The optimum condition for batch activated sludge system in treating of synthetic wastewater concentration of BOD₅ (100, 200, 300, 500 and 1,000 mg/l) were studied. The experiments were carried out in 40 litres-reactor (laboratory scale) with various values of F/M ratio (0.05, 0.1, 0.3, 0.5 and 1.0 d⁻¹).

The results showed that the BOD₅ removal efficiency of the systems at various F/M ratio and initial BOD₅ concentration were given the same patterns. The removal efficiency of the system was highest at the first hour with maximum growth rate. Because, at the first hour of operation, the sludge was activated and the wastewater was rich of nutrients.

For the determination of the effluent quality of the system (the effluent BOD₅ was not more than 15 mg/l), we found that the F/M ratio as 0.1 d⁻¹ and 0.3 d⁻³ was the best ratio operating the system to treat the waste water which had initial BOD₅ concentration as 100, 200, 300 and 500 mg/L. Because the system was operated under highest BOD₅ removal efficiency with the lowest HRT and % excess sludge production. For example, at F/M ratio of 0.1 d⁻¹ the HRT, % excess sludge producing and BOD₅ removal efficiency of the system were 2, 4, 6 and 14 hrs, 14.3%, 8.89%, 4.58% and 11.66% and 86.36%, 92.92%, 96.98% and 96.98% when the initial BOD₅ concentration of the sytatic waste water were 100, 200, 300 and 500 mg/L, respectively.

But for the syntetic wastewater which had the BOD₅ concentration as 1,000 mg/l, the BOD₅ effluent from system was higher than 15 mg/l at every F/M ratio (0.01, 0.1, 0.3, 0.5 and 1.0 d⁻¹). At the F/M ratio of 0.3, the BOD₅ of removal efficieincy of the system was 98.63% within 24 hours. The BOD₅ of effluent was 35 mg/l. The excess sludge of the system was 5.48%.