

## Double Function Adhesives

### Background

Apart from their intrinsic function as adhesives, labelling glues are able to show additional effects within the process of bottle washing. Those are:

- **negative effects** contaminating the caustic solution (casein glue's high COD value)
- **positive effects** enhancing the cleaning power of the caustic.

The latter are adhesives with double function resulting from their basic polymer, a polyacrylate.

Example: Many multi-use household adhesives also consist of polyacrylates.

As a component of industrial and household detergents, those polymers serve as cleaning enhancers and as stabilizers to avoid precipitations due to water hardness.

The adhesives with double function are the latest invention of ASIRAL, the innovative German company.

### Technical details:

Refillable bottles for beverages are returned only in part to the original bottlers. A certain percentage of bottles of other beverage manufacturers is normal and therefore an important factor to be considered.

Analysis:

0,15 to 0,2 g of adhesive are necessary for the proper labelling of a bottle for beverages. Therefore, with one bucket of 30 kg the labelling of ca. 150.000 to 200.000 bottles can be achieved

In a bottle washer with a capacity of 50.000 bottles per hour, about 7,5 to 10 kg of adhesive will be accumulated in the caustic each hour. Taking into account the number of external bottles with a percentage of 50%, the quantity of adhesives with double function reaching the caustic can be estimated to be around 3,5 – 5 kg per hour.

This quantity is still bigger than the standard dosage of 0,2% additive and 0,02% defoamer that is usually added to the caustic. In consequence, the returning bottles add enough double function adhesive to the caustic to achieve a significant effect.

In contrary to casein based glues, the new adhesives do not foam. It is therefore to be expected that the necessary amount of defoamer can be significantly reduced by the use of double function adhesives – a fact of great relevance to breweries regarding the stability of their beer froth.

Also, the double function adhesives are resistant to low temperatures. They thaw after freezing without deterioration of quality.

### Consequences:

The advantage of using adhesives with double function are summarized as follows:

- The use of chemical products is reduced – a more **eco-friendly** production can be realized.
- **Cost savings and economization** of the use of additives and antifoaming agents in the bottle washer.
- **More security regarding the stability of beer froth.** The surface tension of the water remaining in cleaned bottles tends to the water equivalent.
- **Less contamination of the caustic** due to an extremely low COD (ca. 230mg/g) compared to the COD of casein glues. The intervals for sedimenting and exchanging of the caustic become longer.
- The waste water pollution with COD is lower, resulting with a diminution of costs and higher security.
- At long sight it may supersede the use of additives, antifoaming agents and associated dosing systems.
- No more wasting of the valuable protein named casein for purposes other than nutrition as it is done with the use of casein based glues.

The double function effect sets in with a certain delay when a sufficient amount of own bottles have returned.

## ASiRAL double function adhesives as additives to the caustic

### Stabilizers of water hardness

The polyacrylates used are high class stabilizers for hard water avoiding the formation of precipitates in the caustic. Their well known dispersing powers result in a very quick removal of the labels and amplify the mould removing properties of the caustic.

A lab test showed that under standard conditions (80°C, 2% caustic solution, 0,2% additive) a metal coated label is removed within 4 minutes.

### Solubility of aluminium foil

The dissolution of aluminum foil is significantly accelerated in the presence of ASiRAL's synthetic adhesive, even in comparison with additives especially designed for this application.

### Foaming behaviour:

The foaming behaviour of a caustic solution with 0,2% additive and 0,2% casein and a caustic solution with 0,2% ASiRAL adhesive was compared in a laboratory test.

While the caustic containing ASiRAL adhesive did show almost no foaming, the caustic containing additive and casein glue was strongly foaming. Therefore it can be assumed that, at customer's conditions, a significant amount of defoamer can be saved (depending on the percentage of external bottles). This can also lead to a reduction of the carryover of alkalinity in the bottle washer.

Table: Foaming behaviour

	Foam depth
Caustic with ASiRAL additive and 0,2% casein glue	300 ml
Caustic with competitor's additives and 0,2% casein glue	300 ml
Caustic with 0,2% ASiRAL adhesive	80 ml

### Determination of the concentration:

ASiRAL adhesives are to be determined in the caustic by a special method of ASiRAL.

### Comment:

Many users have made their experiences with first generation synthetic and semi-synthetic adhesives based on polyvinyl alcohol (PVA) or similar substances. Glues with this basis are foaming significantly and are absolutely not comparable to the ASiRAL adhesives of the second generation. While the use of antifoaming agents is essential for the production process of casein glues and glues based on PVA (in consequence, these defoamers also accumulate in the caustic solution of the bottle washer), the addition of an antifoaming agent is not necessary for the production of ASiRAL's latest adhesives.

### ASiRAL adhesives of the second generation are free of antifoaming agents!