

Proprietary Materials for Acceleration of First Carbonation Thickening

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A paper, "Further Experiences with Algins" was presented at the eighth general meeting of this society by Halden and Moore. (1)² The paper reviewed Spreckels' experiences with Kelgum, a sodium alginate product of the Kelco Company, as a settling aid for first carbonation sludge.

The use of Kelgum as a settling aid has continued at the Spreckels factories. The benefits have been positive and results satisfactory under normal operating conditions. However, for abnormal operating conditions such as processing of muddy beets, and infrequently under apparently normal operating conditions, a cloudy Dorr overflow may be encountered.

To insure that an aid more effective than Kelgum would not be overlooked, a laboratory scale investigation of the effectiveness of various commercially available settling aids was conducted during the 1955 spring campaign. The aids tested include the following:

Settling Aid	Supplier
Kelgum	Kelco Company
Aerofloc 548	American Cyanamid Co.
Aerofloc 552	American Cyanamid Co.
Aerofloc S-3059	American Cyanamid Co.
Lytron X886	Monsanto Chemical Co.
Duolite Polyelectrolyte 503-6A	Chemical Process Co.
Separan 2610	Dow Chemical Co.

This paper presents an evaluation of these settling aids with respect to Dorr thickener capacity, overflow clarity, effect of detention time in the thickener, optimum rate of addition to first carbonation juice, and dispersion characteristics.

Experimental Procedure and Results

Tests were made by the Dorr-Kynch method as described by Talmage and Fitch (2). The calculations were modified to give results in units of capacity per unit area rather than unit area required. The Dorr-Kynch method has been found to be less time-consuming than the Skaar-McGinnis (3) modification of the method of Coe and Clevenger. The results of the Dorr-Kynch method appear to be as valid as those obtained by the Skarr-McGinnis method.

The settling aids were dispersed in water at a concentration of 0.1% and were added to the factory first carbonation juice at a rate of 1 to 5 p.p.m. Figure 1 is a typical settling curve used for the calculation of settling capacity.

All of the aids listed above were tested during the first part of the investigation. After several series of tests, Aerofloc 552, Aerofloc S-3059, Separan 2610, and Duolite 503-6A were eliminated from further testing.

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² Numbers in parentheses refer to literature cited.

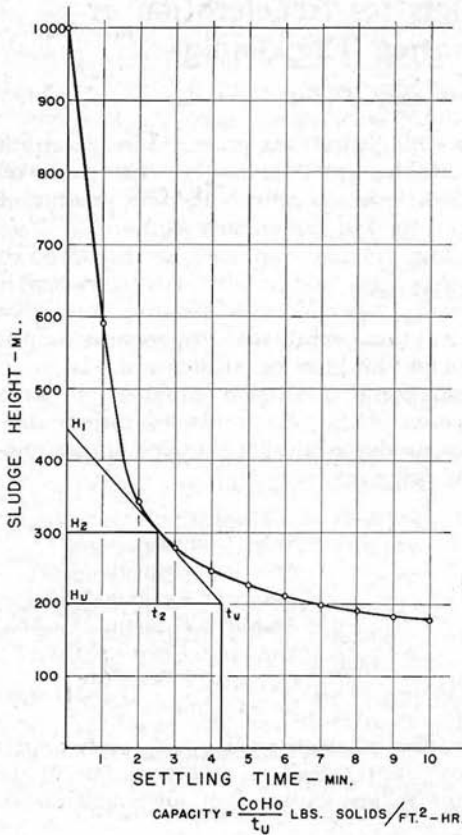


Figure 1.—Thickener capacity by Dorr-Kynch method.

These aids consistently produced lower capacities and in most cases did not give a sparkling clear effluent. The rest of the tests were made using the three remaining settling aids with Kelgum for a basis of comparison.

Two p.p.m. appeared to be the optimum rate of addition for all aids under normal operating conditions. When the rate of addition was increased above this value, the rate of settling was found to decrease slightly. With additions at a lesser rate a cloudy effluent was frequently encountered.

Tests were made on first carbonation juice during a period of cloudy Dorr overflow due to excess mud being brought into the factory with the beets. Aerofloc 548, when added at the rate of 4 p.p.m. was the only one of the aids tested on this juice that produced a clear effluent. The other aids produced effluents of varying degrees of cloudiness. It had been planned to test this aid on a factory scale under similar conditions during the 1955 fall campaign, but the opportunity was not forthcoming as no difficulties were encountered with a cloudy Dorr overflow.

Table 1.—Average Thickener Capacities with Settling Aids

Settling Aid	Quantity Added	Capacity
	P.P.M.	Lbs. solids/sq. ft.-hr.
Kelgum	2	34.9
Aerofloc 548	2	34.6
Lytron X886	2	25.9
No settling aid	0	24.4

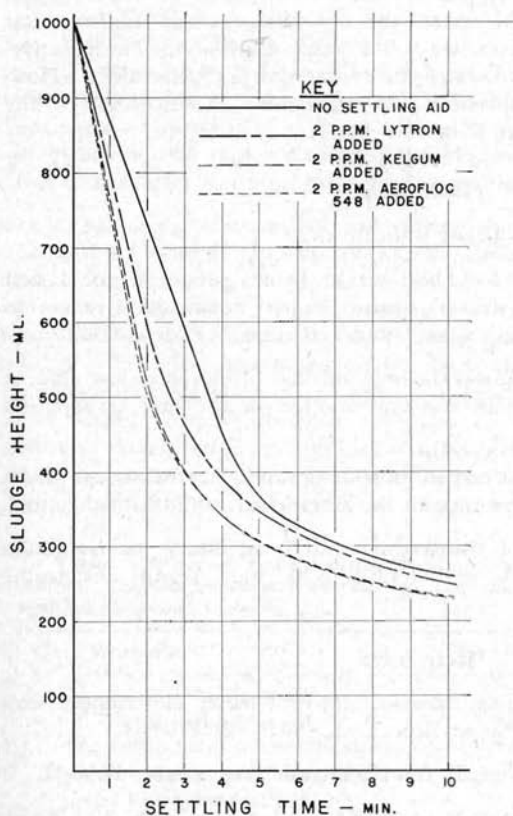


Figure 2.—Typical settling curves.

The average capacities for the aids tested are listed in Table 1. The aids, tested during the first portion of the series only, are not included as the results are considered to be unimportant. Kelgum and Aerofloc 548 when added at the rate of 2 p.p.m. produced the highest capacities and showed approximately equal effectiveness for normal operations. Lytron X886 showed only slightly higher capacities than were obtained without settling aids. Figure 2 illustrates a typical set of settling curves obtained using the settling aids listed in Table 1.

A series of tests were made using an hour contact time between the settling aids and the first carbonation juice, to determine the effect of detention time in the Dorr thickener. Kelgum and Aero-floc 548 gave slight increases in capacity and Lyton X886 gave an equivalent decrease. Halden and Moore (1) previously showed this effect with Kelgum. These observations indicate that when using these aids, one could expect little change in settling characteristics due to detention time in the Dorr thickener.

The dispersibility of the settling aids was found to vary considerably. Hot water is deemed a necessity for dispersion of Kelgum as it will not completely disperse in cold water. Although Aero-floc 548 and Lyton will disperse in cold water, they will do so more readily in hot water. When Kelgum was dispersed in cold water, the optimum rate of addition was 4 p.p.m. as compared to 2 p.p.m. for a hot water dispersion. The effectiveness of the other aids in a cold water dispersion was not determined. However, to insure complete dispersion and maximum efficiency, all of the settling aids should be dispersed in hot water.

Conclusions

The tests reported in this paper indicate that:

1. Kelgum and Aero-floc 548, both at 2 p.p.m., produced the fastest settling rates. They showed approximately equal effectiveness in settling first carbonation sludge under normal operating conditions.
2. Aero-floc 548 at 4 p.p.m. was the only aid that produced a clear effluent when a high silt content was encountered in the first carbonation juice.
3. The settling rate of first carbonation sludge should show no significant change due to detention time in the Dorr when using the aids tested.
4. Complete dispersion of the settling aids is necessary for maximum effectiveness. The aids were found to be most readily dispersible in hot water.

References

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