Toward zero waste production in the paint industry

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Abstract

Wastewater is generated in the batch production process of water-based paints when vessels and filling lines are washed between batches. This results in a diluted paint wash water stream. The wash water is currently treated in a flocculation process using ferric chloride as a coagulant.

An opportunity was identified for re-using wash water from white, non-textured paints. It is necessary to stabilise the wash water with biocides. This water is then used in place of fresh feed water for lower quality paints. Since the wash water originates from high quality products, adding this water to the lower quality paints results in a quality improvement. In addition, treatment costs of the wash water are reduced. This wash water represents approximately 65% of total effluent from the plant.

With respect to the remainder of the wash water, the concentration of paint solids in the wastewater stream can vary widely. For effective treatment different solids content in the wastewater requires different dosage levels of the coagulant. If ferric chloride is used as the coagulant overdosing results in waste that must be disposed of as toxic. Ferric chloride dosing can be more easily controlled by using a dilute feed solution. This paper presents the findings of the effect of concentration of the coagulant on the coagulation process. Both the solids content of the wash water and the concentration of the coagulant have been found to be important variables to ensure efficient flocculation and coagulant utilisation.

Introduction

Although the type of waste generated by different industries varies dramatically the principles in waste minimisation are generic.

An approach known as the hierarchy of waste is being applied. The basic principle is that to avoid waste generation is far easier than to reprocess it later (Cano-Ruiz and McRae, 1998). The next level in the hierarchy is to simply reuse the waste material with almost no processing. A common example of this is the refilling of bottles after simply washing them. Recycling is the next level down and it implies that the waste stream is reprocessed to make it useful again. Again the analogy of a glass bottle being melted down to be formed into a new shape is useful. Potentially the most difficult waste reduction strategy is to reprocess the waste in such a way that it can be used in another unrelated process. This could however also prove to be a simple solution. It is clear that the further from the source of the waste one tackles the problem of waste minimisation, the more energy, technology and cost is required, and hence the more difficult it becomes to strive toward a zero waste system. The major driver for waste reduction is cost. The diagram that follows is a representation of the hierarchy of waste.

In the drive for zero waste Barloworld Plascon SA (Pty) Ltd has undertaken a number of initiatives to eliminate waste at source.

Two of these will be discussed in this paper, namely recycling wash water and the way in which effluent is treated prior to disposal.

Reusing the wash water is a desirable way to minimise the waste generated. This could be done in two different ways: the water could be reused as wash water, however this would result in a fairly fast deterioration of the cleaning of vessels and lines, as the paint is a fairly concentrated suspension. The other alternative is to explore re-using the wash water instead of fresh water feed. The major concern that needs to be addressed is product quality which must not be affected by the reuse of the wash water.

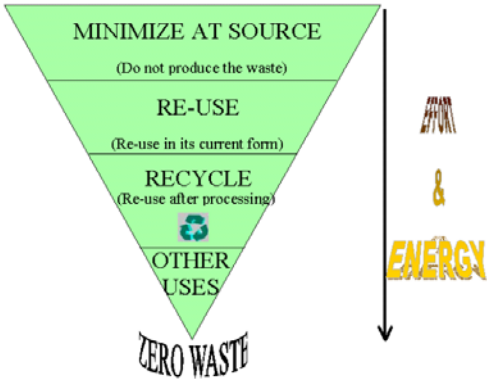

Figure 1
Hierarchy of waste

For example depending on the origin of the wash water it may contain solids with undesirable properties like texture or colour which could affect product quality. Wash water with texture or colour could only be used in products with texture and colour. Moreover the wash water ferments and storage space is limited. In the light of this and the fact that the paint production schedule runs according to market demand for different products, not all of the water can be reused. The remainder must continue to be disposed of once it has been treated.

The wastewater generated is comprised of water and paint constituents (mainly solids that are suspended in the wastewater). This wastewater cannot be sent directly into the public sewage system because it does not meet the effluent discharge standards

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