CHAPTER VI

DISCUSSION

Factors affecting the values of overall oxygen transfer coefficient and the rate of oxygen transfer are :-

Tray Spacing

According to Table 2 and Fig. 9. it is observed that, for a certain flow rate the overall oxygen transfer coefficient K_{La} 20°C increases as the increase in tray spacing. This is due to the fact that greater value of spacing results in better atmospheric ventilation or air diffusion meanswhile the overall oxygen transfer coefficient gradually increases as the increase in flow rate. This can be explained that higher flow rate results in rapid recirculation which reduces aeration time. It is also noticed that at tray spacing of 30 cm. center to center will provide optimum or maximum overall oxygen transfer coefficient. Further increase or decrease tray spacing beyond this point will not provide better transfer coefficient, therefore tray spacing of 30 cm is the optimum value for the design basis.

Number of Tray Aerator

Fig. 10 to Fig. 13 show the relationship of D.O. measured (C_L) and the number of trays Deoxygenated water was having initial dissolved oxygen of 0.00 to 1.00 mg/l distributed through the packing gravel of each tray flow rate the effluent,D.O. will gradually increase as the increase of the number of tray and reach finally over 90 percent of oxygen saturation value after passing through six trays of 1" to 3" size gravel under continuous flow. This may be indicated that six-layer of tray aerator having a spacing of 30 cm. center to center are performed satisfactorily for such a tray type aerator.

Flow Rate and Volume of Water Aerated

According to Fig. 14 and 15, the overall oxygen transfer coeficient will gradually increase as the increase of water flow rate at a difinite volume of water and decrease as the increase of aerated volume at any flow rate. It is because a greater time is required for the transfer of molecular oxygen from the atmosphere through the body of liquid by means of diffusion and convection.

Power Consumption

According to Table 1, theoretical net power consumption is computed from momentum transfer equation by adjusting required flow rates at avialable elevated head constant. It results from the experiment that the increase of rate of flow will increase the power consumption at a given constant head.

According to this research, the specified tray spacing of 30 cm. will provide the optimum rate of Oxygen transfer and it will rapidly increase in the case of decreasing the flow rate as shown in Fig. 16. The relationships of oxygen transfer rate versus flow rate at various aerated volume are plotted in Fig. 17 and 18. It is found that the

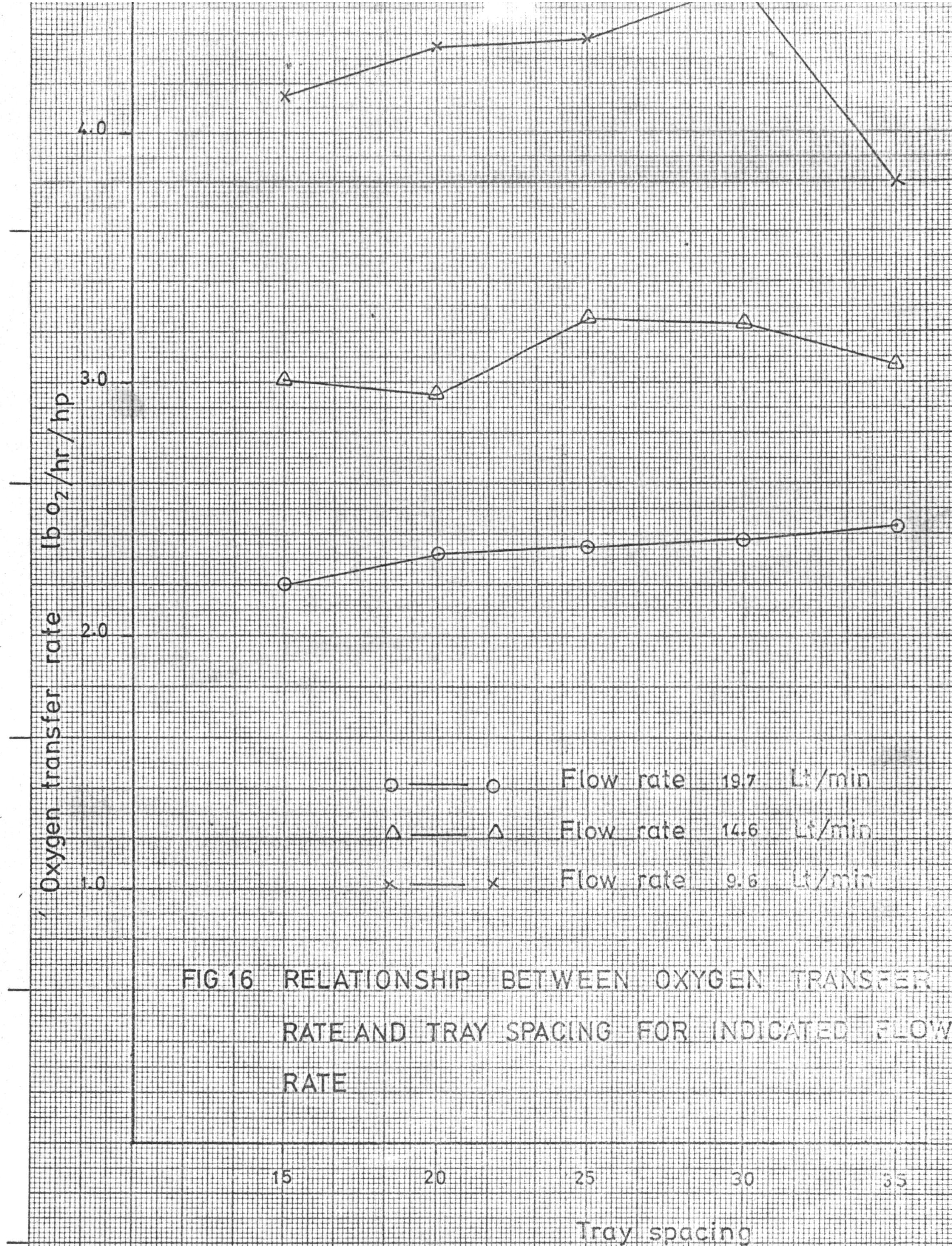

FIG 16 RELATIONSHIP BETWEEN OXYGEN TRANSFER RATE AND TRAY SPACING FOR INDICATED FLOW RATE

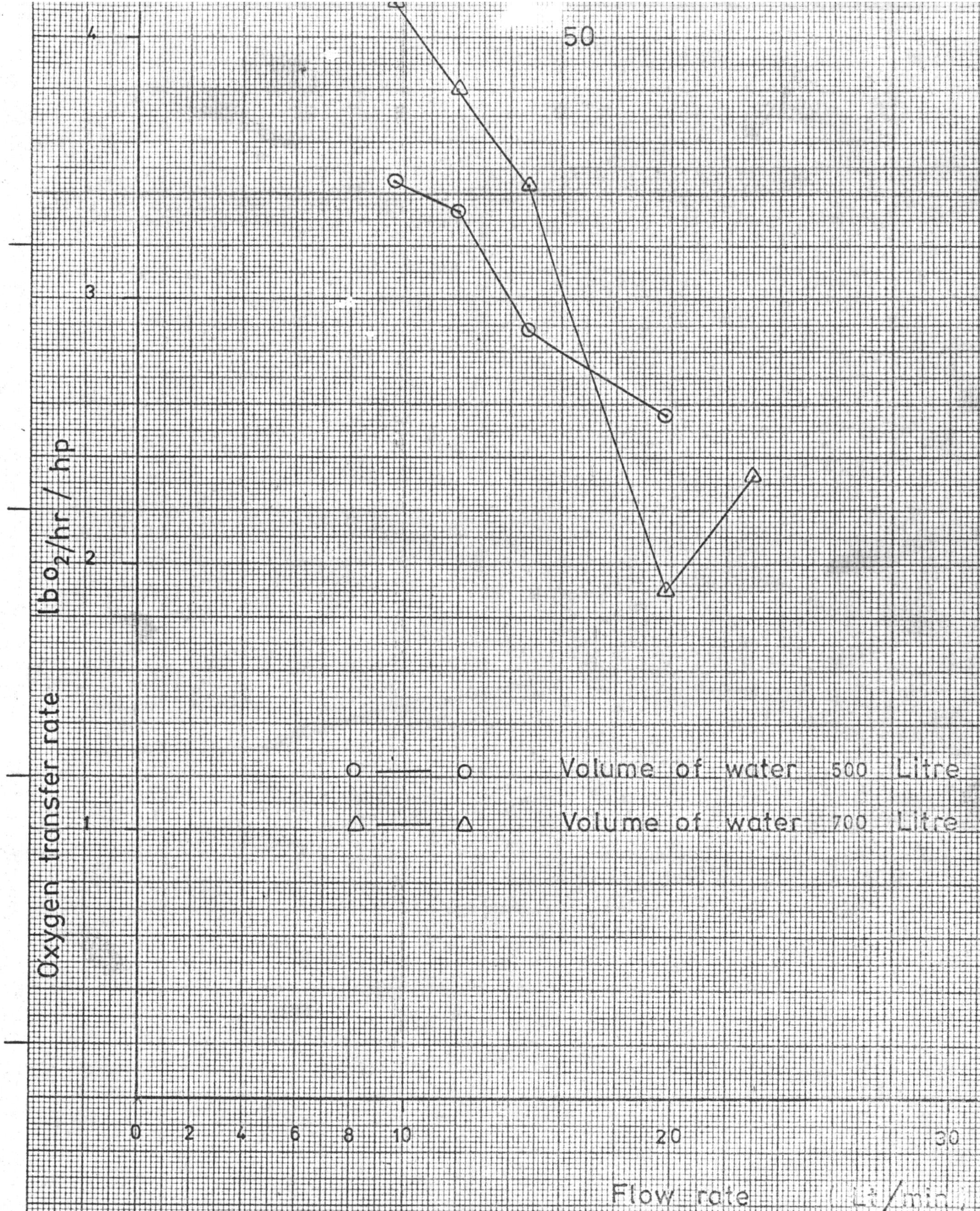

FIG 17 RELATIONSHIP BETWEEN OXYGEN TRANSFER RATE AND FLOW RATE FOR INDICATED AERATED VOLUME

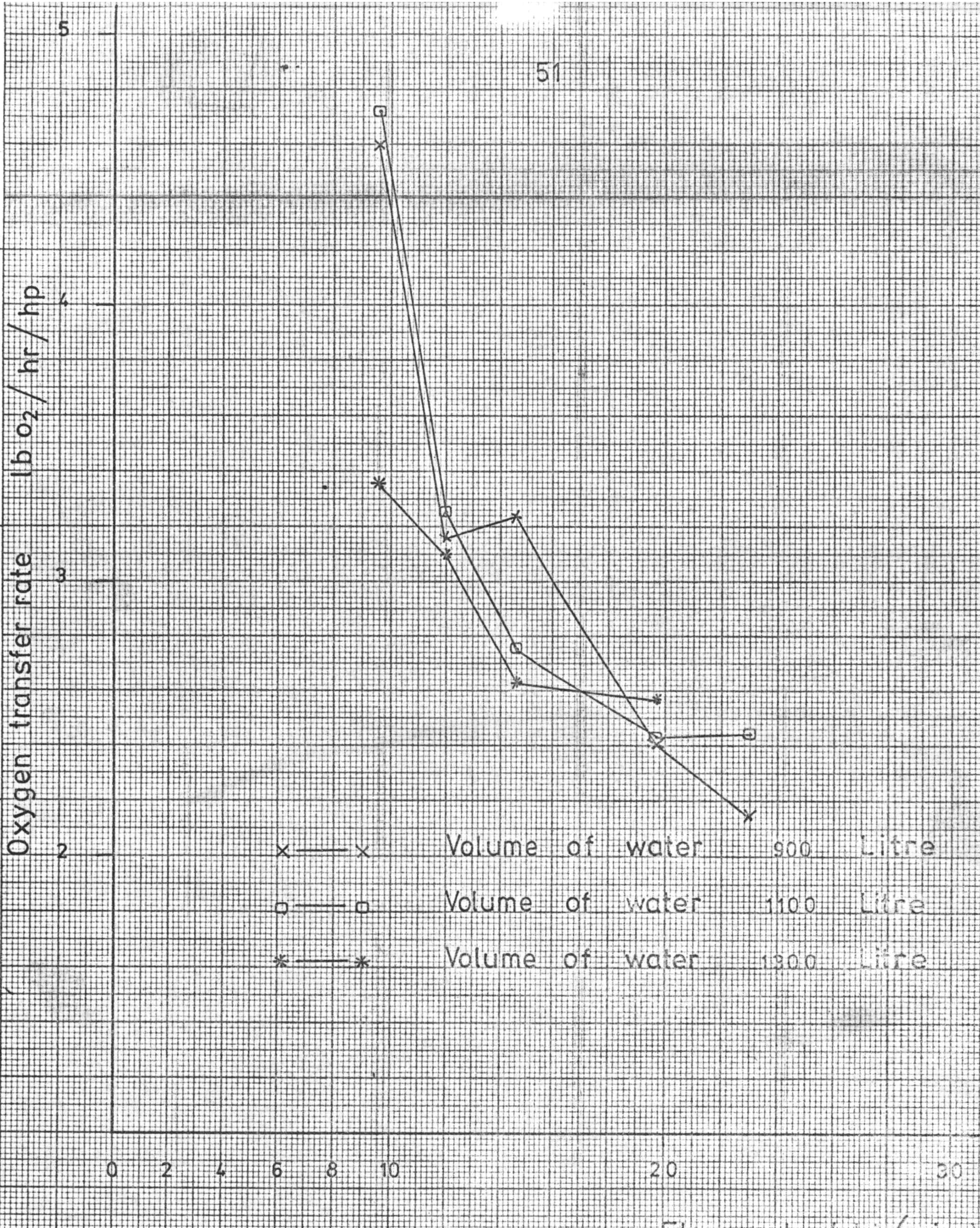

FIG 18 RELATIONSHIP BETWEEN OXYGEN TRANSFER RATE AND FLOW RATE FOR INDICATED AERATED VOLUME

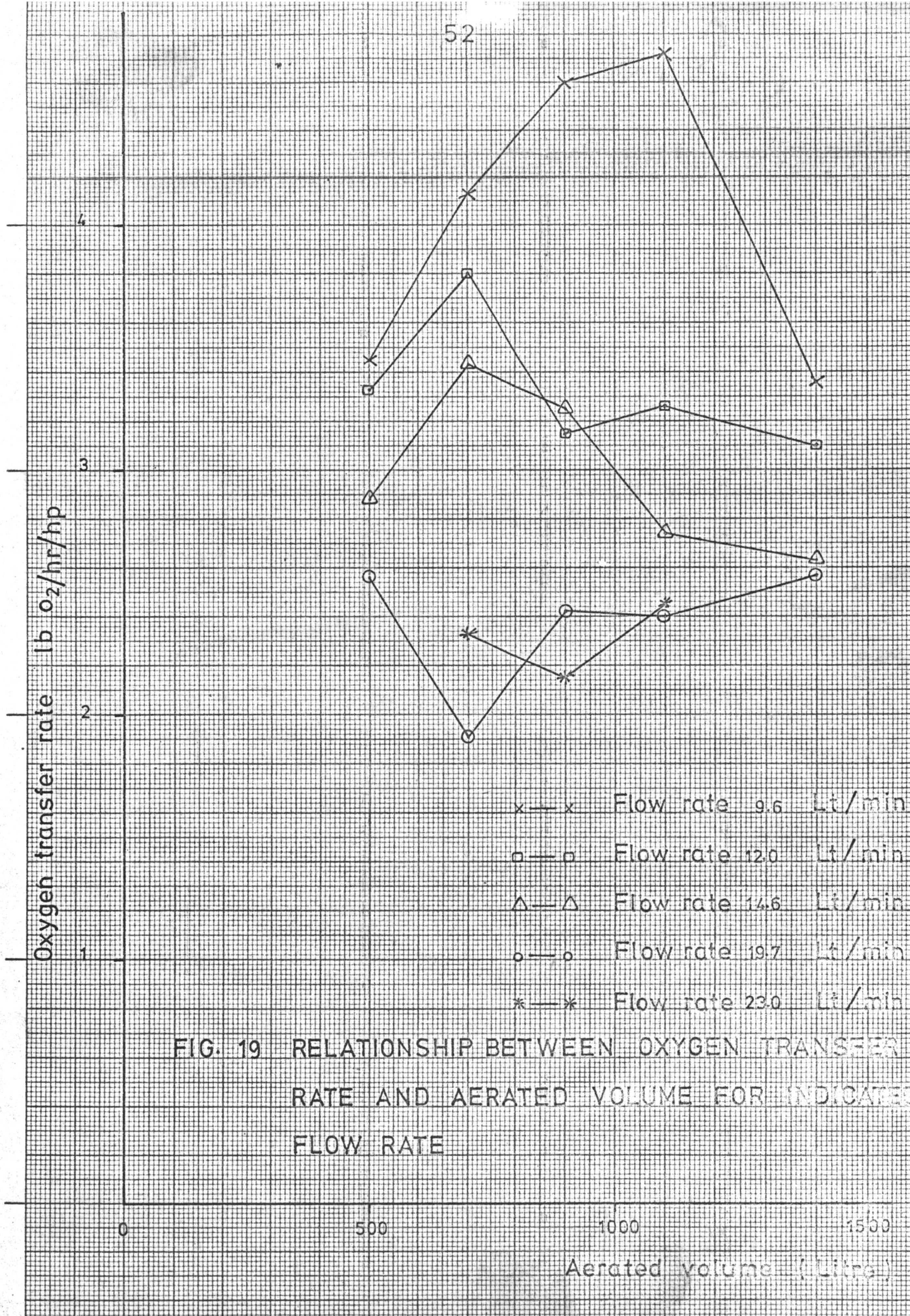

FIG. 19 RELATIONSHIP BETWEEN OXYGEN TRANSFER RATE AND AERATED VOLUME FOR INDICATED FLOW RATE

decrease of oxygen transfer rate per unit power consumption results from the increase of the both water flow rate and power concumption as reported by Bears and Muskat (1959). The plot of oxygen transfor ratr against aerated volume at various rates of flow is also shown in Fig. 19. It is pointed out that the oxygen transfer rate will decrease as the increase of volumetric flow rate at the same quantity of water aerated. It is also observed from the results that the oxygen transfer rate per unit power consumption slightly fluctuate for a given flow rate and the mean value of oxygen transfer at various flow rates are ranged approximately from 2.3 to 4 lb O_2/hp/hr for multiple tray aerator, which means that oxygenation capacity of small or large scale aeration unit is not widely different. O'CONNOR (1967) reported the values of oxygen transfer rate of 1.5 lb O_2/hp/hr for diffused aeration and 3 to 4.0 lb O_2/hp/hr for mechanical aeration.