Rheological properties of liquid egg products for pumping system design

Identification

Key words  rheological properties, egg white, liquid, flow, pumping
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Completed by  FRIP

How does it work?

Primary objective  transport of liquid egg product
Working principle  Pump and tube with special design (avoid mixing with air, low shear forces) has to be designed to be as gentle as possible to the liquid egg white. Especially whipping has to be avoided as well as shearing of protein macromolecules. For this special design, it is crucial to know the rheological properties of liquid egg white at shear rates and temperatures that are applicable in industrial conditions. The convenient types of pumps: hose pump, double diaphragm pump, ev. screw pump. Not convenient pump: centrifugal pump (high shear, risk of whipping), piston pump with valves (bad cleaning, shearing) [1,2,3,4].

Images

Additional effects  Better quality of final product where egg white is used or lower dose of egg white for the same quality of final product due to better gelling properties of egg white.

Important process parameters

Important product parameters  Apparent viscosity, pH.

What can it be used for?

Products  E.g. surimi is made of fish meat pieces joined by the egg white used as the gelling agent, production of egg white based product such as protein slice and or meat products.

Operations  foaming, gelification

Solutions for short comings  Design convenient pumping system for liquid egg white based on knowledge of its rheological properties.
What can it NOT be used for?

**Products**
Foods with eliminated egg proteins determined for allergic patients sensitized on egg white proteins

**Operations**
Intensive shearing, whipping and heating during pumping

**Other limitations**
Cleanability of pumping system

**Risks or hazards**
microbial risk because liquid egg white is ideal growth broth for bacteria and food born viruses e.g. Norwalk type

Implementation

**Maturity**
Mature, broadly used. Full scale applications exist.

**Modularity/Implementation**
Pumping system is inherent part of the production line.

**Consumer aspects**
Increase hygiene of production by pumping of liquid egg white (avoid the transport in open vehicles).

**Legal aspects**
Pumping system consists of stainless steel and has to be designed with regard to high level of hygiene, cleanability of all space inside the system.

**Environmental aspects**
Pumping needs additional electrical energy. Transport in vehicles needs only human power.

Facilities that might be interesting for you

Further Information

**Institutes**
FRIP, IYTE Biotech, McGill Uni DFSAC, DFS UW

**Companies**
Alfa Laval, Verder

**References**

Source: