Why O/A ratios and phase continuity are important for efficient SX plant operation.

O/A Ratio

The O/A ratio of the phases in a mixer has a significant effect on entrainment as shown in Figures 1 and 2. With organic continuous dispersions, aqueous entrainment in the organic phase increases considerably at O/A ratios greater than 1.5:1. Organic entrainment in the aqueous phase is very low for organic continuous dispersions and is not dependent on the O/A ratio in the mixer.

For aqueous continuous dispersions, organic entrainment in the aqueous phase increases sharply at O/A ratios of less than 1:1, and aqueous entrainment is lowest between O/A ratios of 1:1 to 2:1. Therefore, the optimum O/A for both organic and aqueous continuous dispersions is between 1:1 to 1.5:1.

The O/A ratio of the phases in a mixer can be maintained between 1:1 to 1.5:1 by recycling either the organic or aqueous phase from the settler to its mixer. Another important reason for maintaining the optimum O/A ratio is to improve the mass transfer rate and stage efficiency. At the optimum O/A ratio the rate of coalescence and re-dispersion of the dispersed phase is enhanced.

Phase Continuity

A relationship exists between entrainment and phase continuity. Under organic continuous dispersions, in which the aqueous phase is dispersed as droplets in the organic phase, aqueous entrainment in the organic phase is common. Organic continuous dispersions usually produce an aqueous phase low in organic entrainment. Therefore, in order to produce a strip liquor and raffinate low in organic entrainment, it is recommended to operate the first stage of stripping and the last stage of extraction with organic continuous dispersions in the mixers.

Aqueous continuous dispersions, in which the organic phase is dispersed as droplets in the aqueous phase, can produce an aqueous phase with organic entrainment and an organic phase low in aqueous entrainment. Therefore, it is recommended to operate the mixer in the last stage of stripping and the first stage of extraction under aqueous continuous conditions in order to minimize aqueous entrainment in the organic phase. This relationship between O/A ratio and phase continuity on entrainment can be used to improve SX plant operation.

Figure 1. Effect of O/A ratio on Aqueous Entrainment.

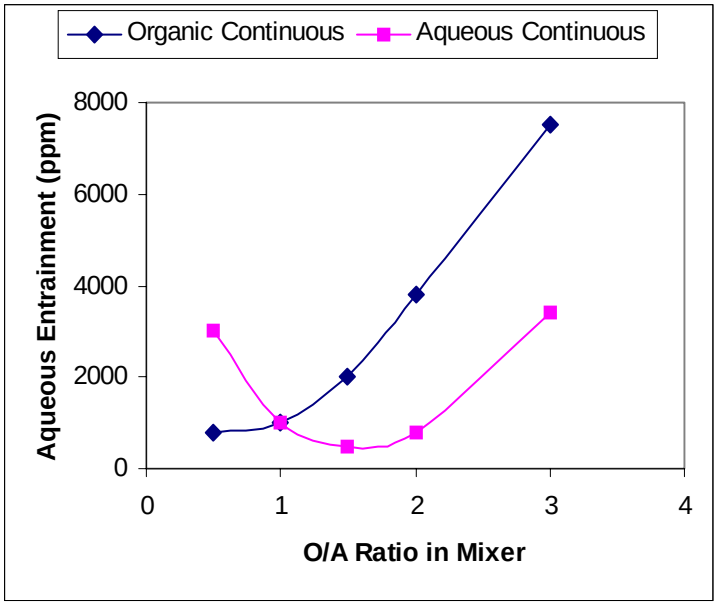
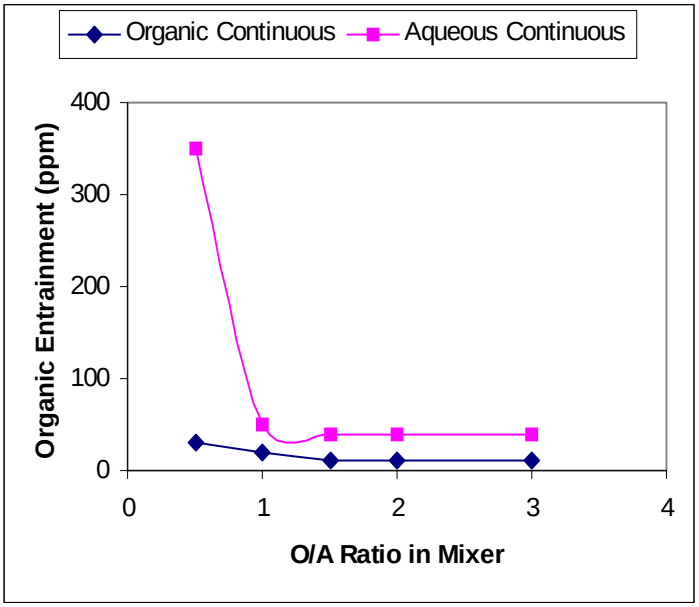


Figure 2. Effect of O/A Ratio on Organic Entrainment.



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