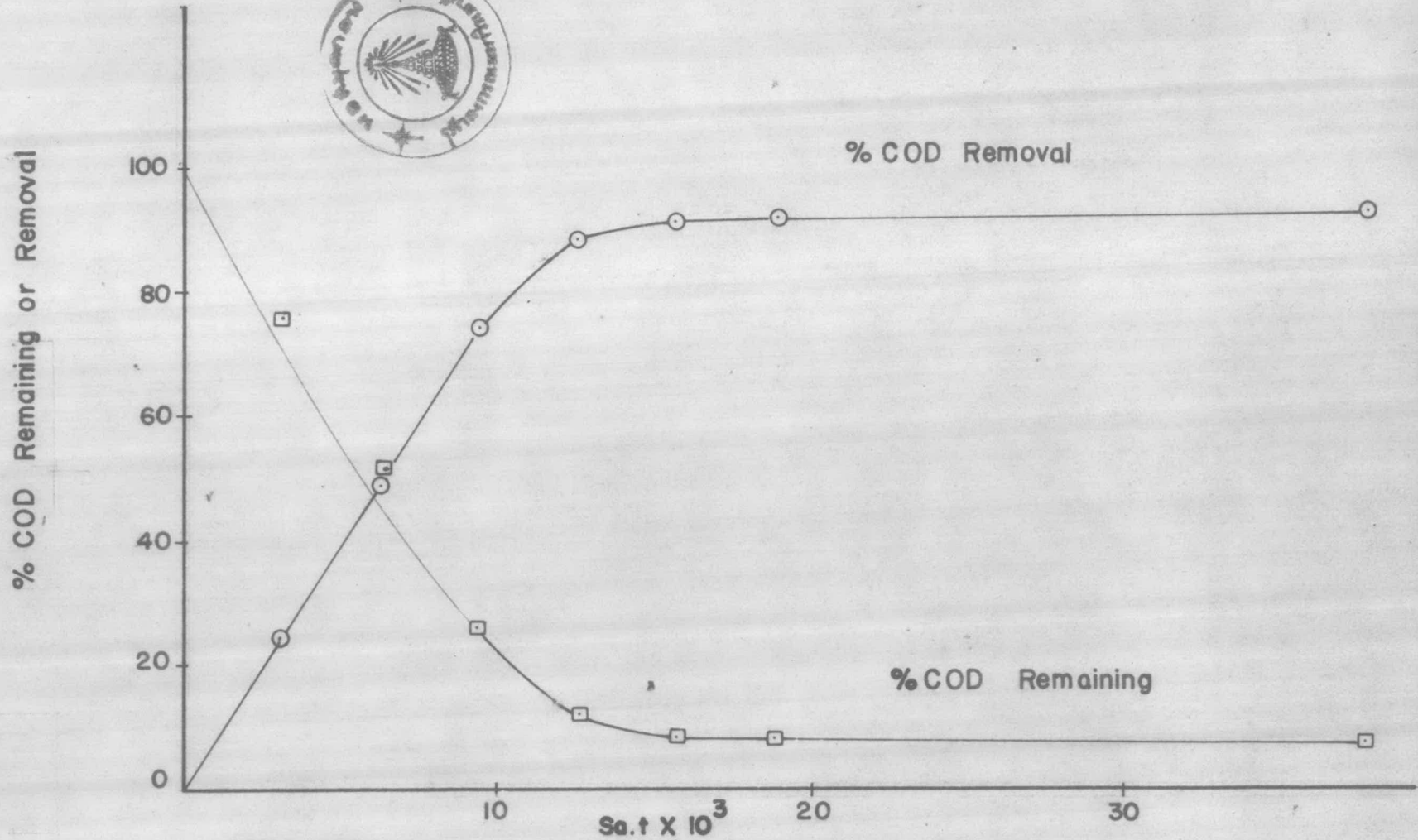


Fig. 1 COD Removal from Batch Oxidation

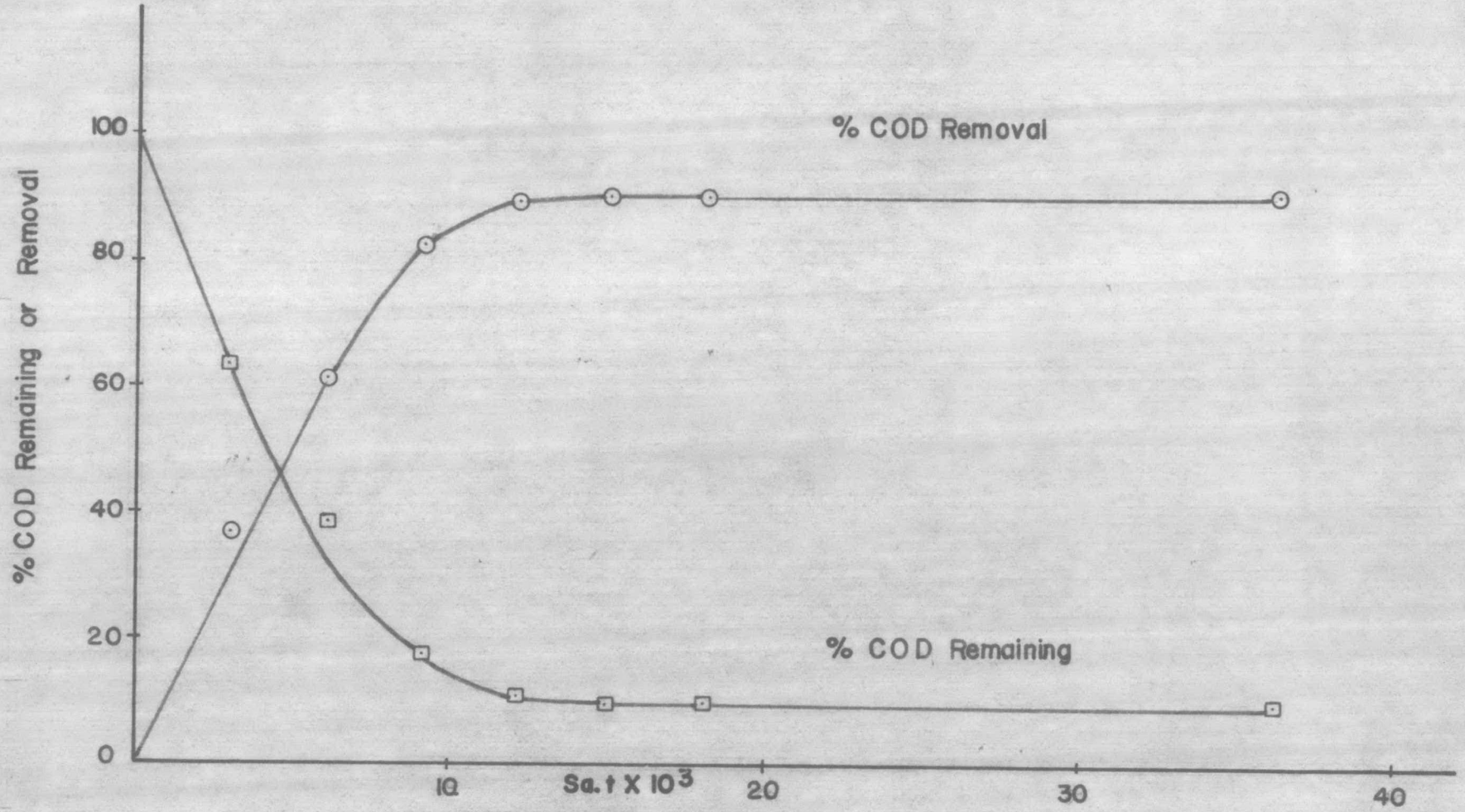


Fig. 2 COD Removal from Batch Oxidation

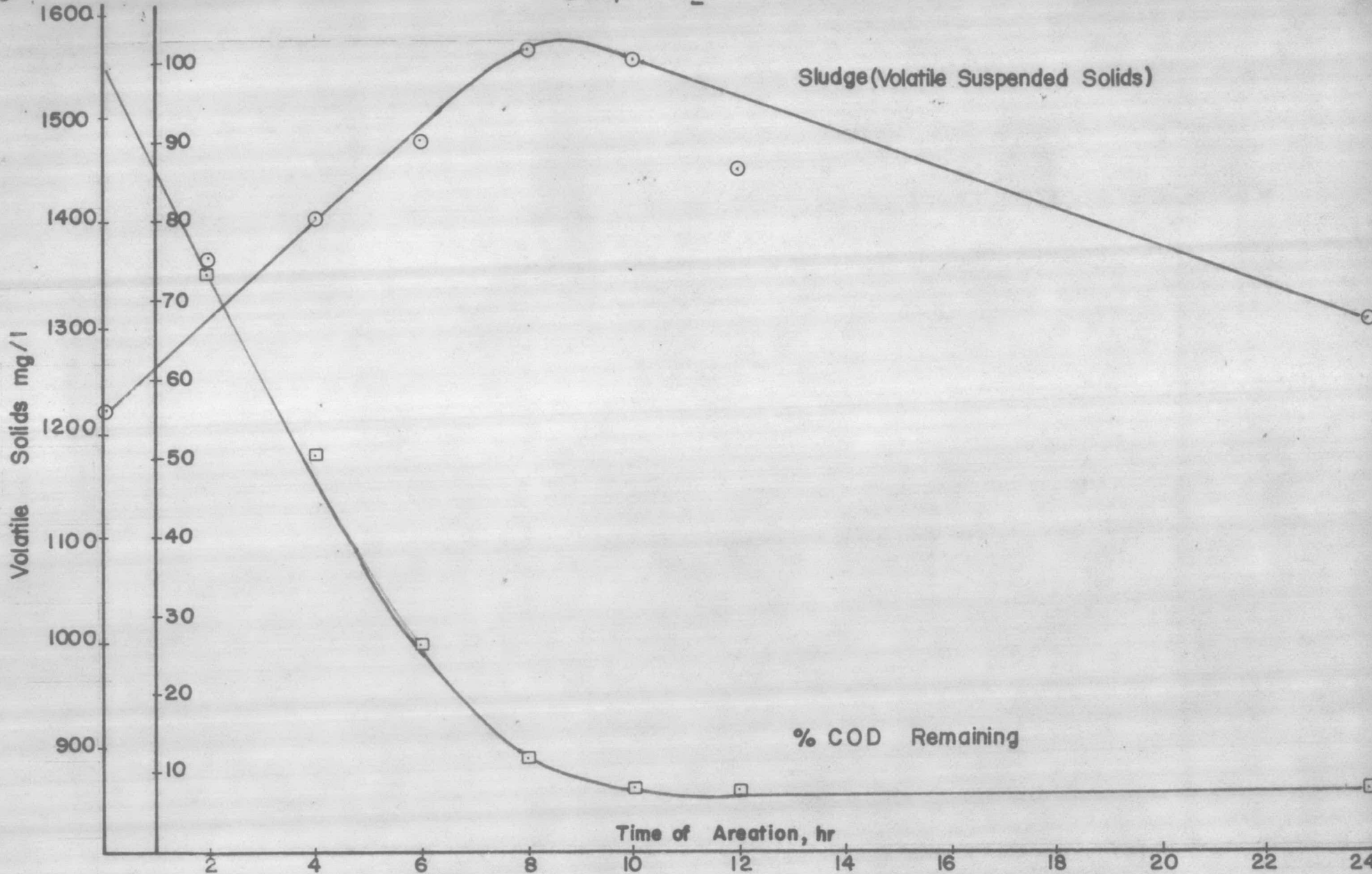


Fig. 3 COD Remaining & Sludge Growth Relationship

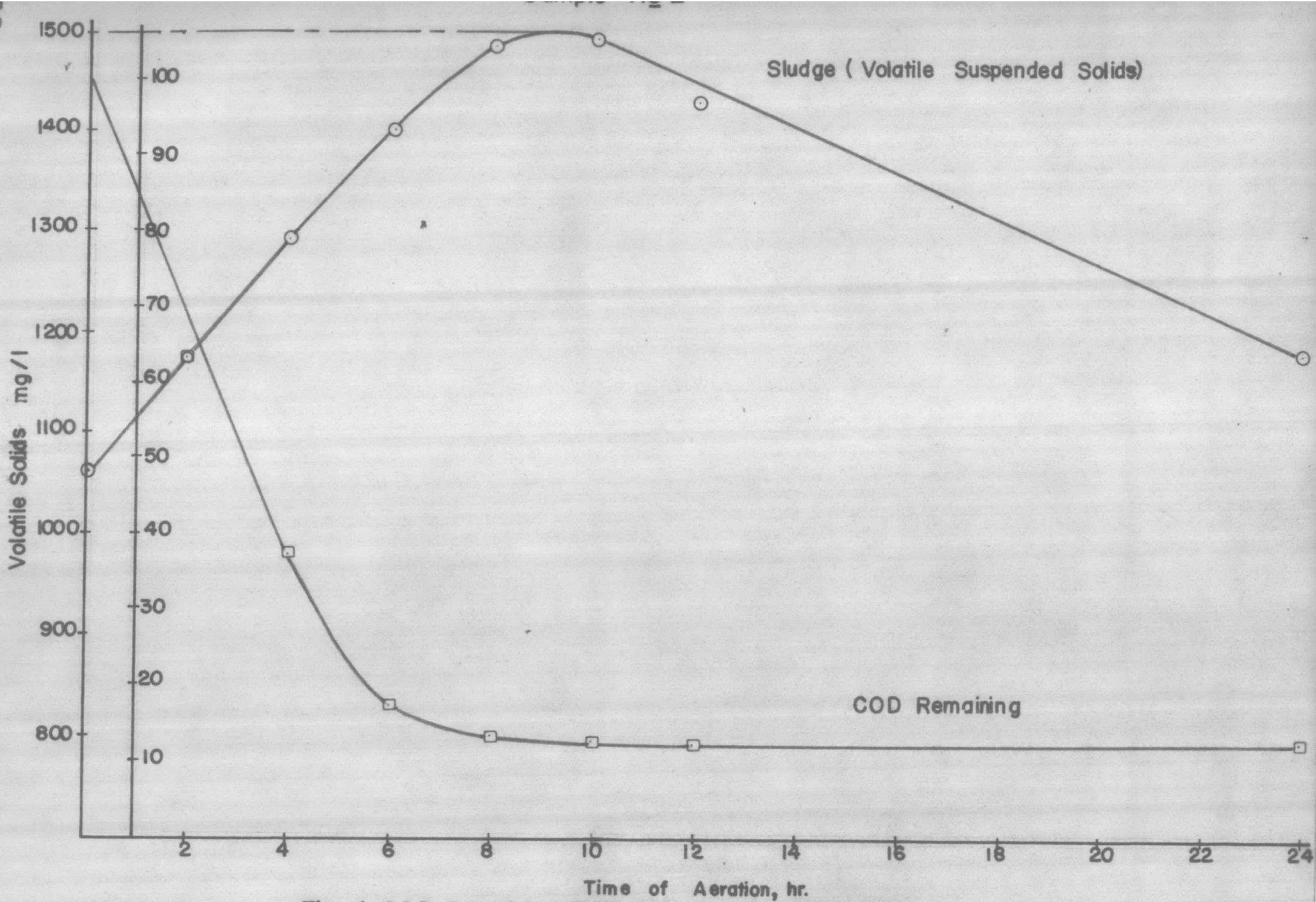


Fig. 4 COD Remaining & Sludge Growth Relationship

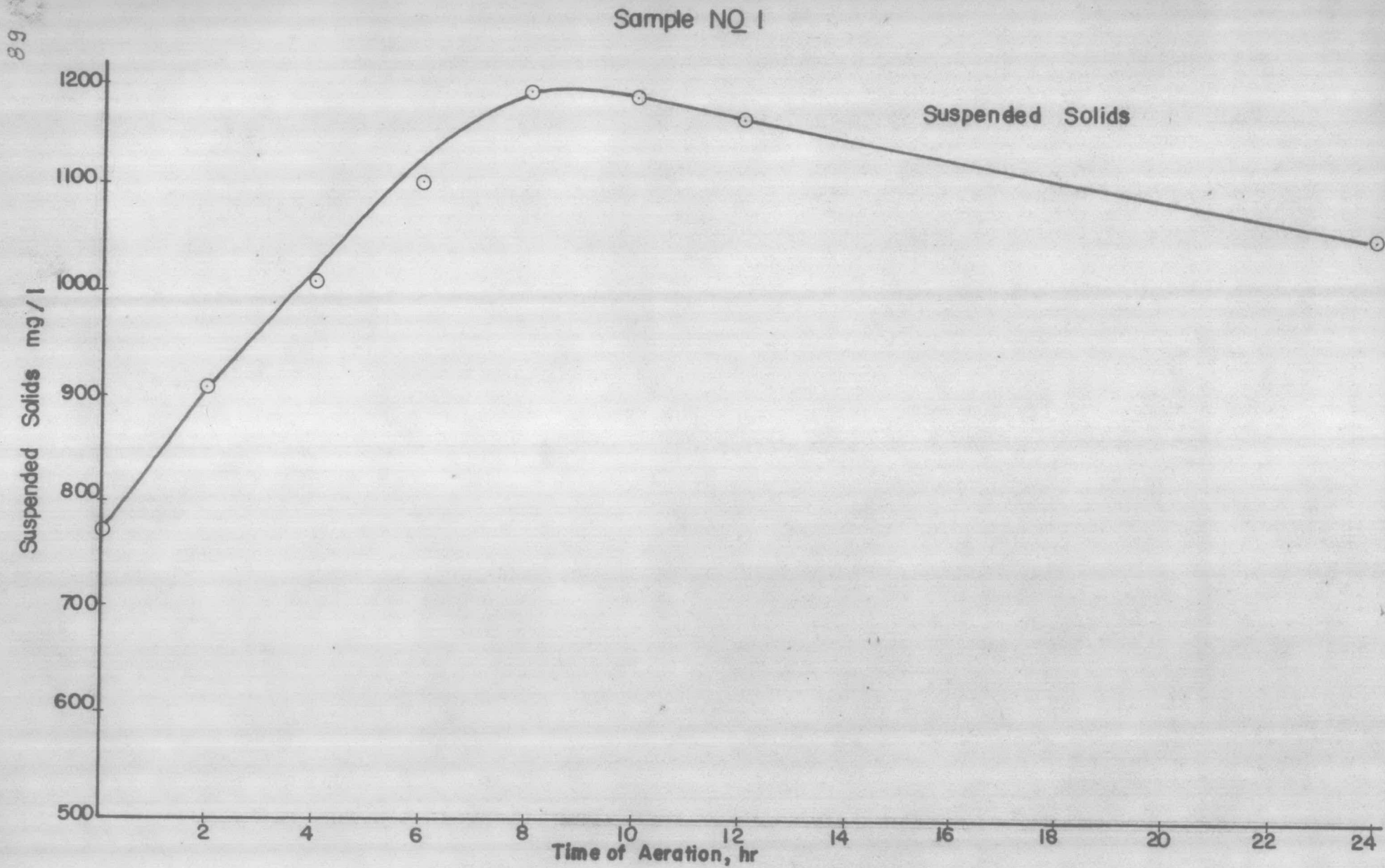


Fig. 5 Solids Production Characteristics

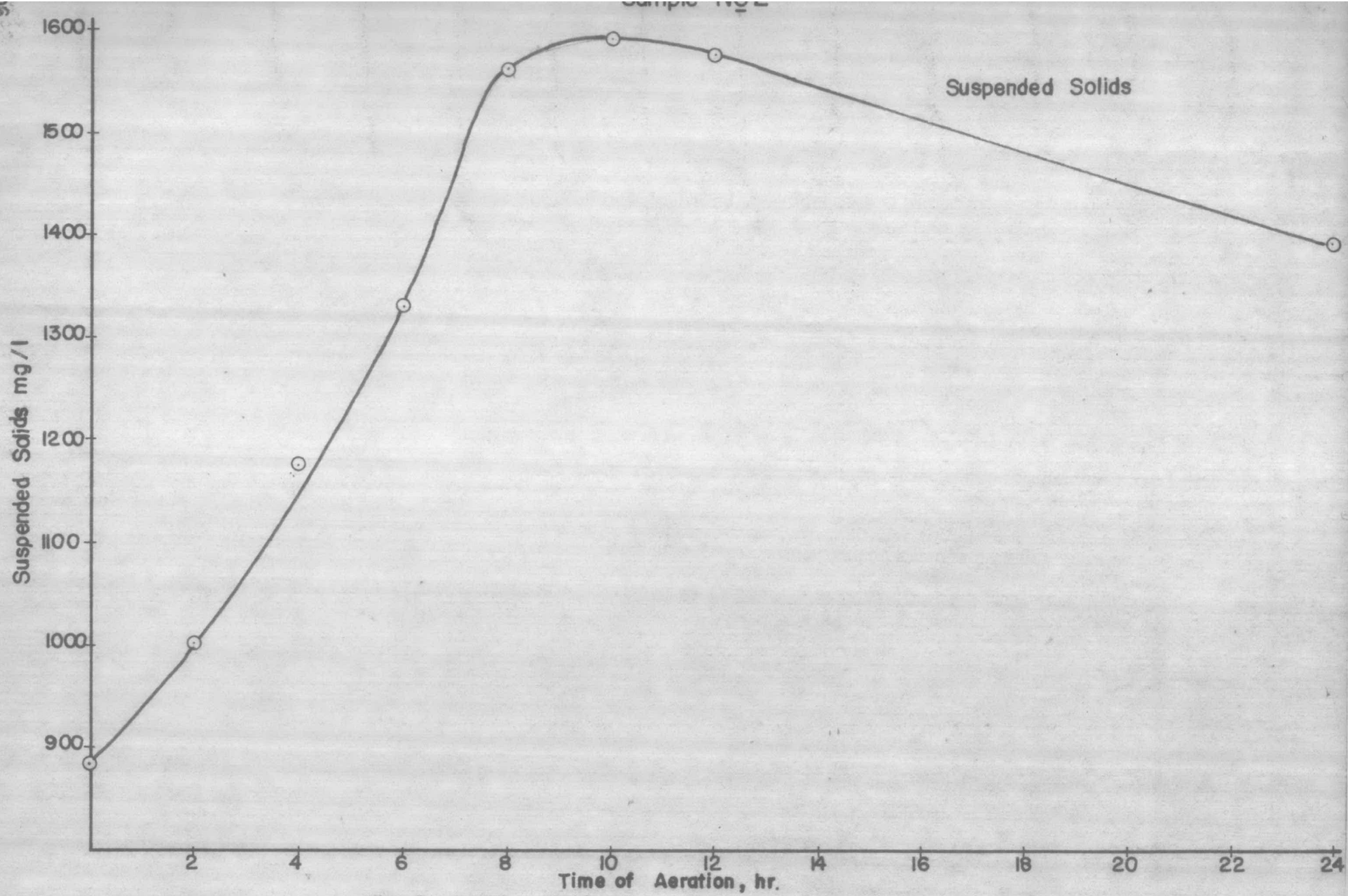


Fig. 6 Solids Production Characteristics

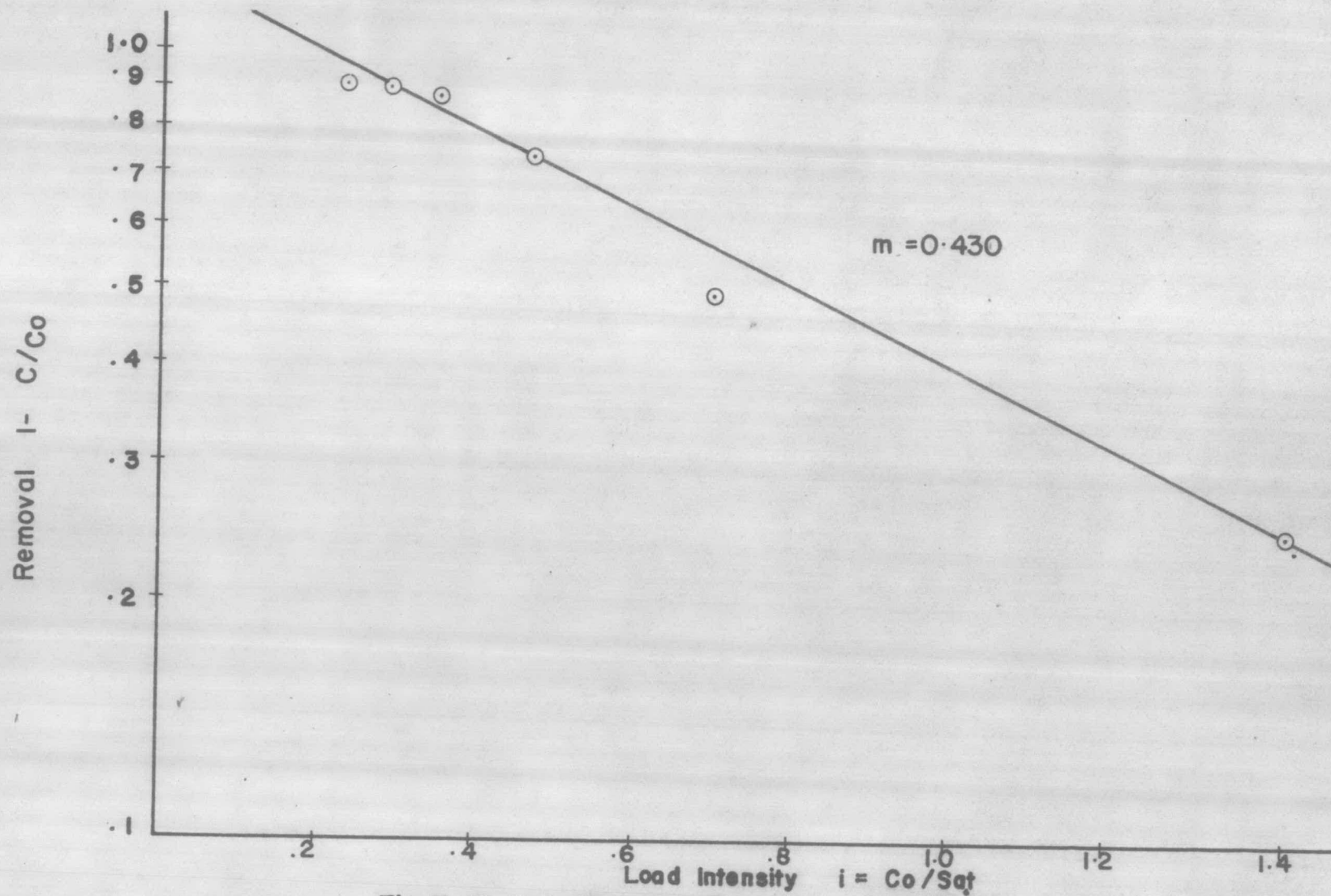


Fig. 7 Organic Removal Rate m , by Assimilation

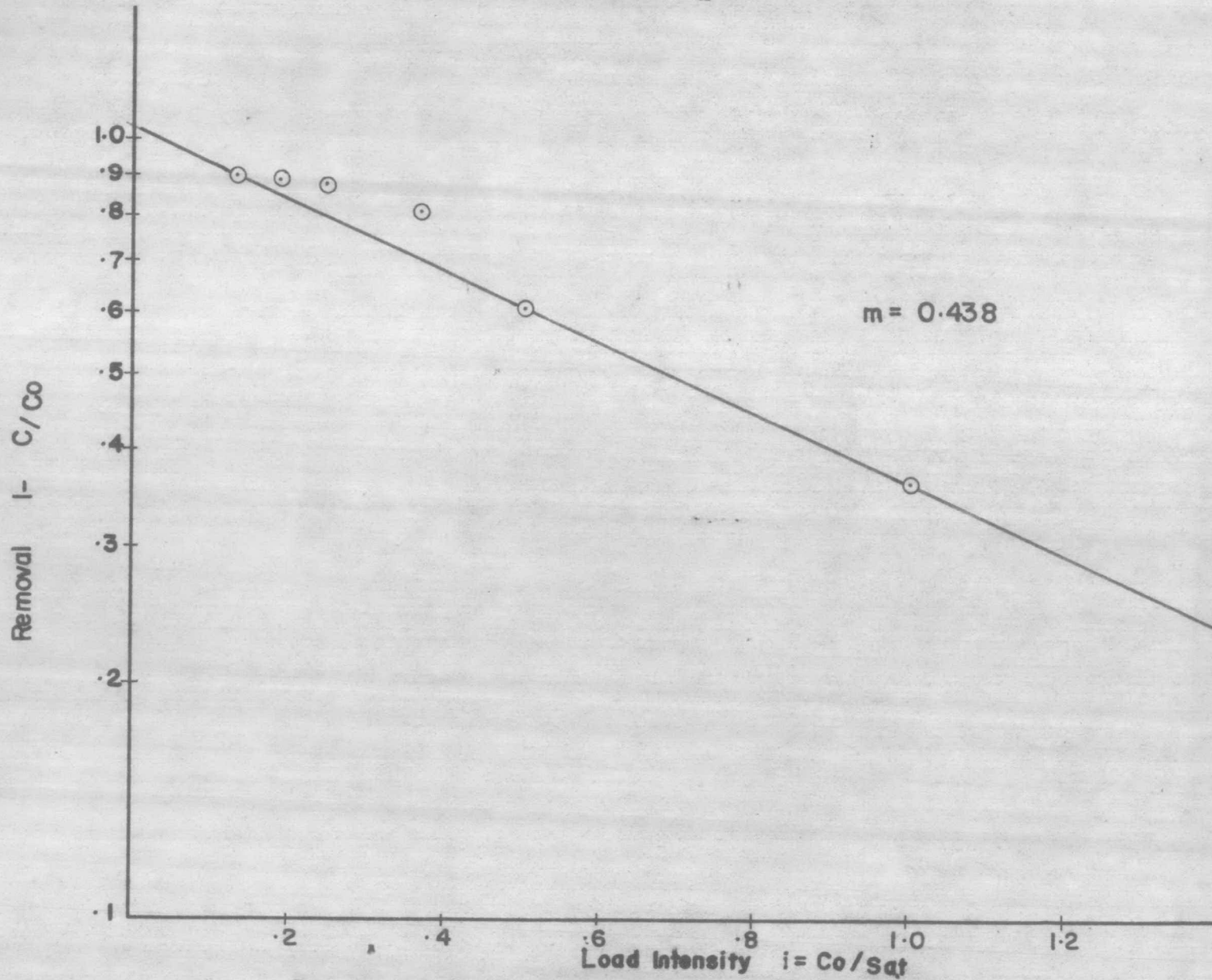


Fig. 8 Organic Removal Rate m , by Assimilation

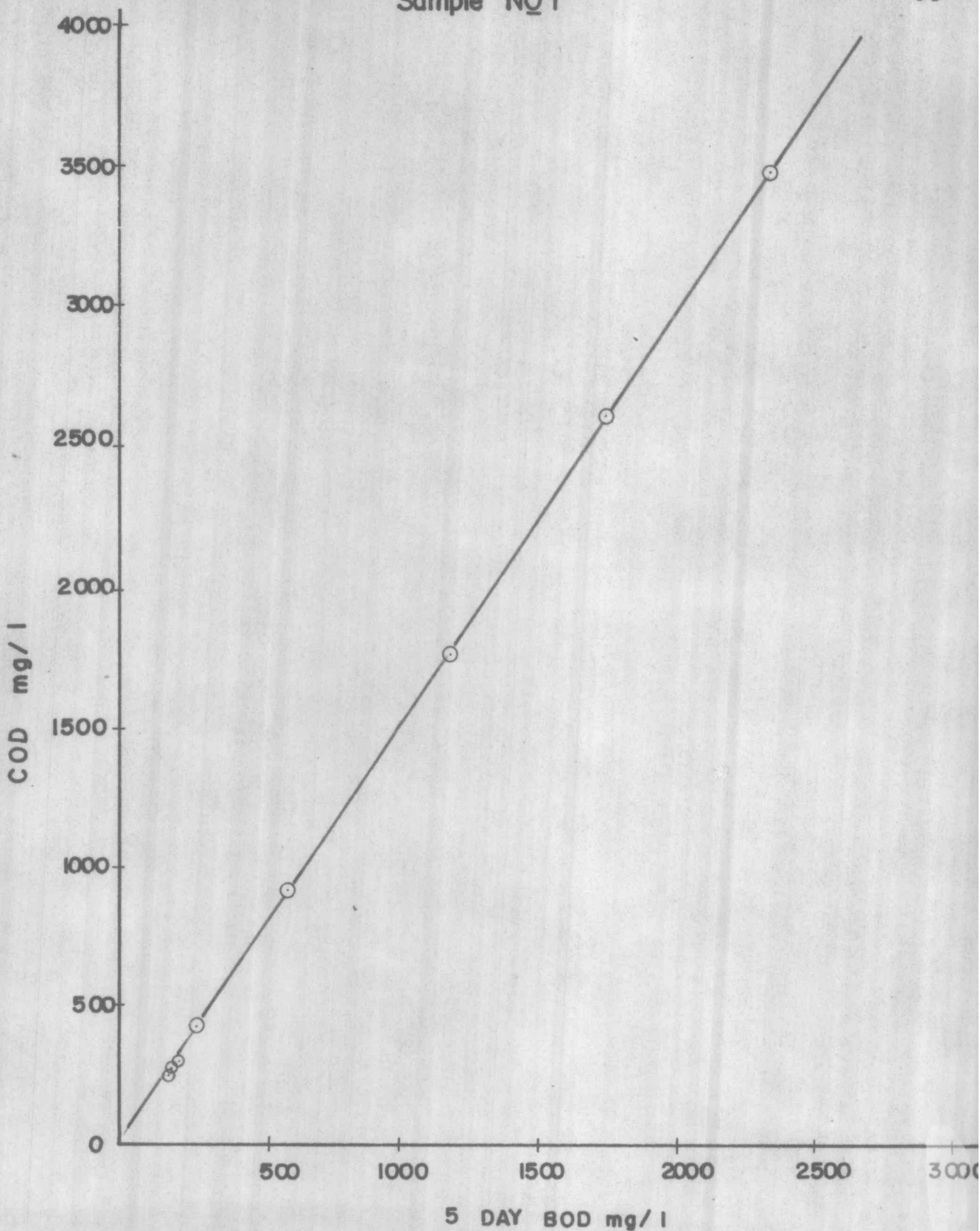


Fig. 9A COD & BOD Relationships
5

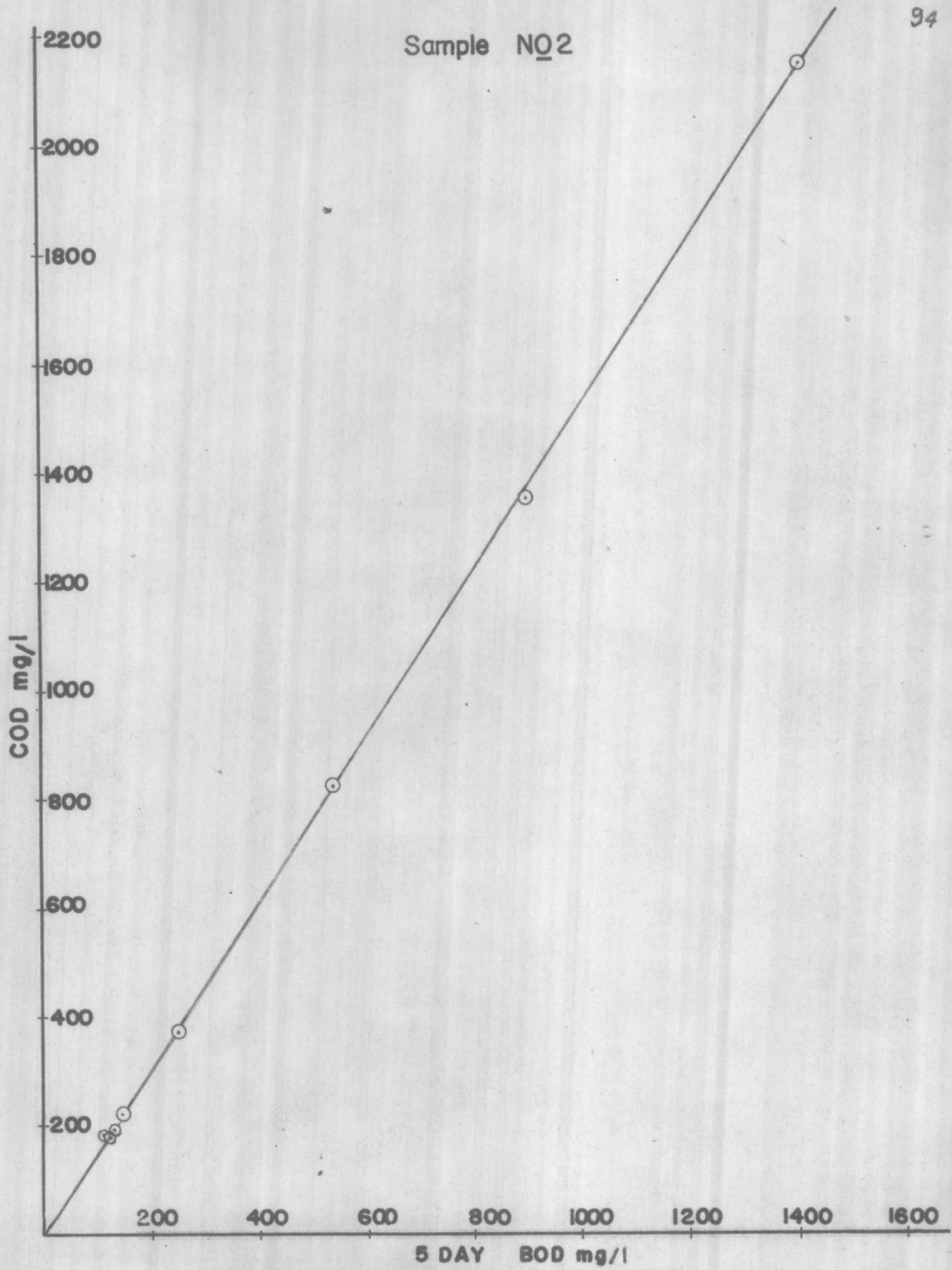


Fig. 9B COD & BOD₅ Relation Ships

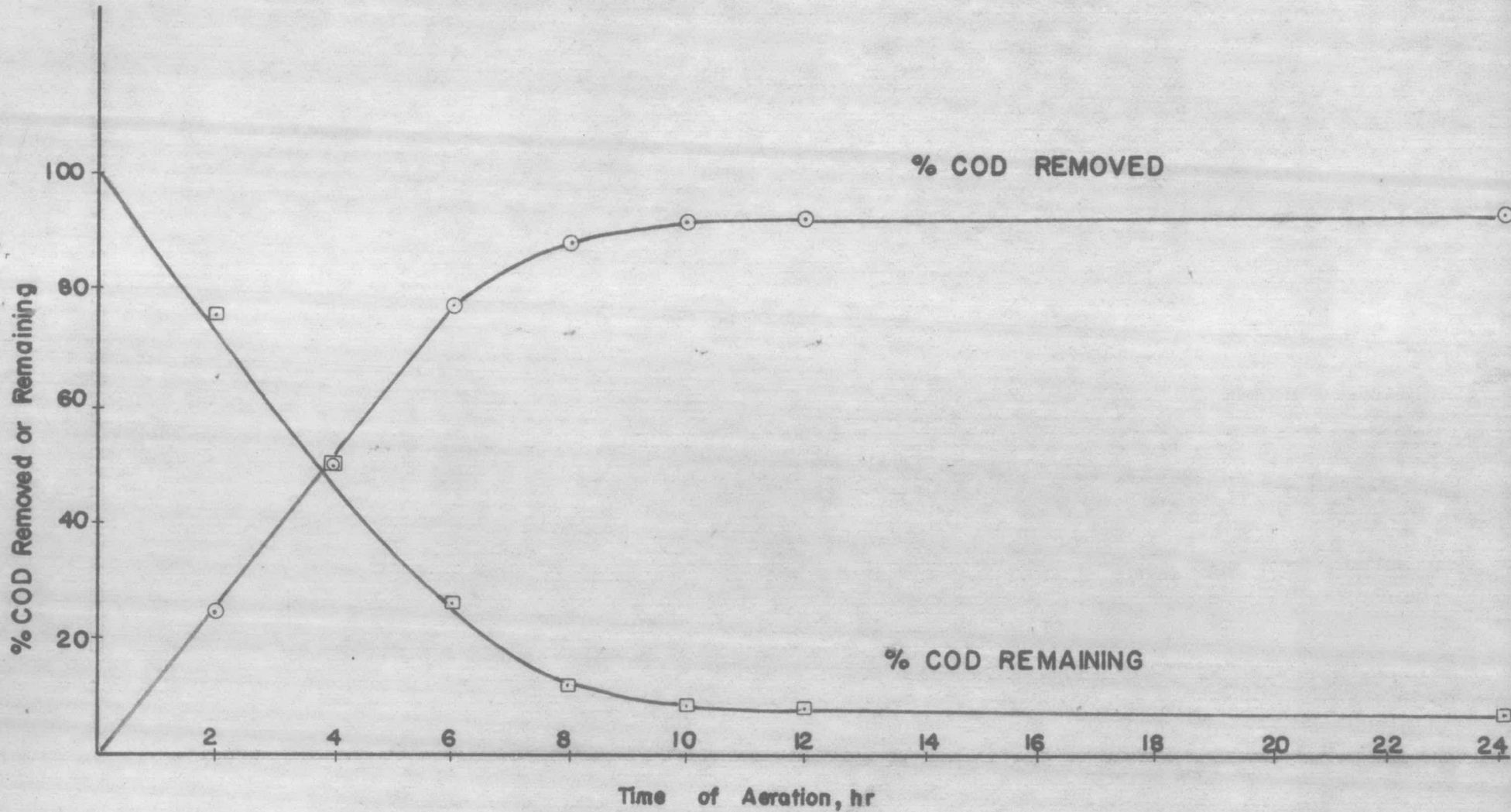


Fig. IOA % COD Remaining & Removed VS Time of Aeration

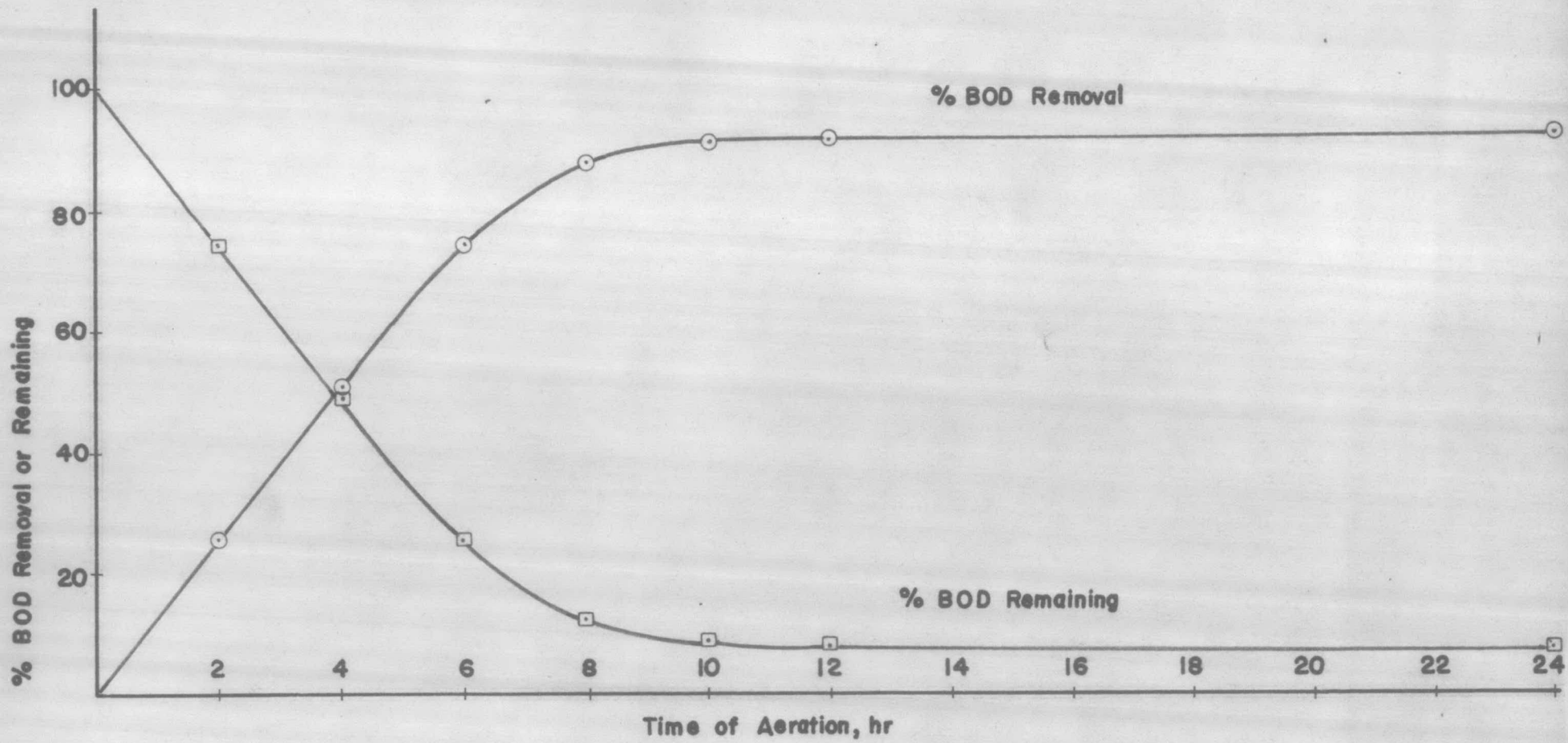


Fig.10B BOD Removal & Remaining VS Time of Aeration
5

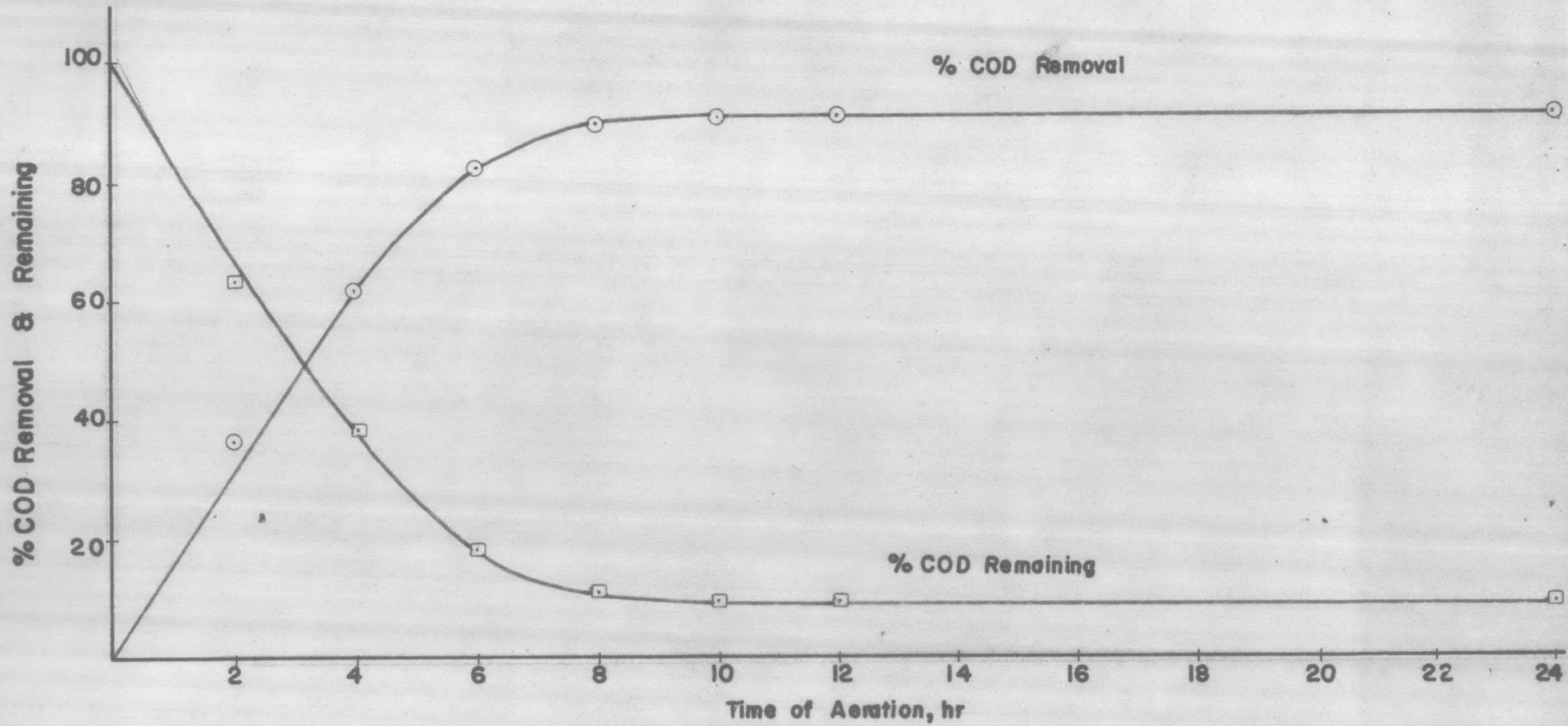


Fig. IIA % COD Removal & Remaining VS Time of Aeration

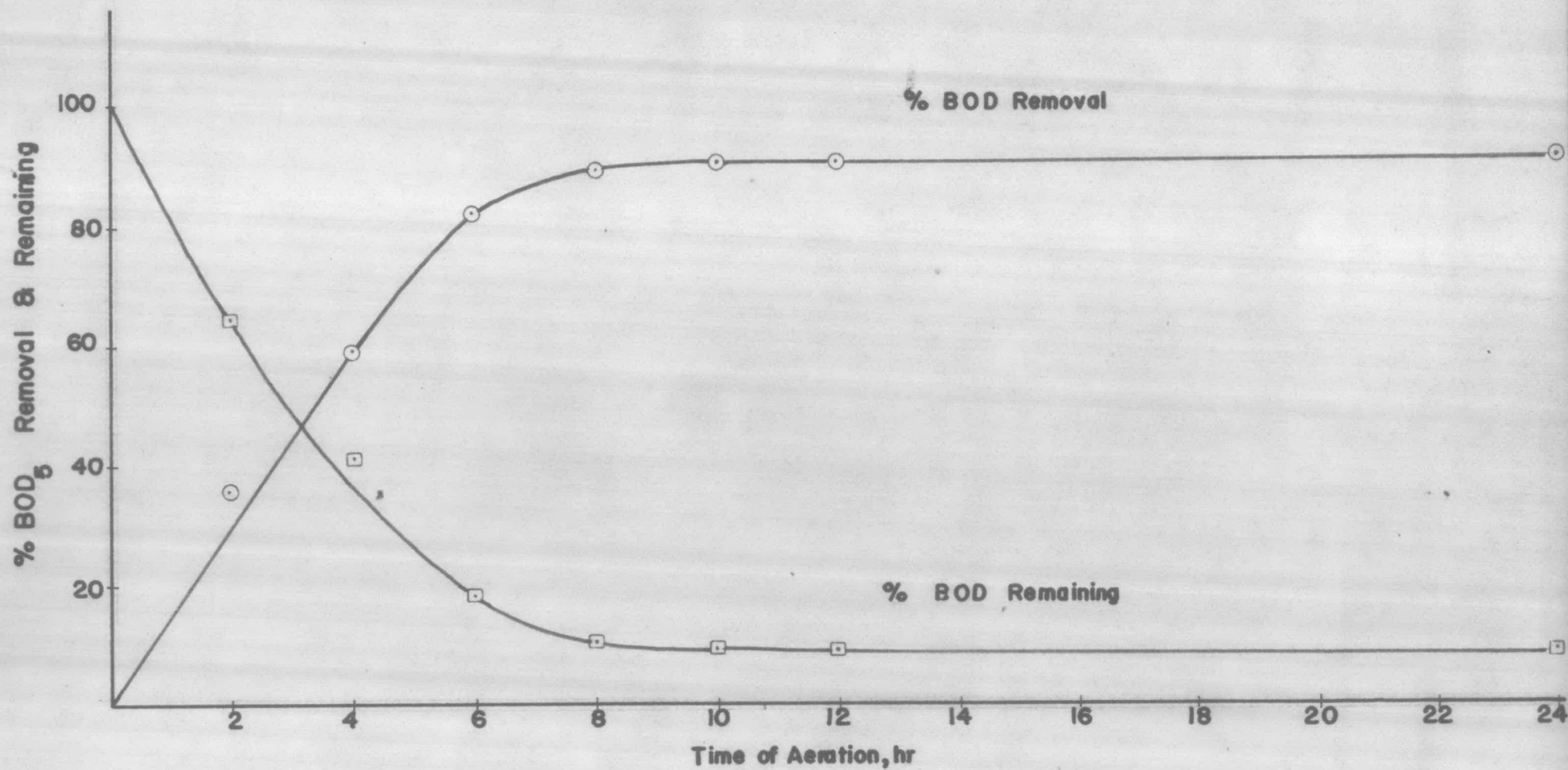


Fig. II B % BOD₅ Removal & Remaining VS Time of Aeration

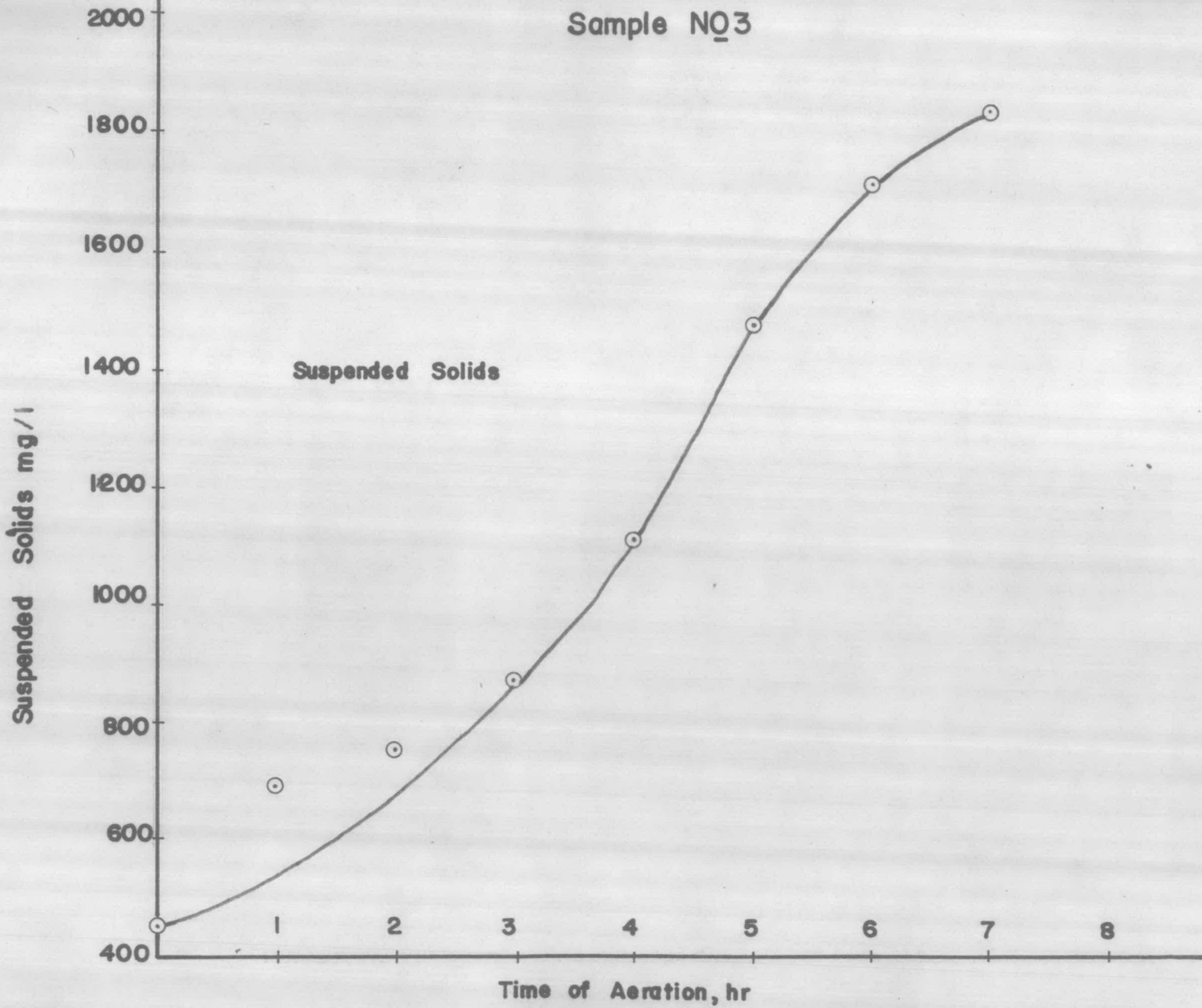


Fig. 14A Variations of Suspended Solids during Aeration Period

Fig. 13A

Sample NO 3

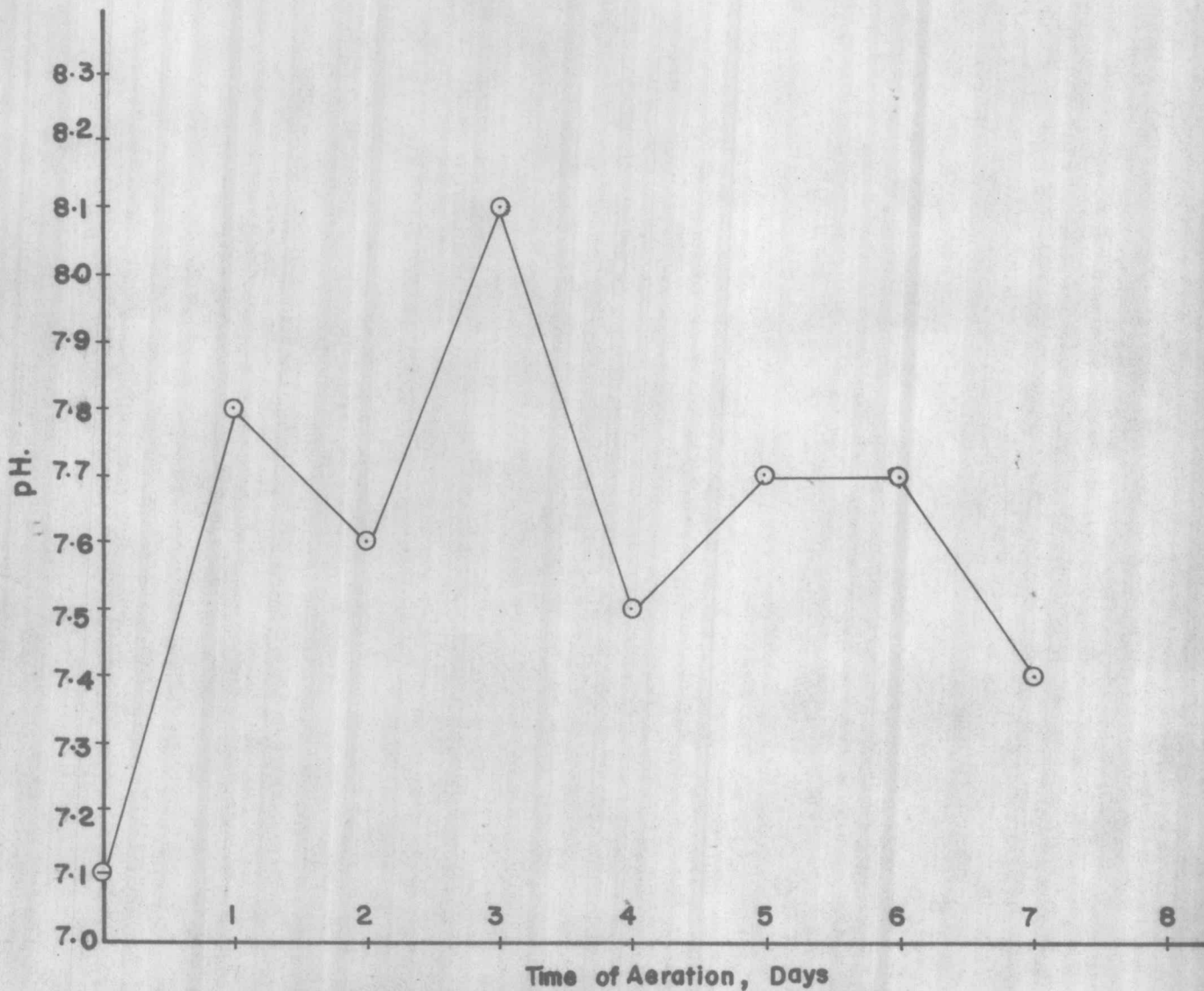


Fig.14 B Variation of pH. During Aeration Period

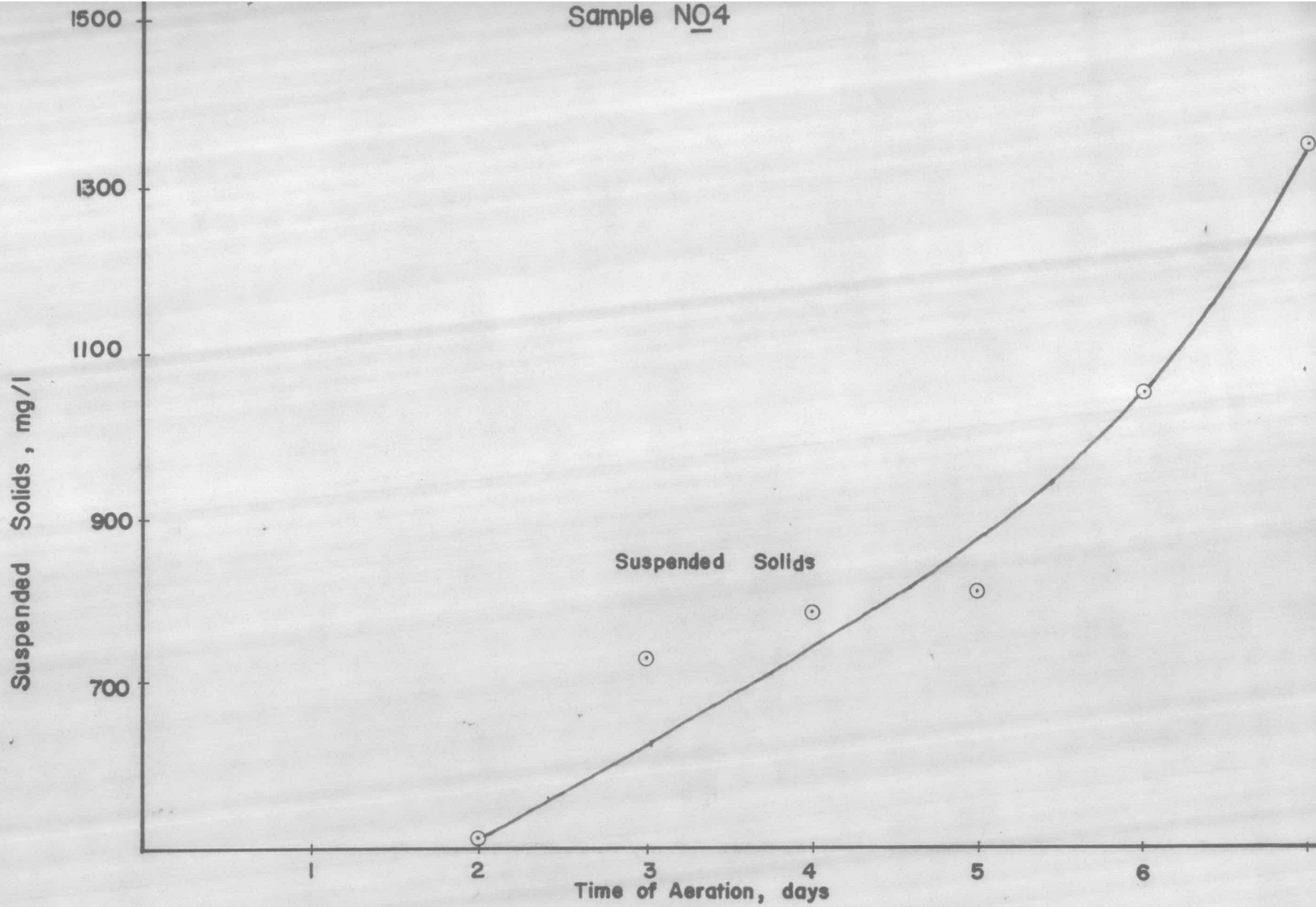


Fig. 15A Suspended Solids at Various Time of Aeration

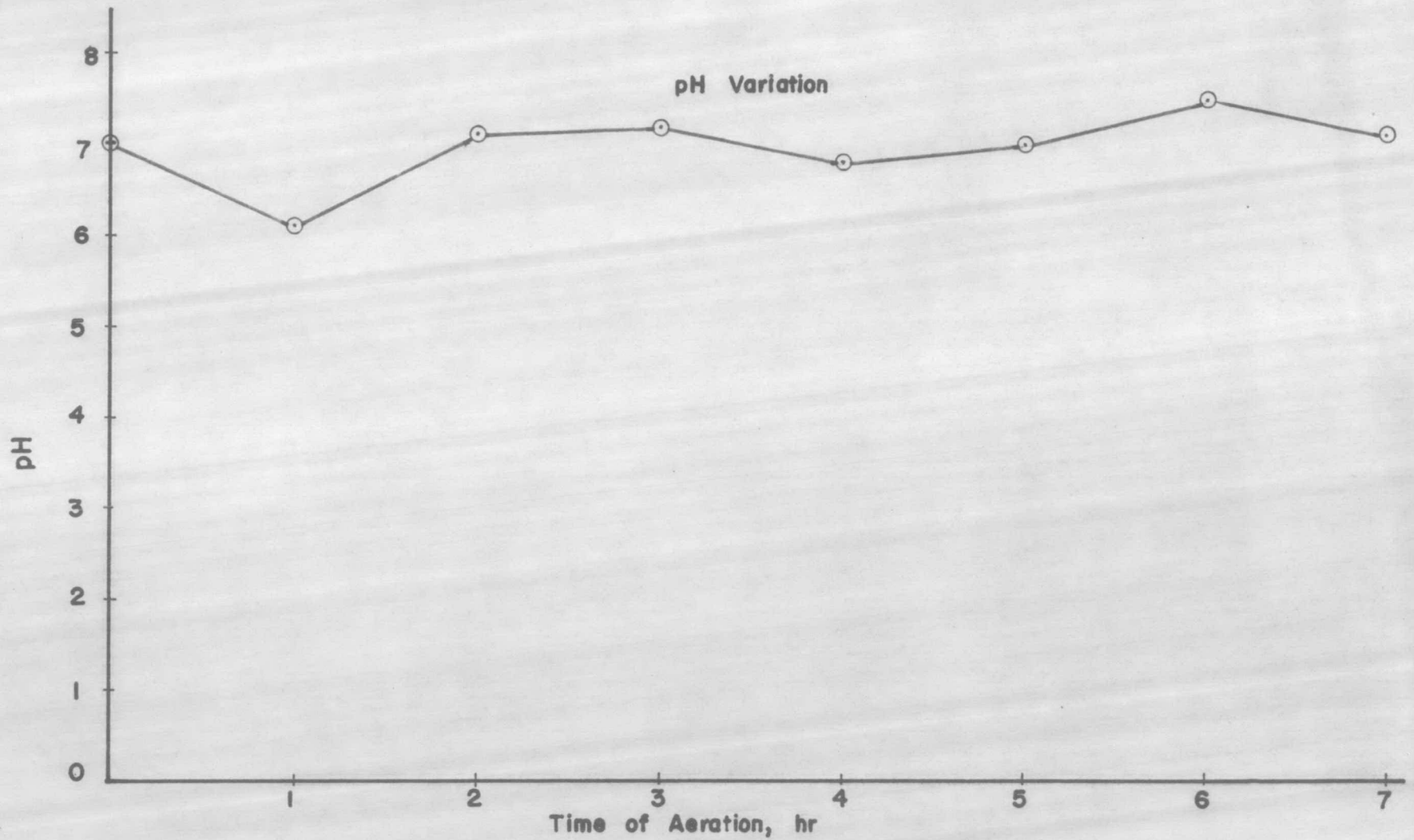


Fig. 15B Variation of pH during Aeration Period

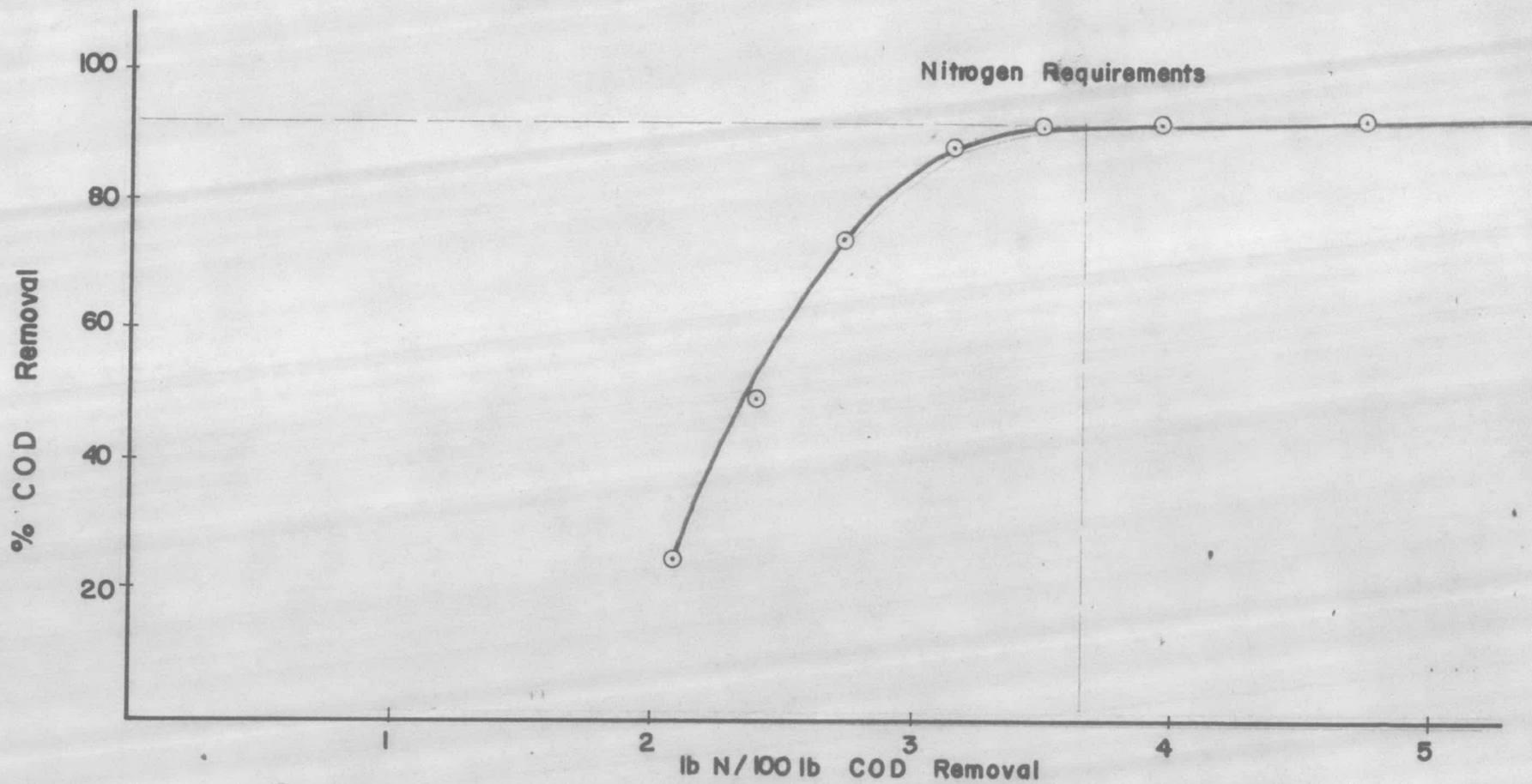


Fig. 16 Relationship between COD Removal & Nitrogen Requirements

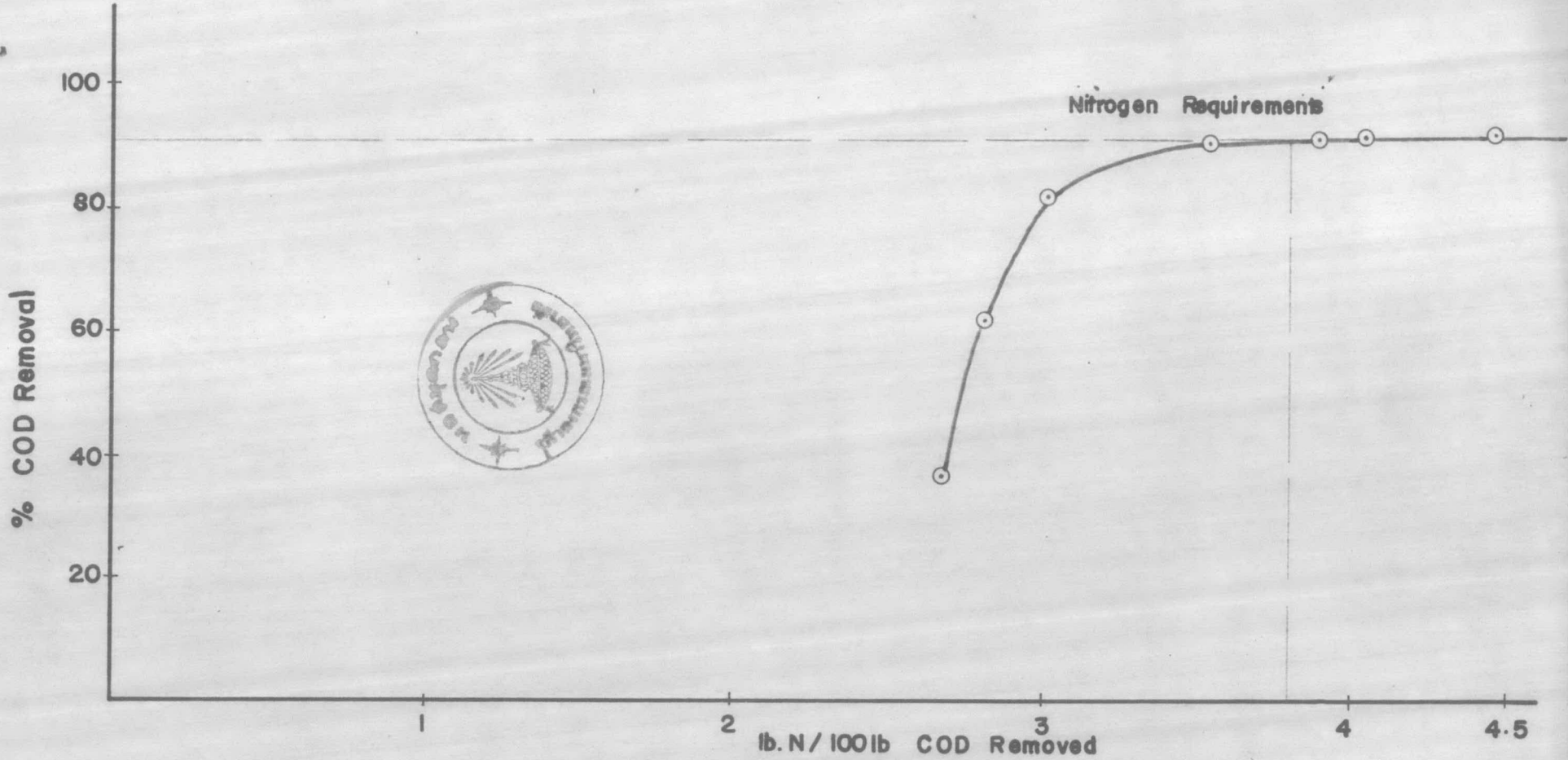


Fig. 17 Relationship between COD Removal & Nitrogen Requirements

Fig. 17

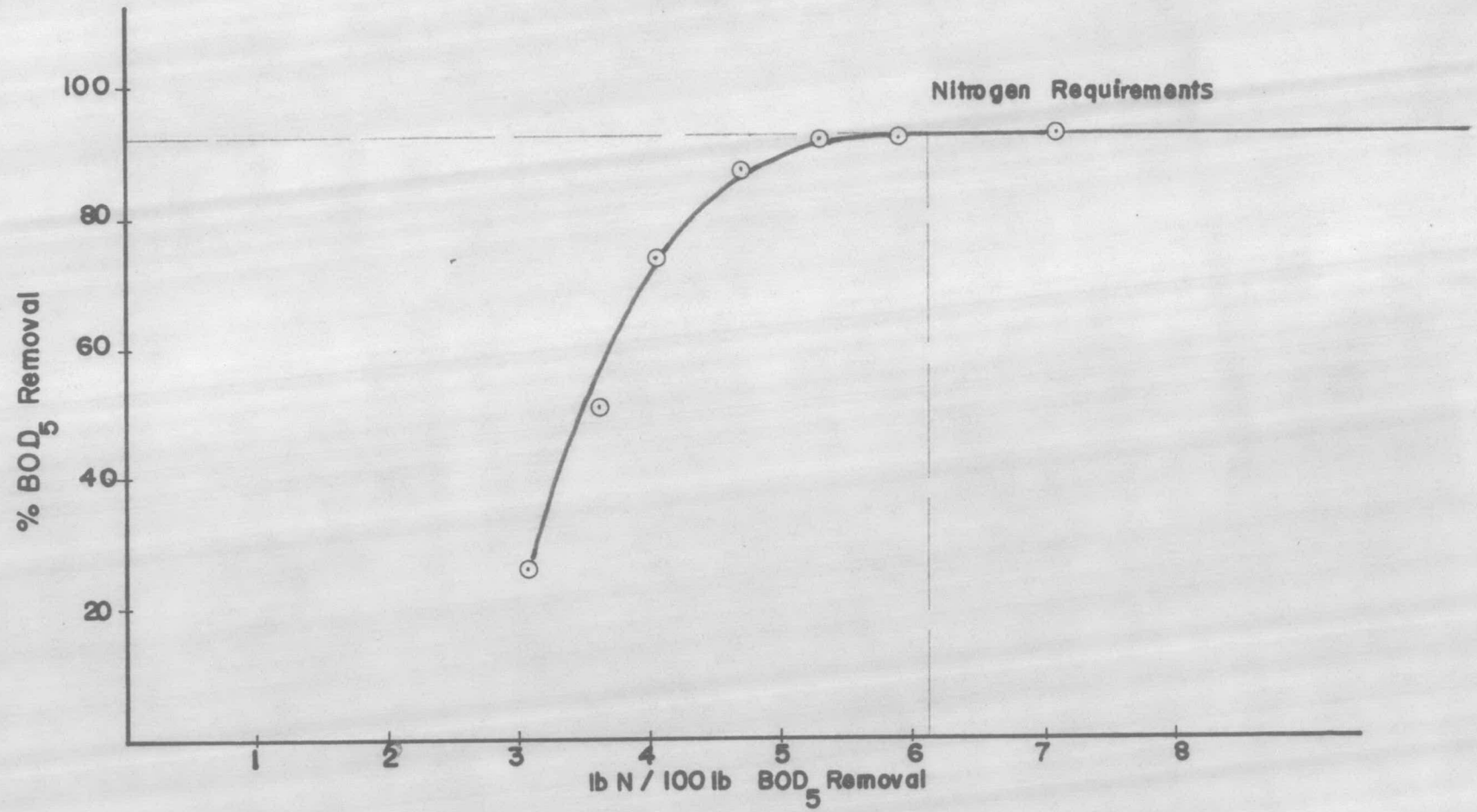


Fig. 18 Relationship between BOD₅ Removal & Nitrogen Requirement

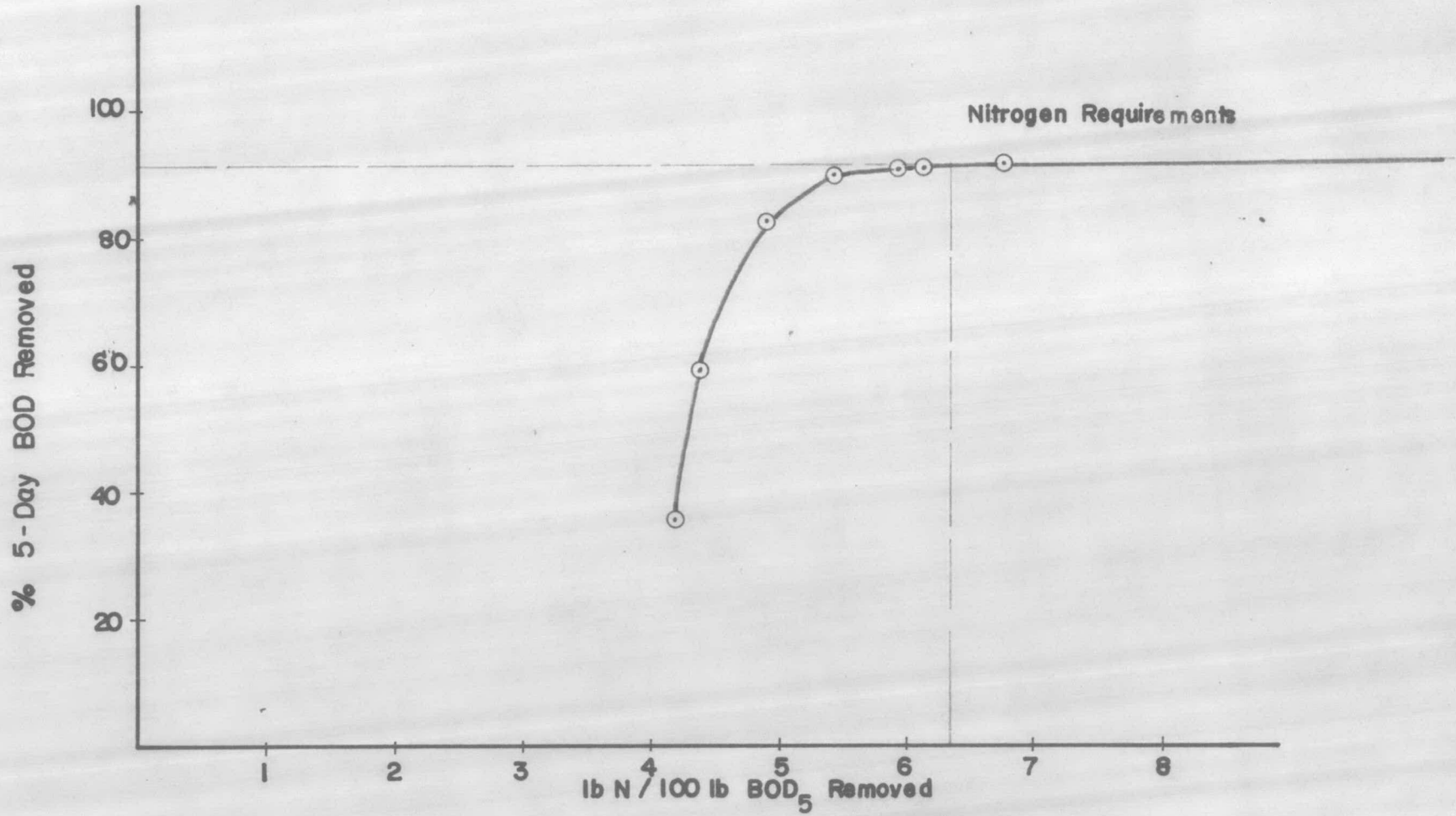


Fig. 19 Relationship between BOD₅ Removal & Nitrogen Requirements

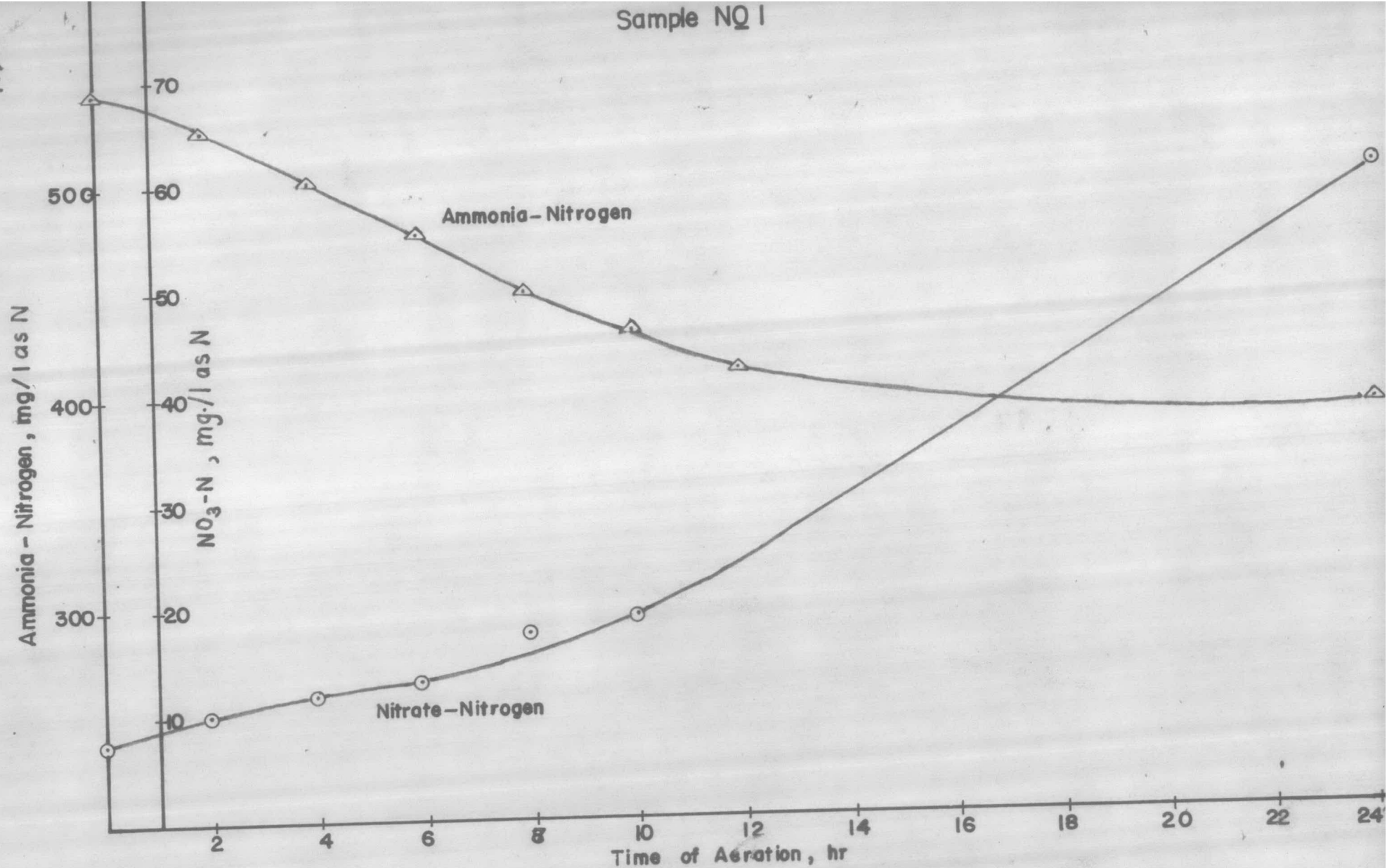


Fig.20 Nitrogen Relationship between Ammonia-Nitrogen & Nitrate-Nitrogen

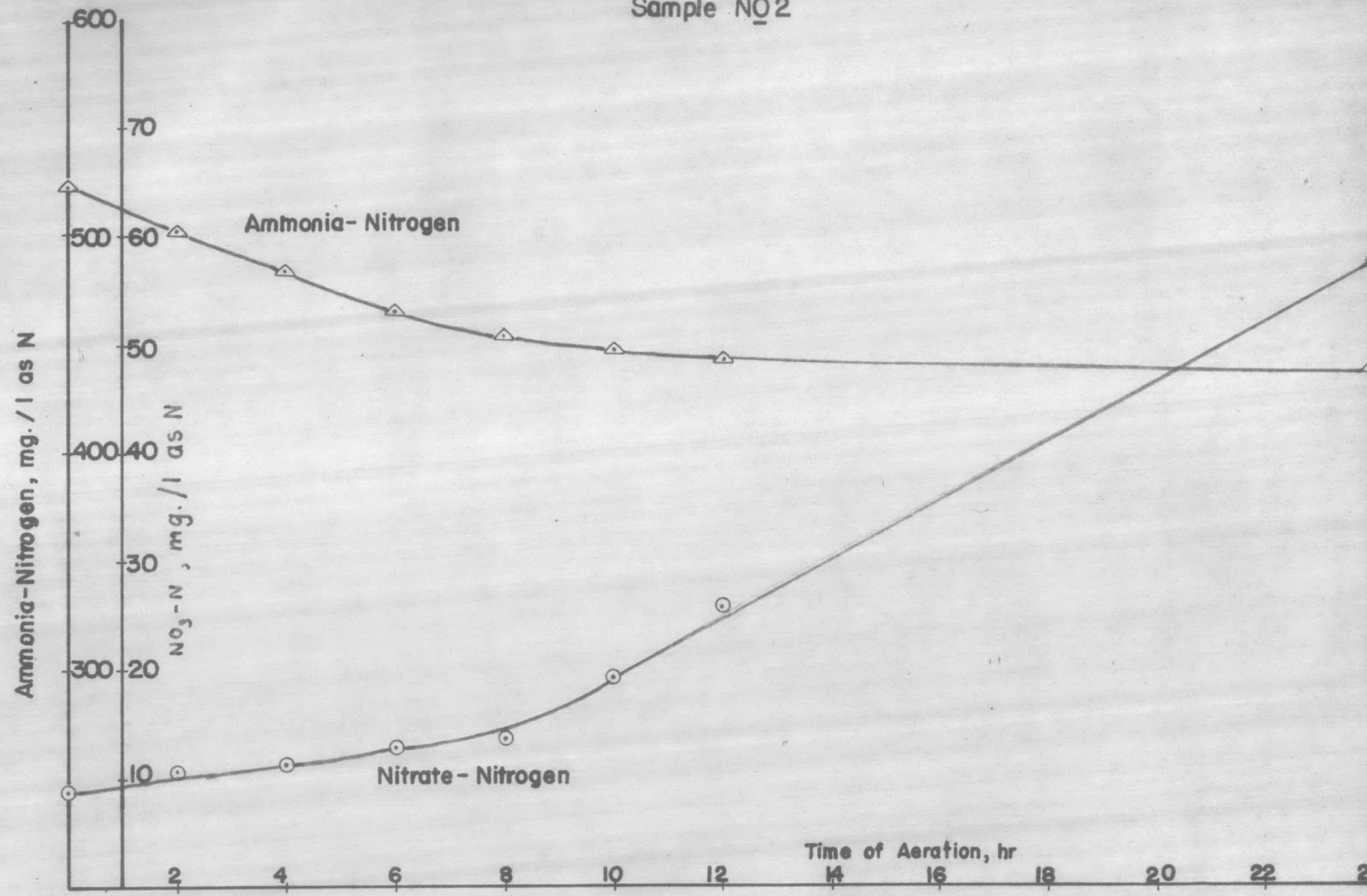


Fig.21 Nitrogen Relationship between Ammonia-Nitrogen & Nitrate-Nitrogen

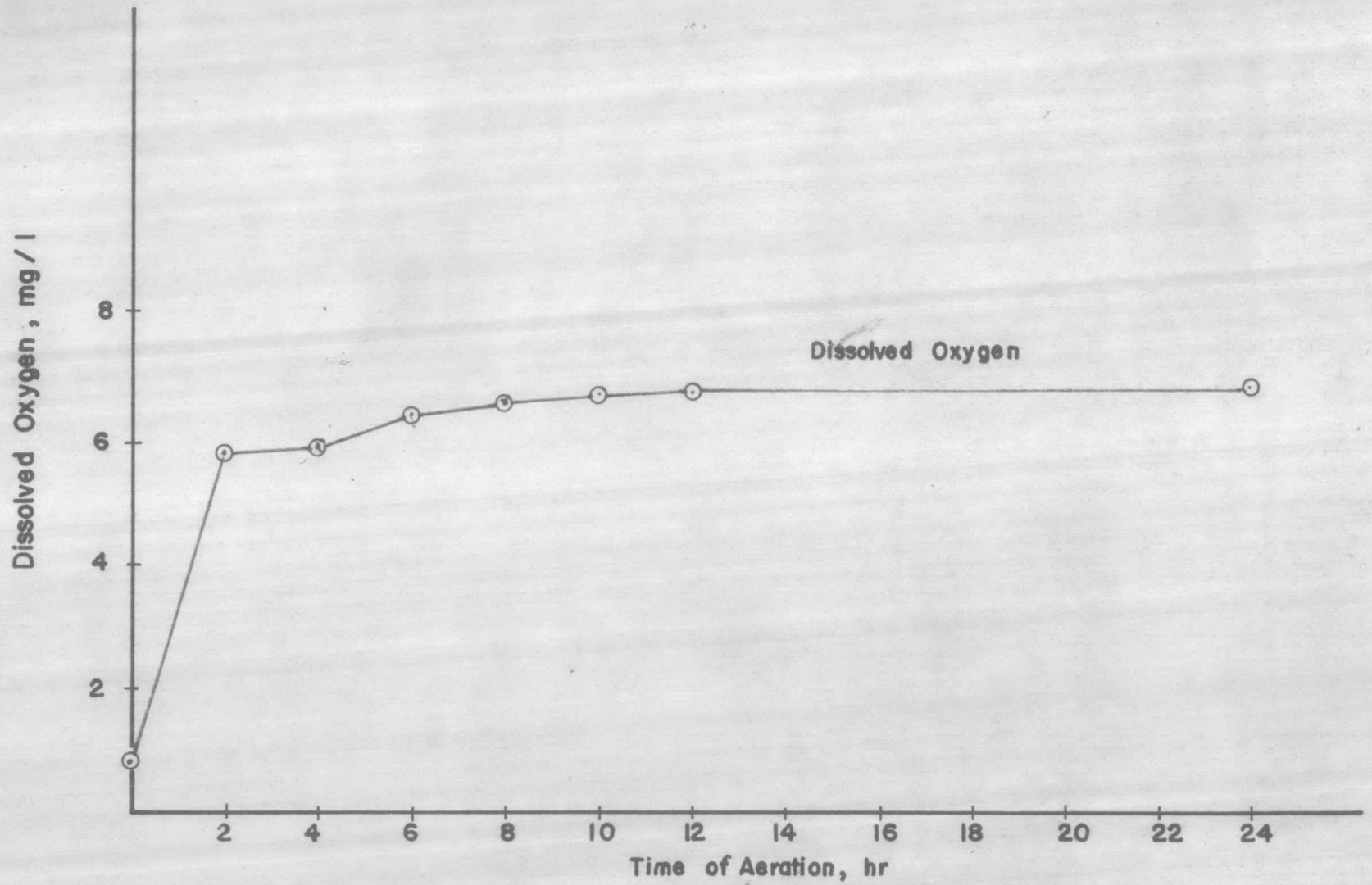


Fig.22 Dissolved Oxygen during Period of Aeration

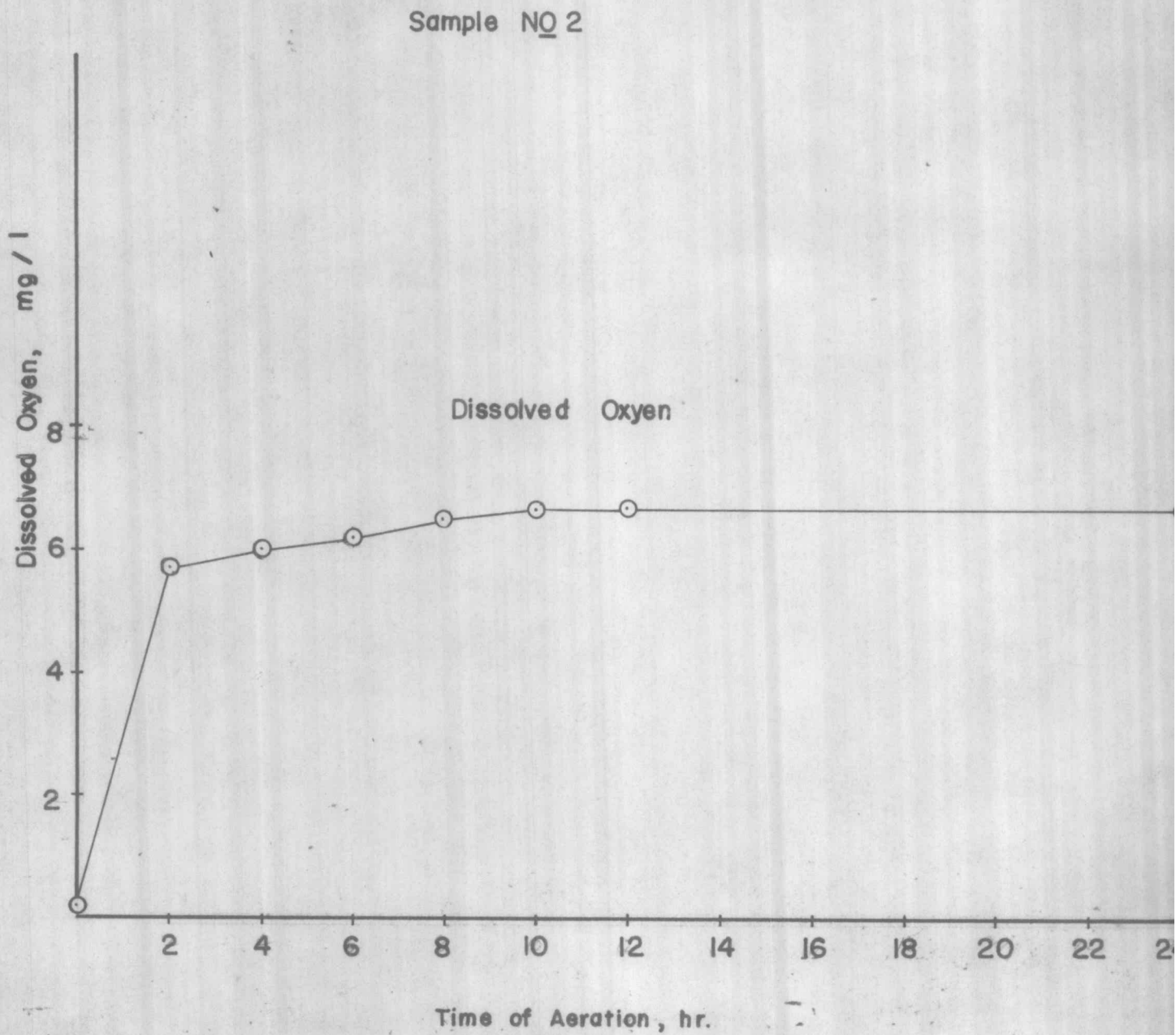


Fig. 23 Dissolved Oxygen During Period of Aeration

Sample NQ 3

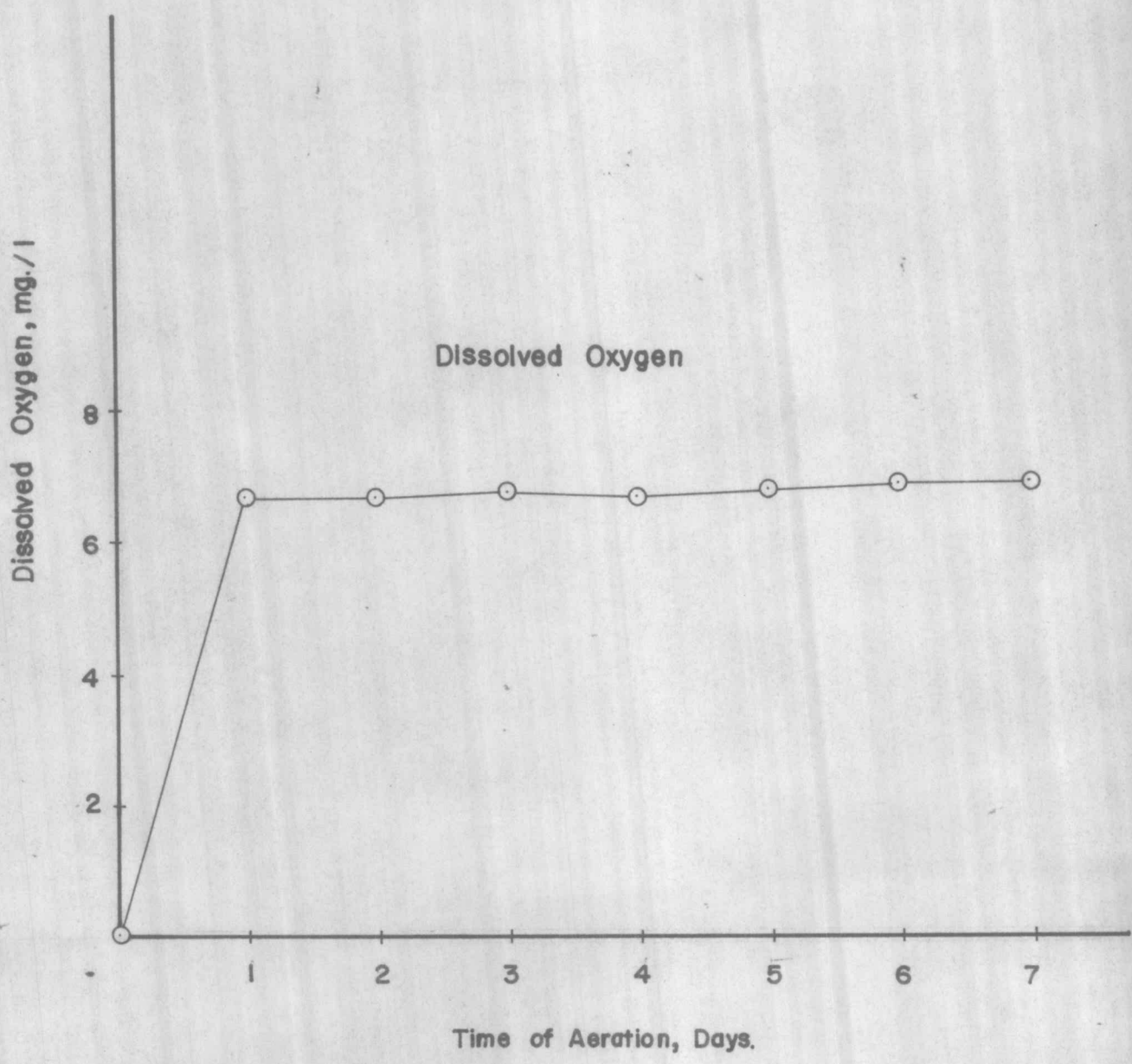


Fig. 24 Dissolved Oxygen During Period of Aeration

Sample NO 4

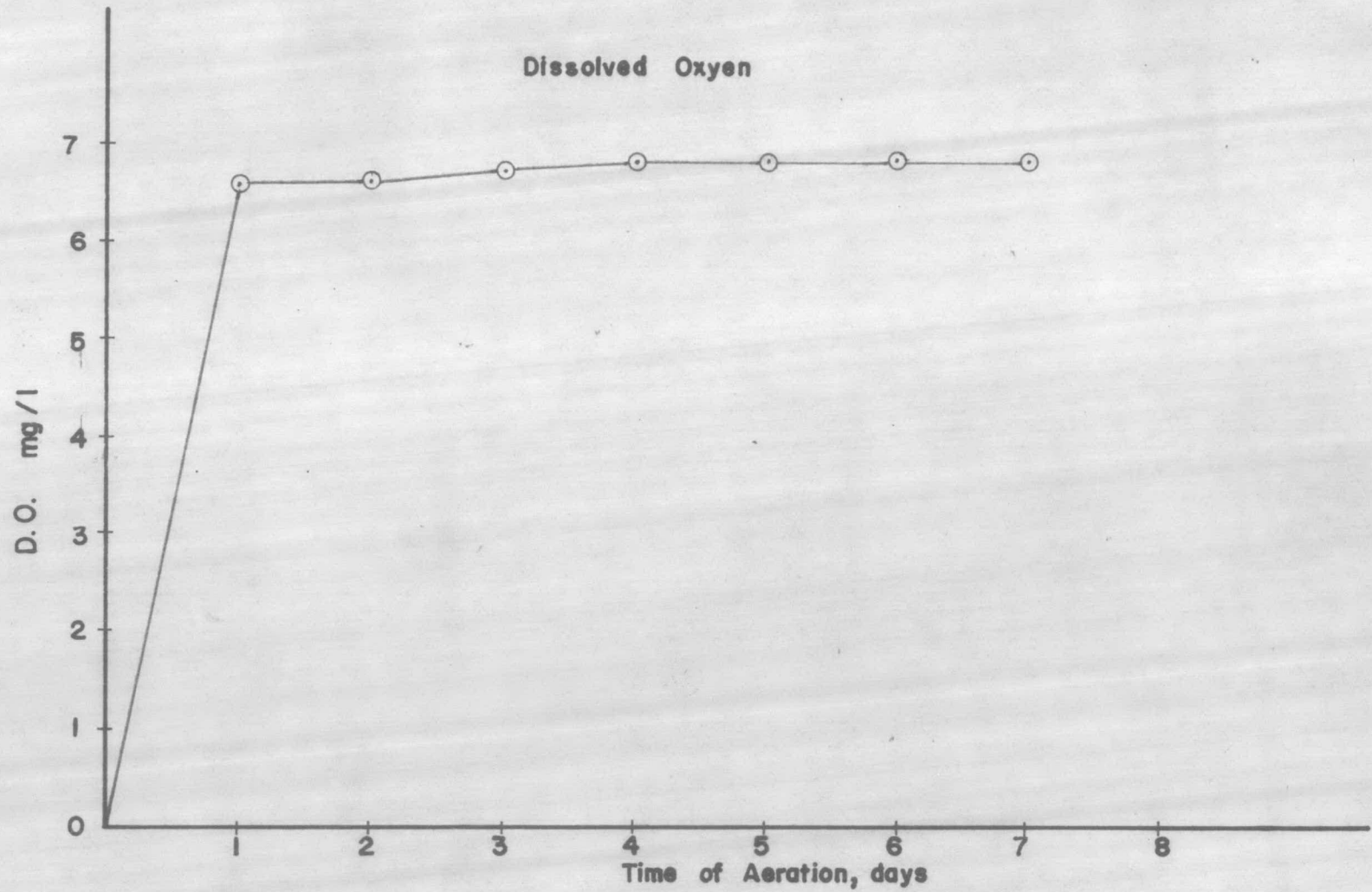


Fig. 25 Dissolved Oxygen during Period of Aeration

Sample NO 1

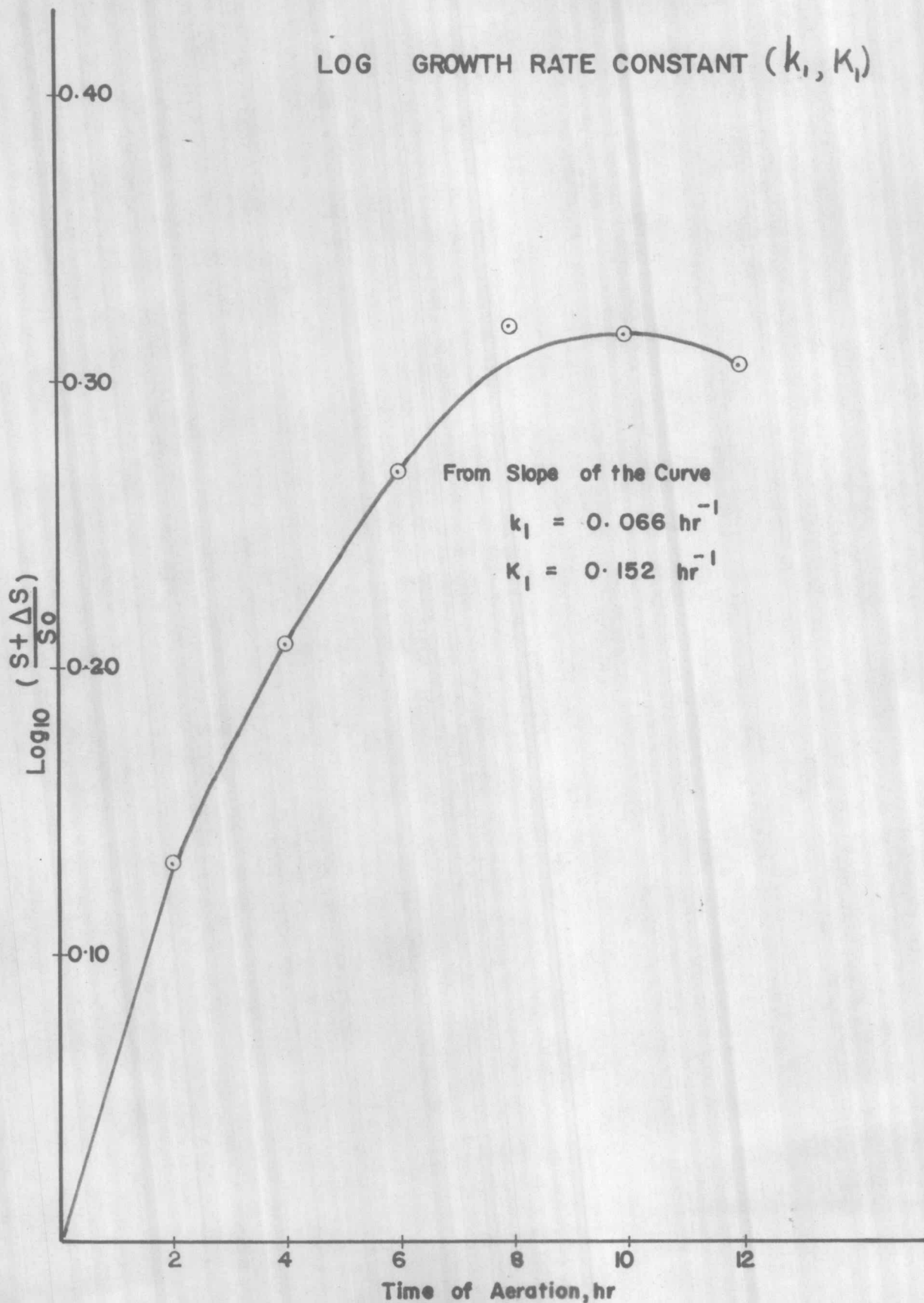


Fig. 26 A The Logarithmic Growth Phase

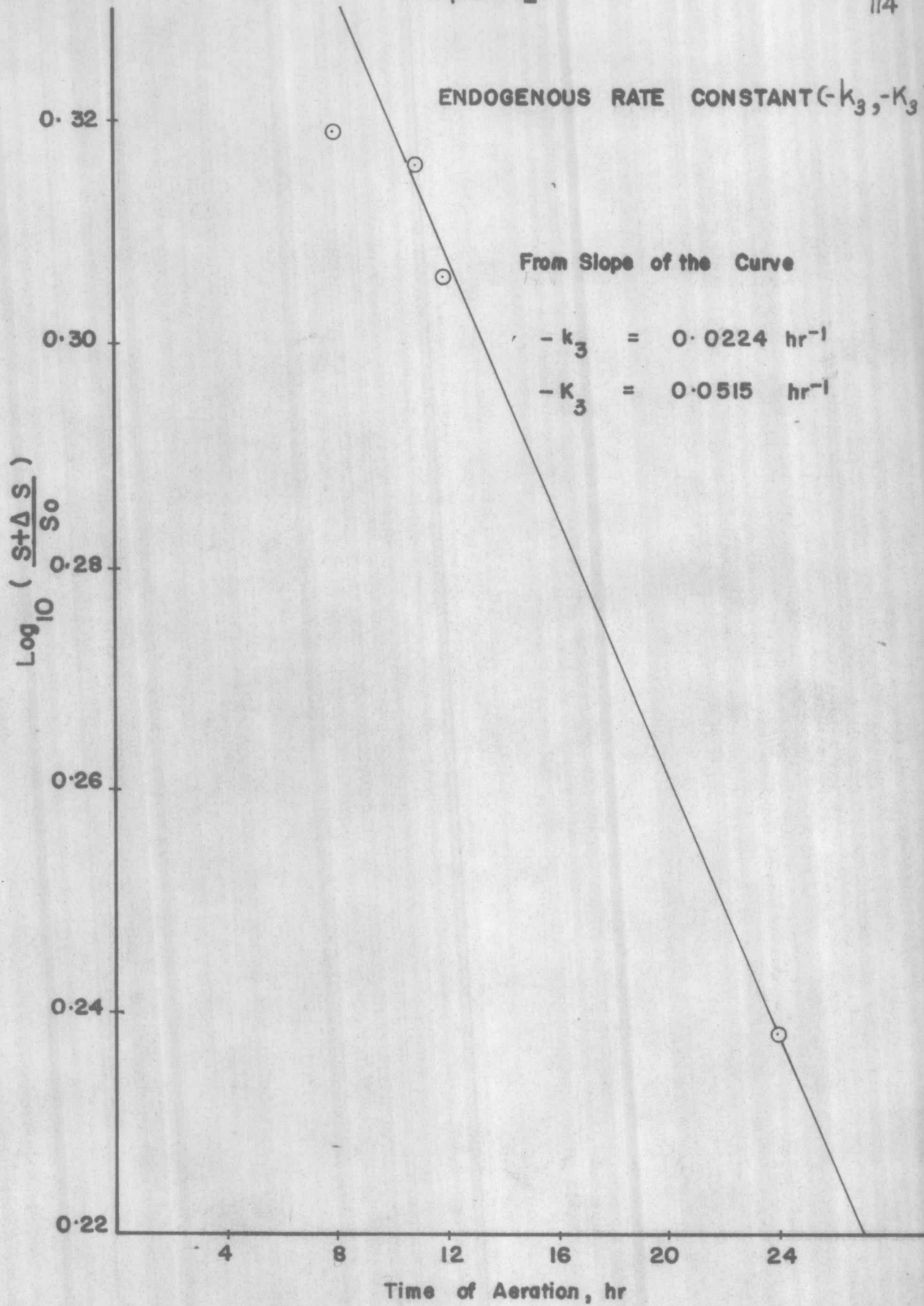


Fig. 26 B The Endogenous Growth Phase

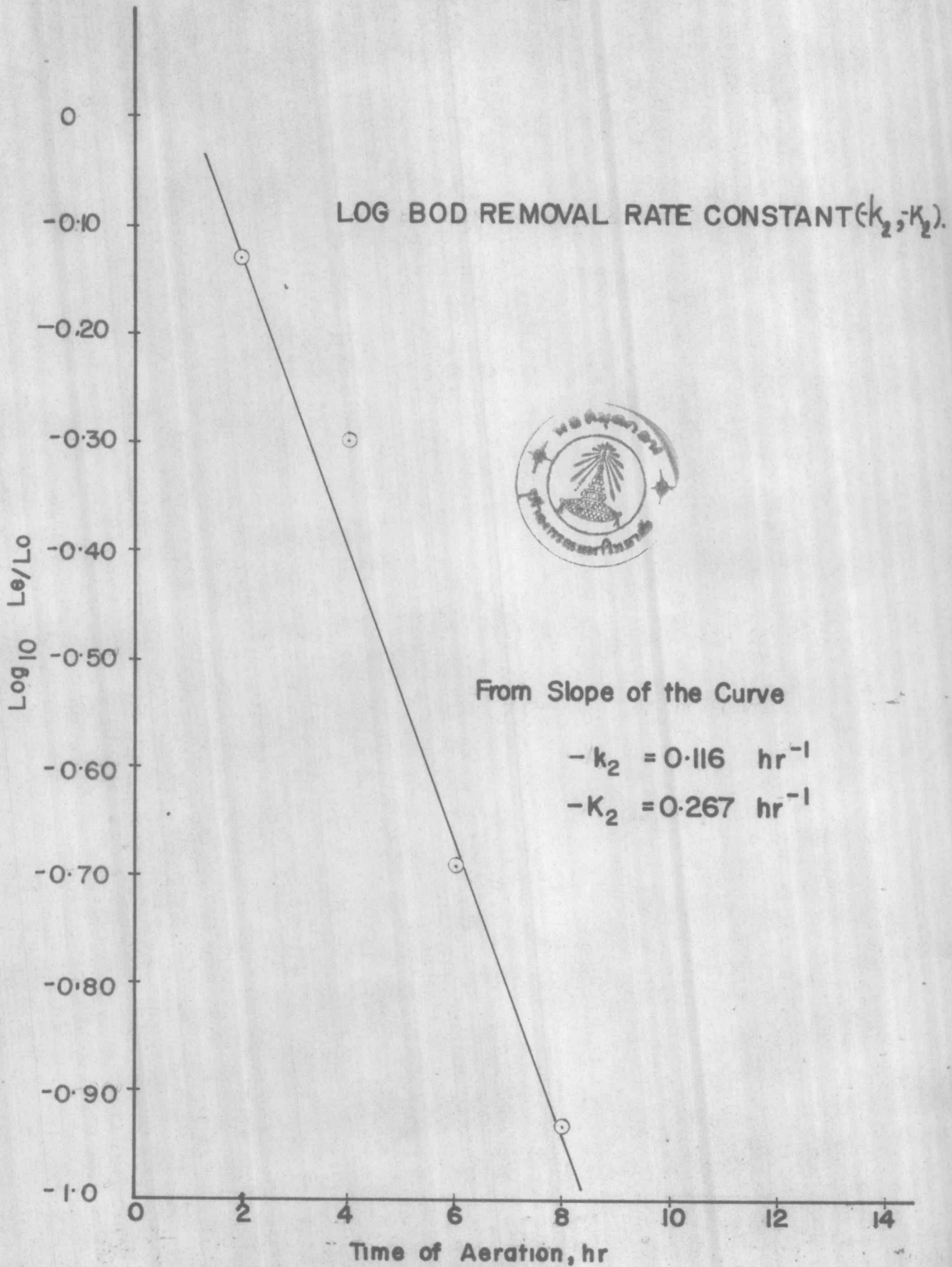


Fig. 27 the Declining Growth Phase

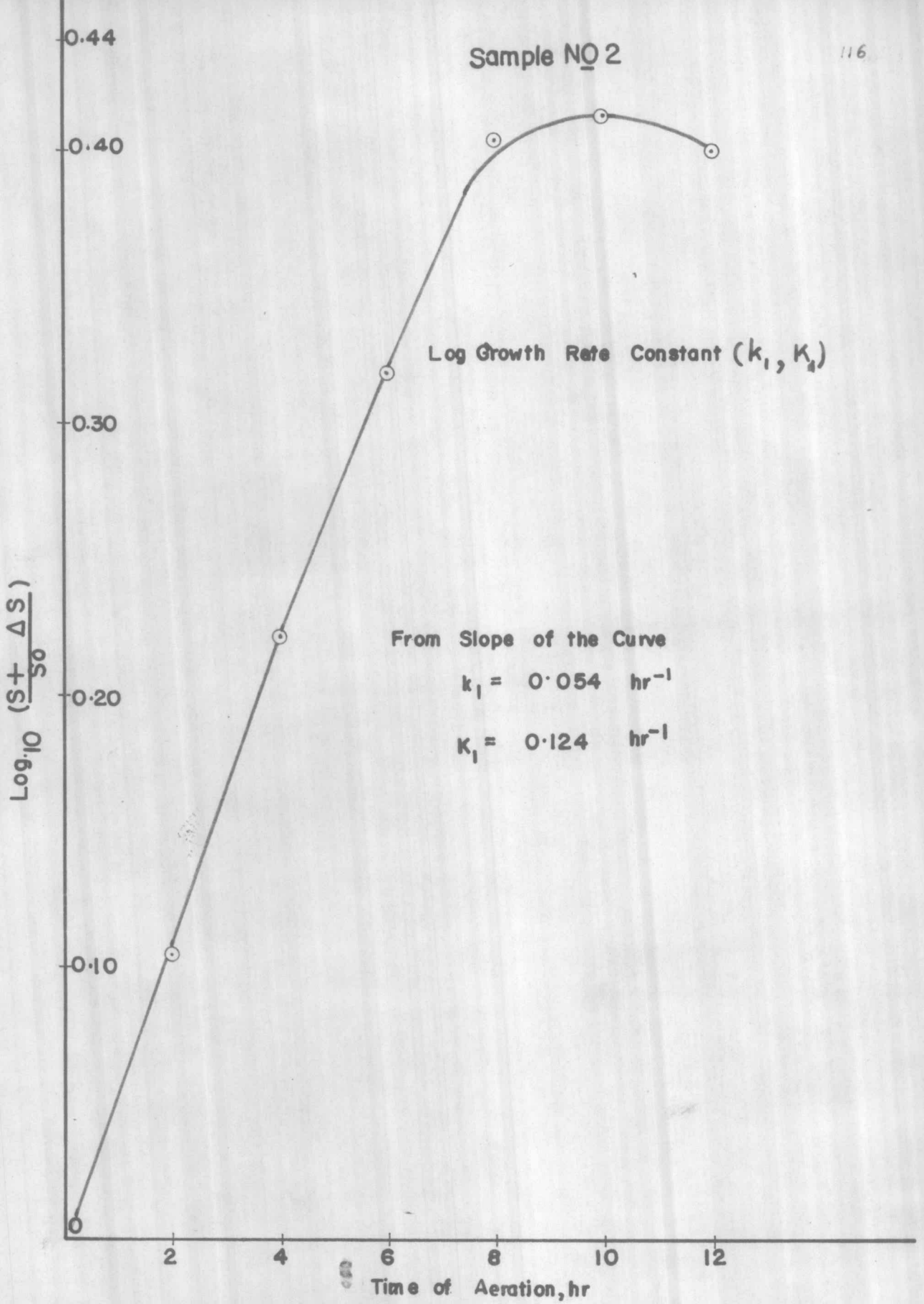


Fig. 28 A The Logarithmic Growth Phase

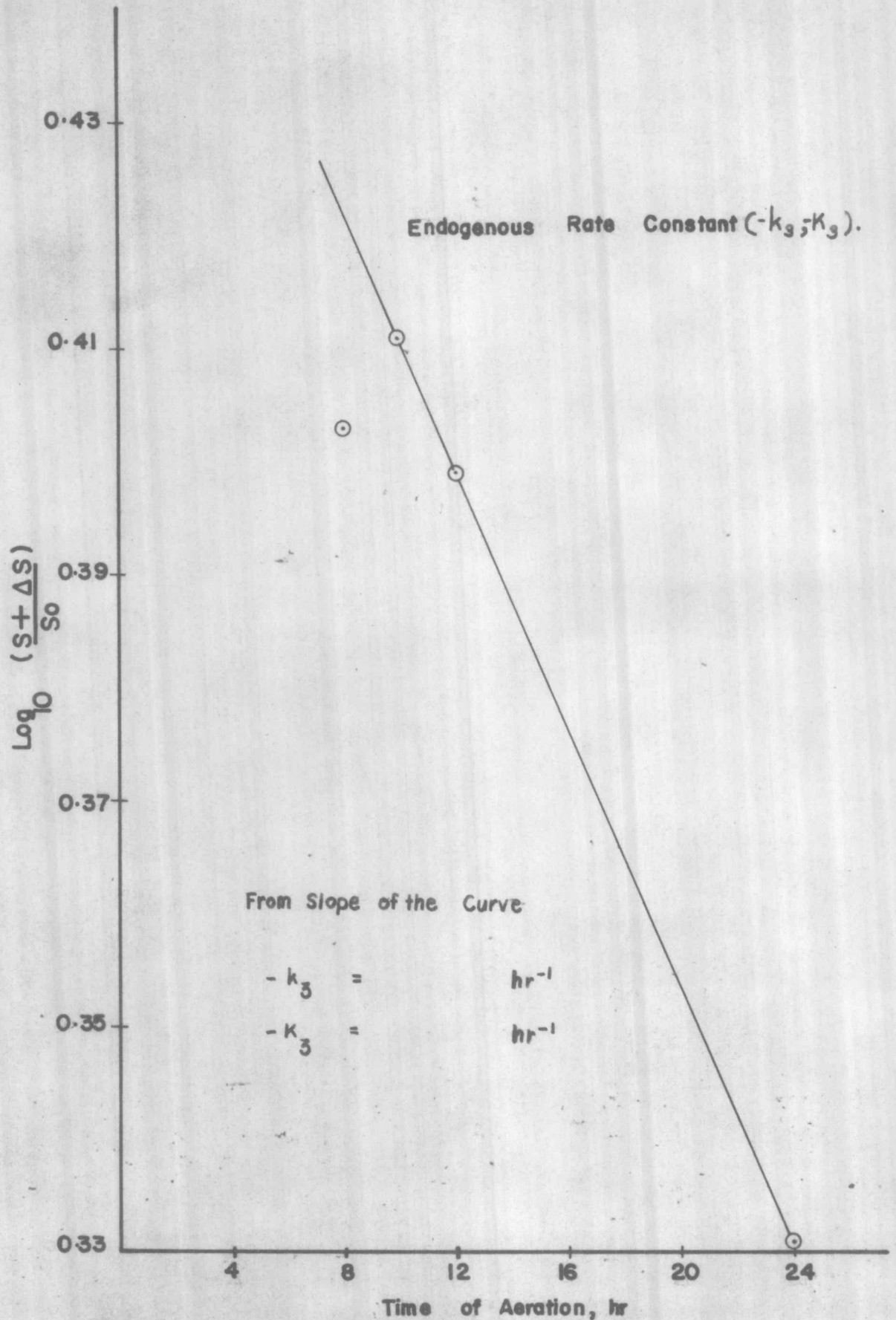


Fig. 28 B. The Endogenous Growth Phase

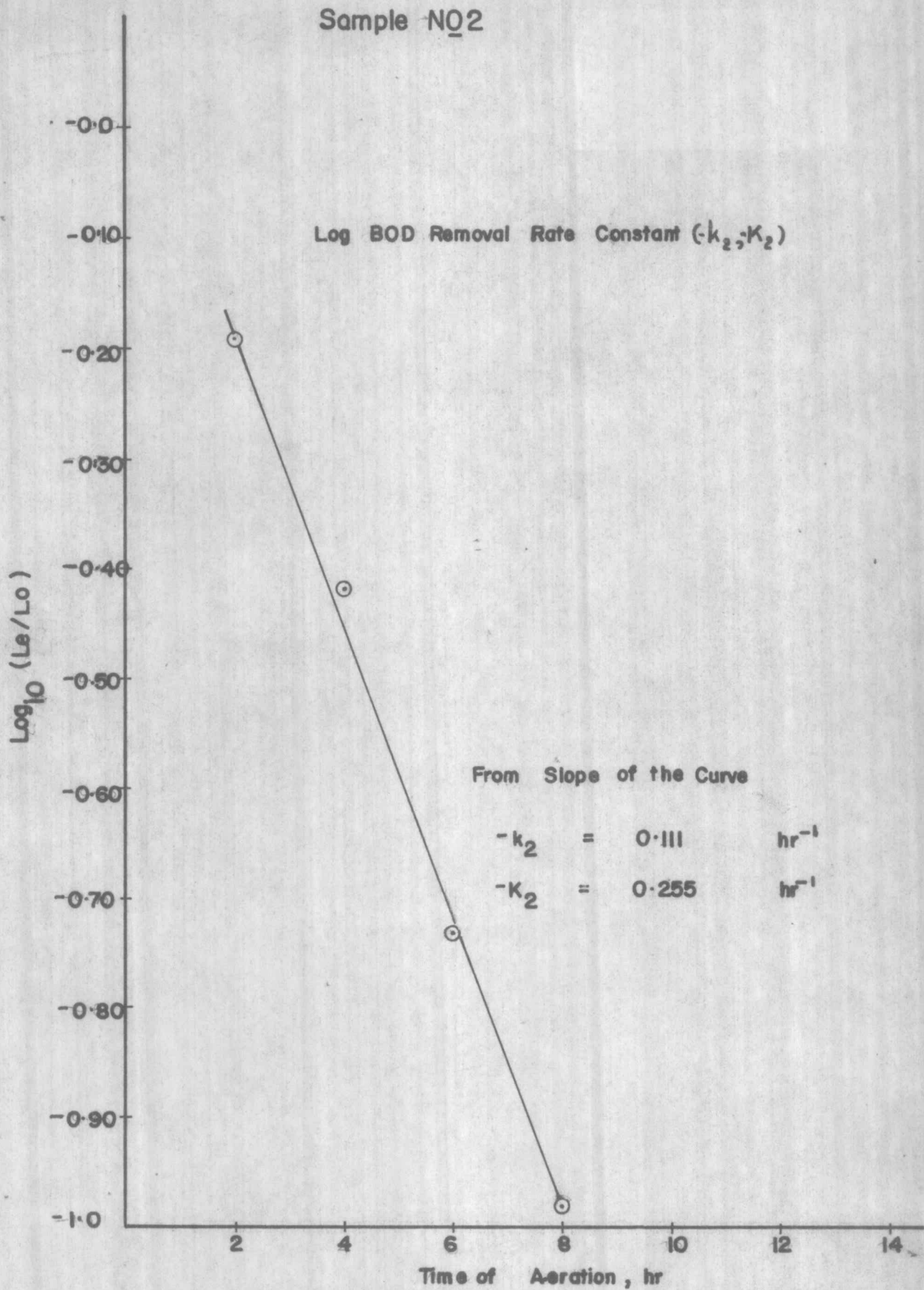


Fig. 29 The Declining Growth Phase