

## Does Magnesium Stearate influence the electrical charge of lactose powder?

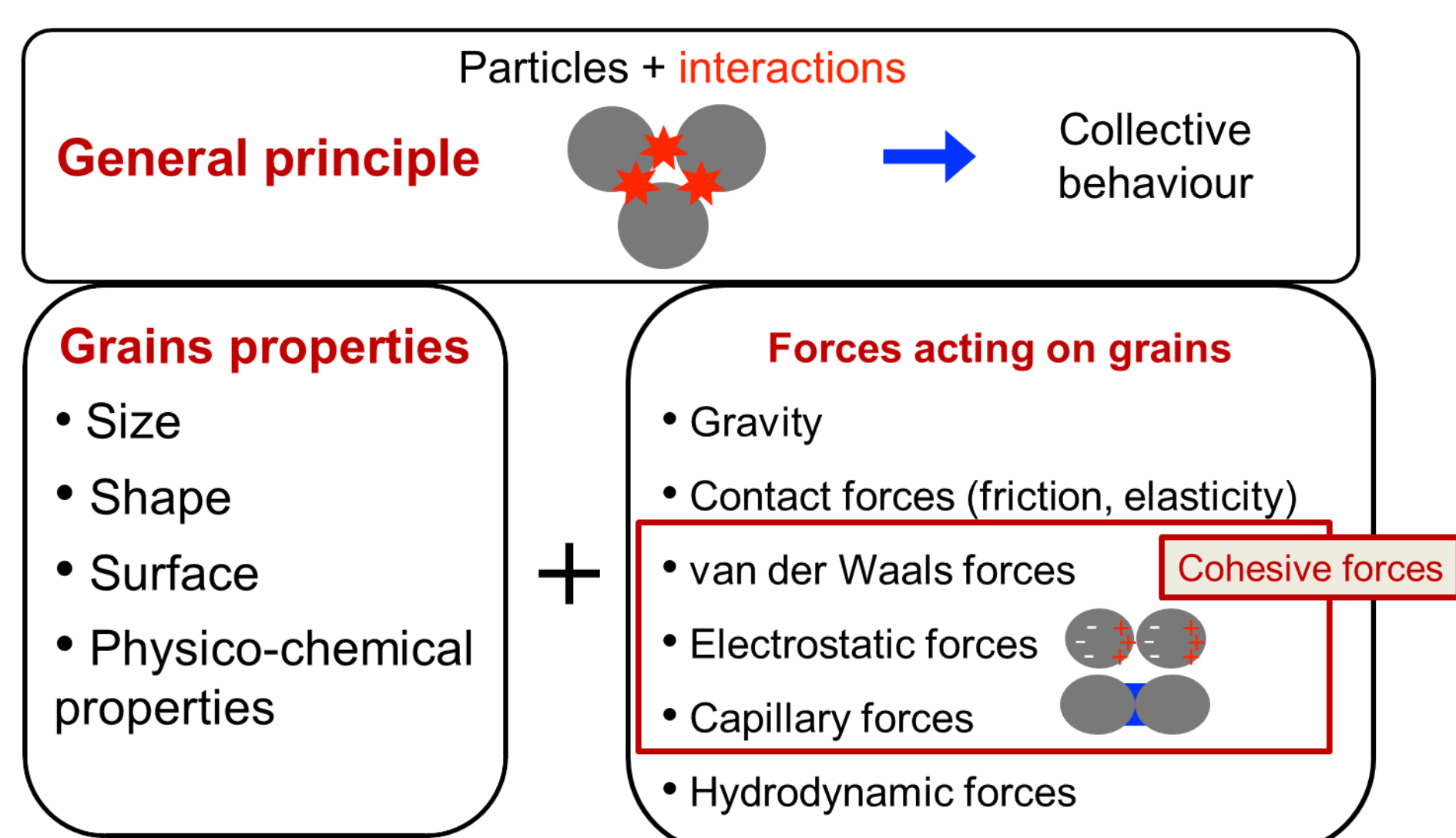
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### ABSTRACT

In Pharmaceutical processes, the powder flow properties are connected with the solid dosage. These properties are investigated by various methods such as, angle of repose (dynamic and static), packing dynamics, electrostatic charge etc. These characteristics are related either to the grain properties (morphology, chemical composition etc.) or bulk behaviour of powder (flowability, electrostatic charge etc.). In this research, the influence of magnesium stearate (MgSt) concentration, as an additive, is investigated on the flowability of lactose powder. The flowability is measured using the electrostatic charge parameter. It is found that, with addition of only 3% of MgSt, the electrostatic charge (measured by GranuCharge) can be limit up to 23% of (77% reduction in charge) virgin lactose powder flow in contact with Stainless-Steel 316L pipes.

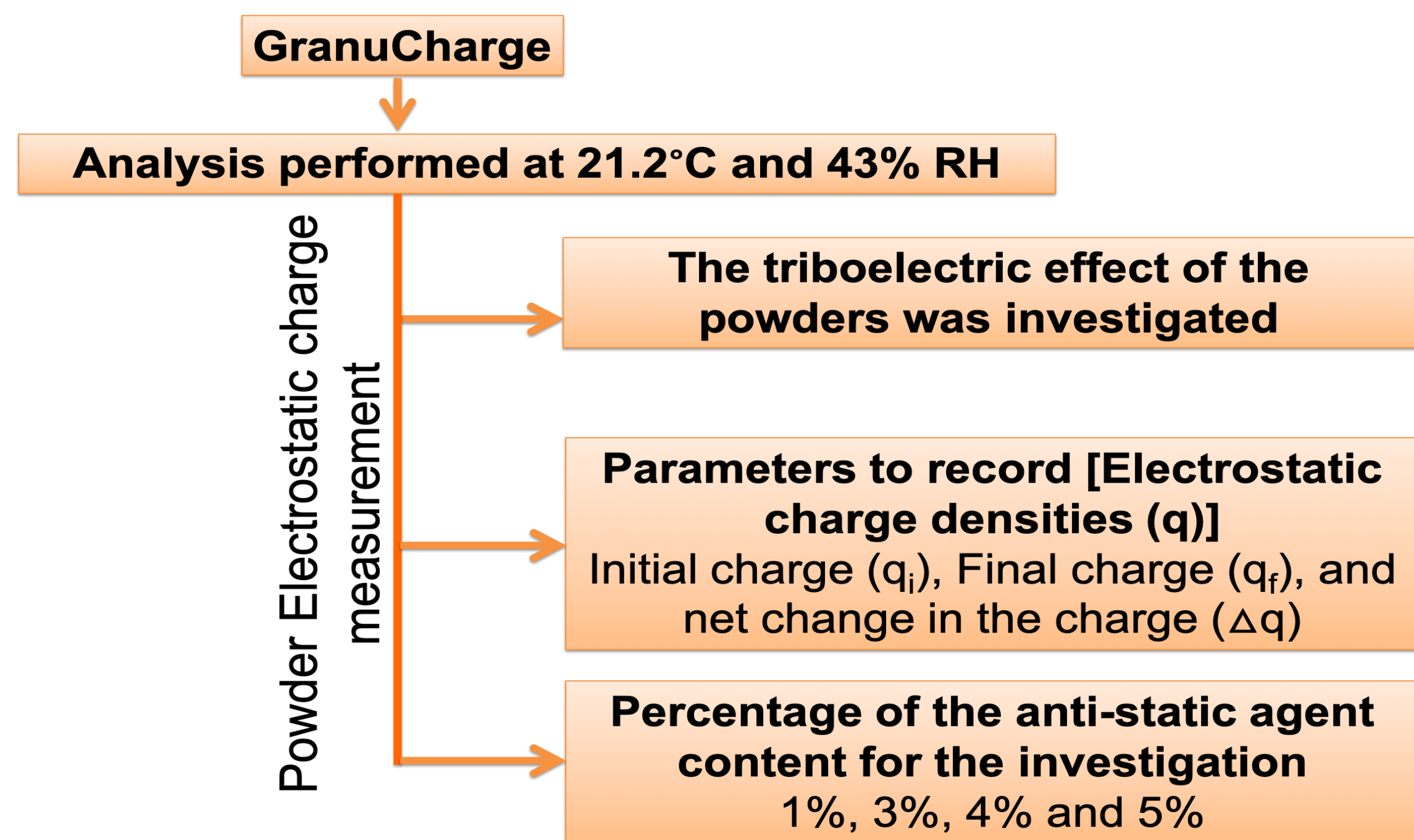
### 1. Introduction



#### Objective:

- ✓ The influence of flowing agent on excipient (powder) flowability

### 2. Experimental method



### 3. Materials

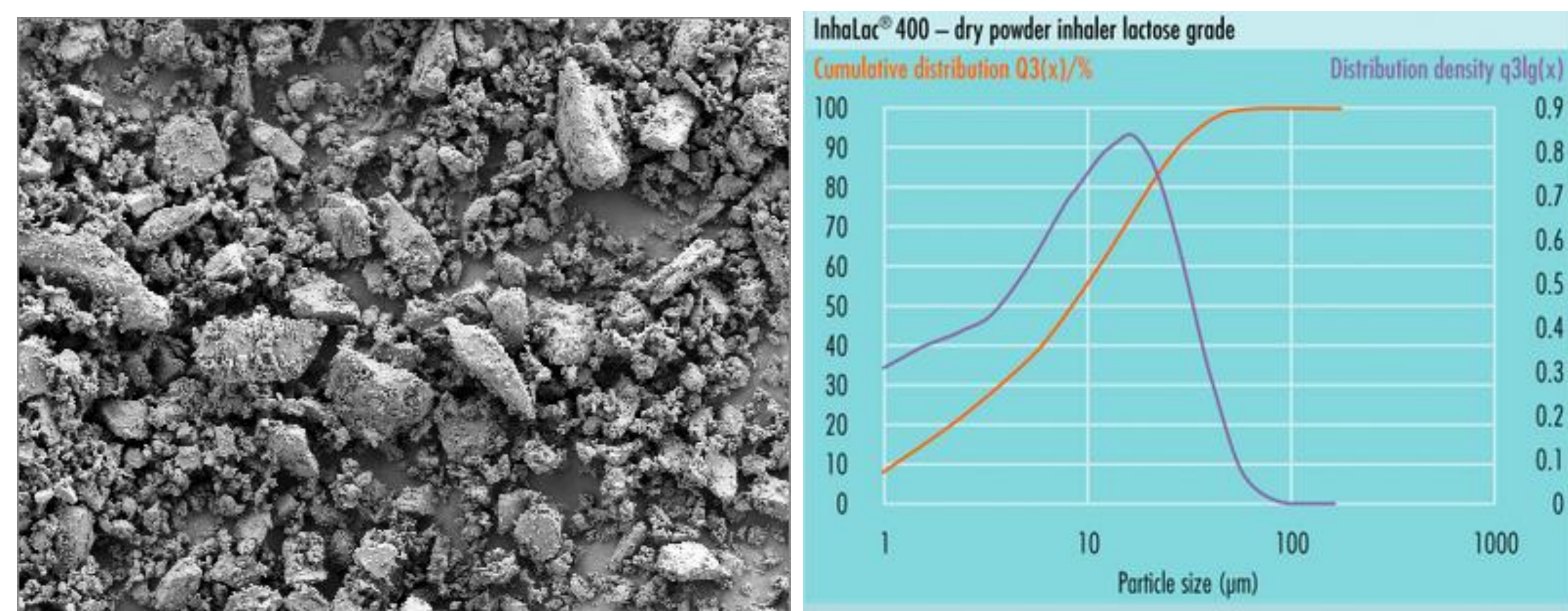
**Excipient:** InhaLac 400 (Provided by Meggle Germany)

#### Properties:

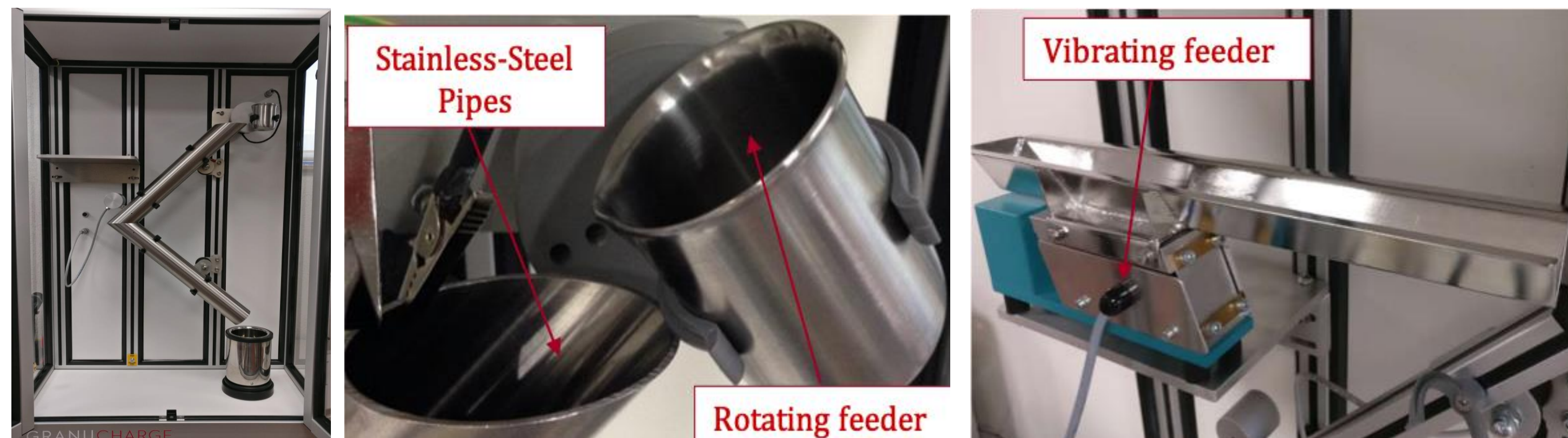
- InhaLac 400 is a high-quality crystalline lactose powder, designed for DPIs (Dry Powder Inhalers).

#### Anti-static Agent:

- Magnesium Stearate (MgSt)



**Figure 1:** InhaLac 400, SEM Picture and particle size distribution (manufacturer data).

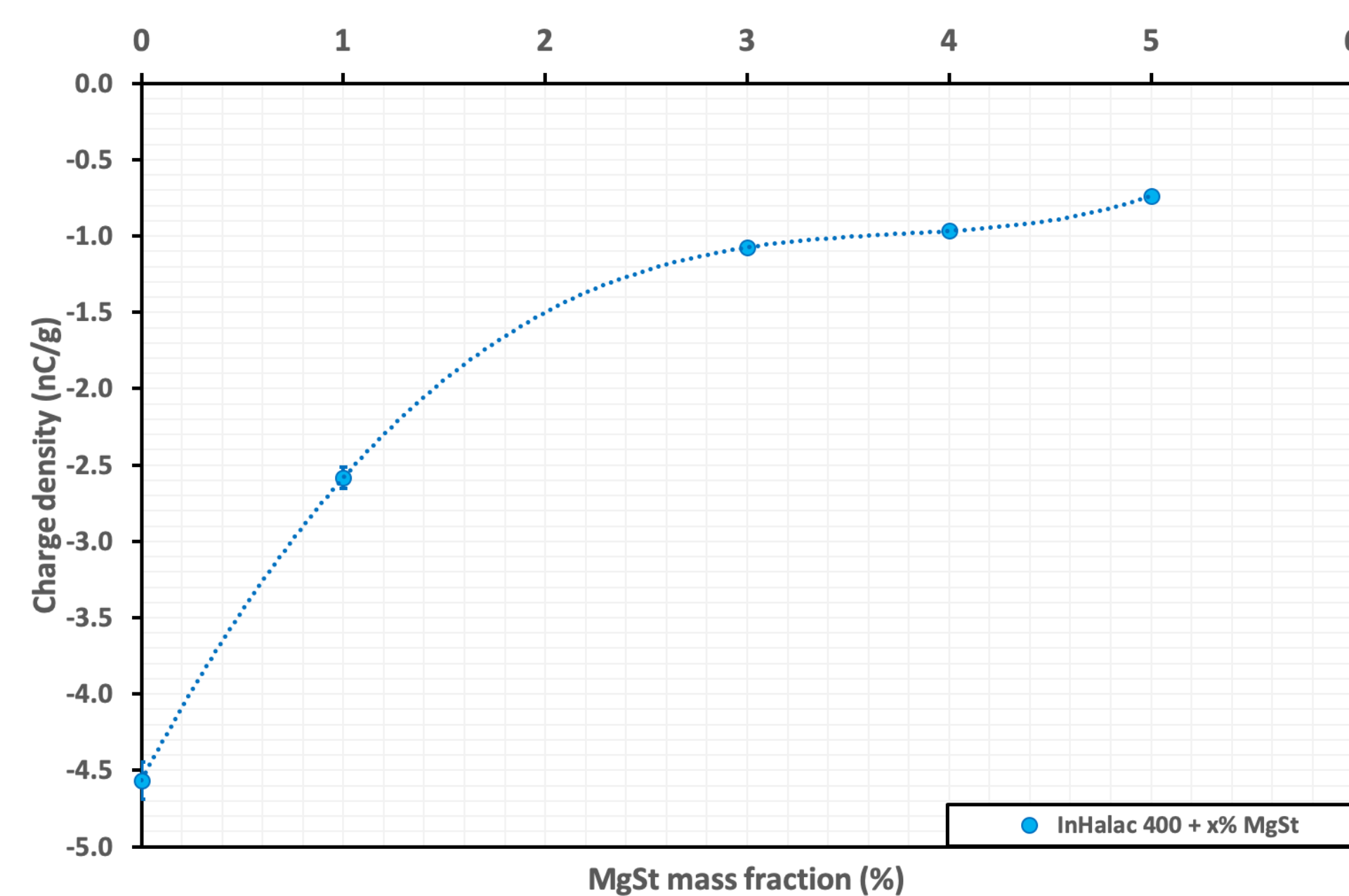


**Figure 2:** GranuCharge Instrument

### 4. Result and Discussion

**Table 1:** Synthesis of the results obtained with the GranuCharge instrument.

MgSt content (%)	$\Delta q$ (nC/g)
0	-4.6
1	-2.6
3	-1.1
4	-1.0
5	-0.7



**Figure 3:** Influence of Magnesium Stearate (MgSt) mass content on the charge density of an InhaLac 400 lactose powder.

- The InhaLac 400 powder is highly sensitive to electrical charge ( $\Delta q = -4.6 \text{ nC/g}$ ).
- With increase of the magnesium stearate mass fraction, a decrease in the charge density variation is observed.
- Above a magnesium stearate mass fraction close to 3% a plateau is reached (charge density variation close to  $-0.75 \text{ nC/g}$ ).
- All measurements are fast (less than five minutes for one powder).

### 5. Conclusion

- The GranuCharge instrument is able to quantify the triboelectric effect of the powders and the influence of flowing agents addition easily.
- This instrument is highly sensitive, accurate, and it can quantify the product formulation.
- The charge density versus Magnesium Stearate mass fraction (%) chart can serve this purpose.
- With only 3% Magnesium Stearate, we manage to limit electrostatic charge build up after a flow in contact with stainless-steel 316L pipes.

### REFERENCES

- [1] How tribo-electric charges modify powder flowability, A. Rescaglio, J. Schockmel, F. Francqui, N. Vandewalle, and G. Lumay, Annual Transactions of The Nordic Rheology Society 25, 17-21 (2016).
- [2] Combined effect of moisture and electrostatic charges on powder flow, A. Rescaglio, J. Schockmel, N. Vandewalle and G. Lumay, EPJ Web of Conferences 140, 13009 (2017).
- [3] Effect of an electric field on an intermittent granular flow, E. Mersch, G. Lumay, F. Boschini, and N. Vandewalle, Physical Review E 81, 041309 (2010).