



Trisodium Citrate Anhydrous **Loaded**

Boost dishwashing performance ecologically

- Carrier for liquid ingredients
- Excellent flowability
- Easy tableting
- Superior water absorption
- Effective builder in phosphate-free formulations

Jungbunzlauer

*From nature
to ingredients®*

Optimising dishwashing detergents

Sodium citrate is widely used as an ecologically friendly builder in phosphate-free automatic dishwashing detergents (ADWDs). Jungbunzlauer's special water-free trisodium citrate anhydrous (TSA) has a porous crystal matrix which can absorb water and can be used as a carrier for inorganic and organic liquids (e.g. surfactants) while remaining a free-flowing powder. These properties enable optimised processing and product features for automatic dishwashing detergents.

General functions and properties of sodium citrate

- Chelation of water hardening ions
- Buffering the pH of the washing liquid
- Readily biodegradable
- Free from phosphorous - no eutrophication
- Compatible with all other dishwashing detergent ingredients

Advantages of loaded Trisodium Citrate Anhydrous

With the removal of two water molecules from trisodium citrate dihydrate (TSC) through a patented drying process, TSA's molar mass becomes 12.2% lower than its hydrate form. Trisodium citrate anhydrous can be loaded with up to 7% of liquid or even paste-like ingredients (e.g. surfactants) while remaining a free-flowing powder with excellent dry-mixing, tableting and dissolution properties.

Potential applications for loaded Trisodium Citrate Anhydrous

- Dishwashing tablets
- Multichamber sachets
- Dishwashing tablets with polyvinyl alcohol foil (PVOH)

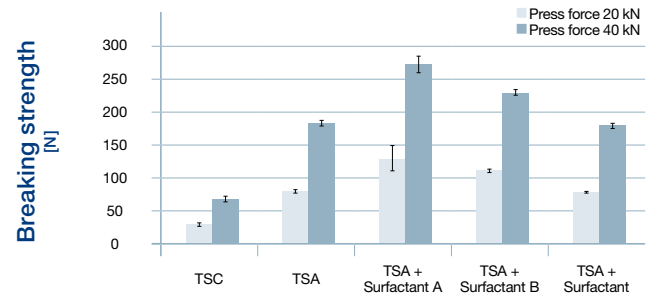


From easy mixing..

- 100% active matter - requires lower dosage
- 2-in-1 product - easy handling without additional pre-granulation steps
- Bulk density comparable to regular sodium citrate
- Free-flowing powder - flow time level with regular TSC
- No agglomeration in pipes and press moulds - less maintenance needed

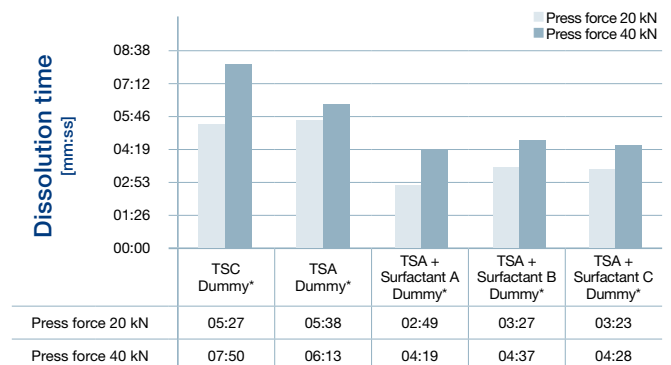
..to excellent tableting

- Higher breaking strength compared to tabs using regular sodium citrate or pure TSA
- Superior compressibility characteristics - less press force needed to achieve the same tablet hardness
- Reduced tablet fragility in comparison with tabs containing regular TSC - lower risk of product damage during transport and storage



..to fast dissolution

- Tabs containing surfactant-loaded TSA dissolve faster than tabs including solely TSC or TSA
- Lower risk of reduced cleaning performance due to slow/incomplete dissolution of ADWD tab



*based on representative P-free ADWD dummy formulation

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