Chapter I

INTRODUCTION

1.1 General introduction

A major objective of most water treatment systems is to remove suspended and colloidal particles from turbid water. The conventional water treatment systems are usually composed of several steps of processes such as coagulation, flocculation, sedimentation, filtration, disinfection and including sludge disposal.

In the meantime, a drastic change in sedimentation methods occured. Solids contact clarifier including flocculation and sedimentation in the same unit were employed, which showed two or more times higher rate of sedimentation than conventional systems. The detention time of solids contact clarifier is about 1 to 2 hours (Chaovayut Phornpimolthape, 1972; American water Works Association, 1984).

The main objective of this research is to developing new, effective and very high rate clarifier. Therefore, turbidity removal by an upflow pellet-floc formation process is developed in a fludized pellet-floc bed clarifier to form more compact flocs than conventional and general solids contact clarifier, with very high upflow rate of 30 and 40 cm./min. So, hydraulic

detention time through the bed are only about 5 and 3.8 minutes, respectively, for water purification in the innovative clarifier.

1.2 Objective of the investigation

To study the possibility and efficiency of clarification of turbid water by an upflow pellet-floc formation process for low-concentration suspension. To obtain basic information on experimental results of clarification by the said process. For recommendation of the further study, developing and application of the process.

1.3 Scope of the investigation

The investigation was done by using a 50 NTU suspension of kaolinite clay in tap water as the feed water. Polyaluminum chloride (PACl) was used as the coagulant while an anionic polymer, anionic polyacrylamide, was used as the flocculant. The independent variable included coagulant and flocculant dosage, rate of paddle agitation and upflow velocity. And excess flocs drawoff rate was however kept constant at 15 % of the inflow rate.

Scope of the investigation are shown in the following tables:

Table 1.1 Experimental group 1.

Speed of paddle agitation in fluidized pellet-floc bed clarifier is 5 rpm.

	Upflow Velocity is 30 cm./min.				Upflow Velocity is 40 cm./min.			
PACl(ppm.) / PE(ppm.)	1.0	2.0	3.0	4.0	1.0	2.0	3.0	4.0
0.1	R 1	R 2	R 3	R 4	R 13	R 14	R 15	R 16
0.2	R 5	R 6	R 7	R 8	R 17	R 18	R 19	R 20
0.3	R 9	R 10		R 12	R 21			R 24

Notes:

PACl is polyaluminum chloride

PE is anionic polymer

R is run number

Table 1.2 Experimental group 2.

Speed of paddle agitation in fluidized pellet-floc bed clarifier is 10 rpm.

	Upflow Velocity is 30 cm./min.				Upflow Velocity is 40 cm./min.			
PACl(ppm.) / PE(ppm.)	1.0	2.0	3.0	4.0	1.0	2.0	3.0	4.0
0.1	R 25	R 26	R 27	R 28	R 37	R 38	R 39	R 40
0.2	R 29	R 30	R 31	R 32	R 41	R 42	R 43	R 44
0.3	R 33	R 34			R 45			R 48

Notes:

PACl is polyaluminum chloride

PE is anionic polymer

R is run number

Table 1.3 Experimental group 3.

Speed of paddle agitation in fluidized pellet-floc bed clarifier is 15 rpm.

	Upflow Velocity is 30 cm./min.				Upflow Velocity is 40 cm./min.			
PACl(ppm.) / PE(ppm.)	1.0	2.0	3.0	4.0	1.0	2.0	3.0	4.0
0.1	R 49	R 50	R 51	R 52	R 61	R 62	R 63	R 64
0.2	R 53	R 54	R 55	R 56	R 65	R 66	R 67	R 68
0.3	R 57	R 58			R 69	R 70		R 72

Notes:

PACl is polyaluminum chloride

PE is anionic polymer

R is run number