



Whey Processing

Agenda



1. What is Whey?



2. Composition



3. Whey Processing



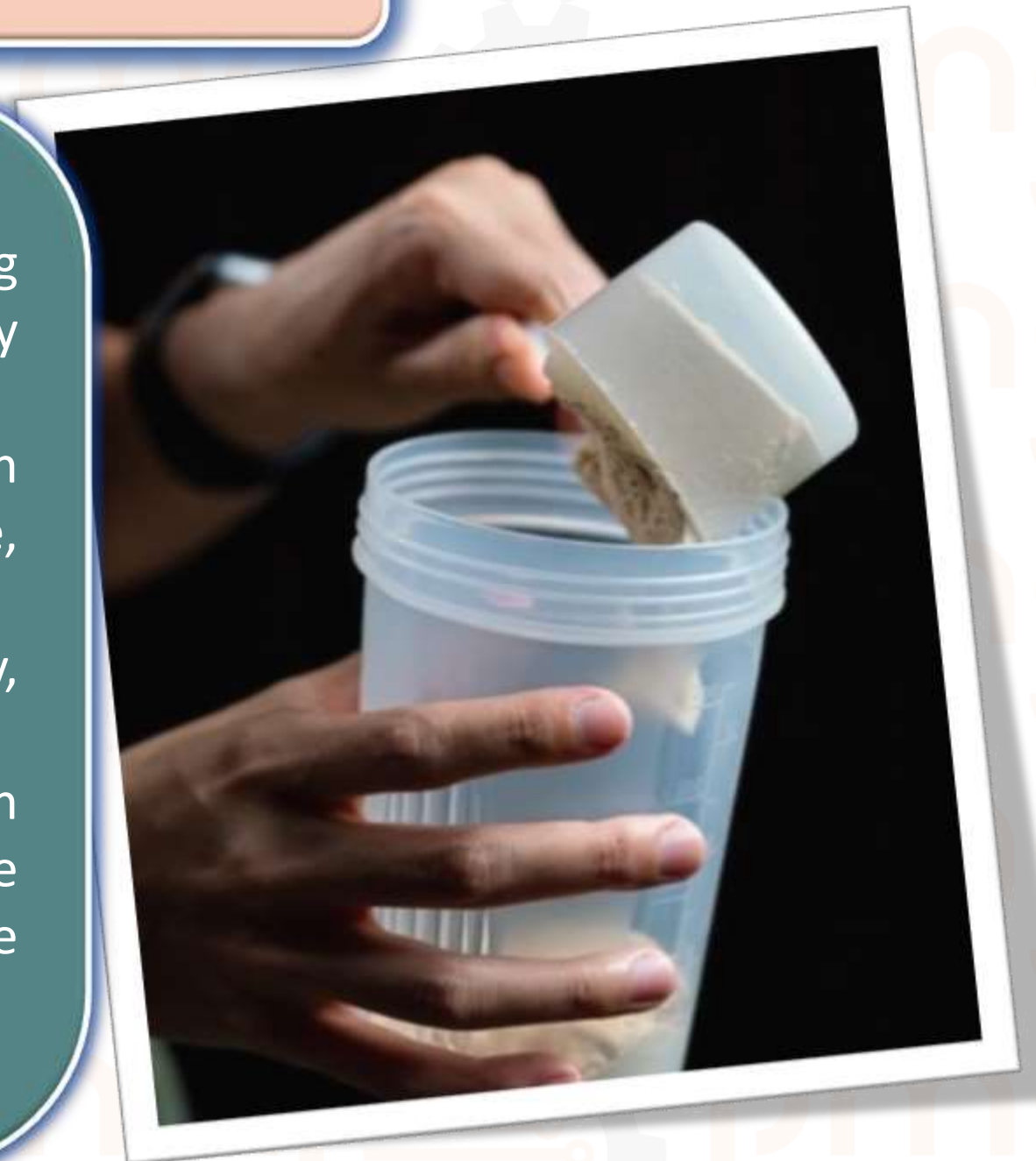
4. Dried Products from Whey



5. Conclusion

1. What is Whey?

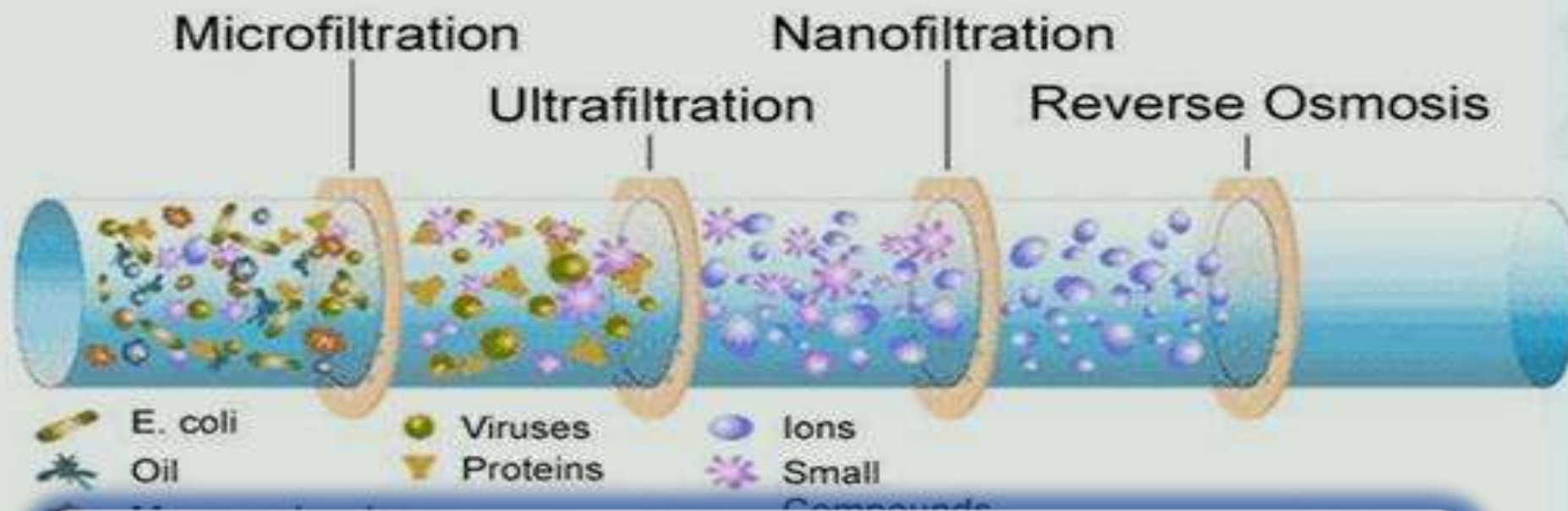
- Whey is a dairy byproduct obtained during the production of coagulated dairy products.
- The coagulation of milk produces casein which is used for producing Cheese, Paneer, Chhana etc.
- The remaining liquid portion is Whey, Which contains whey proteins.
- Whey, the liquid residue of cheese, casein and yoghurt production, is one of the biggest reservoirs of food protein available today.



2. Composition

#	Components	Sweet Whey	Acid Whey
1.	Water	93-94	94-95
2.	Dry Matter	6-6.5	5-6
3.	Lactose	4.5-5.0	3.8-4.3
4.	Total Protein	0.8-1.0	0.8-1.0
5.	Whey Protein	0.6-0.65	0.6-0.65
6.	Citric Acid	0.1	0.1
7.	Minerals	0.5-0.7	0.5-0.7
8.	pH	6.4-6.2	5.0-4.6





3. Whey Processing

- Whey must be processed as soon as possible after it is drawn from the cheese curd as its temperature, and it has a high BOD
- If transporting the whey, it can be concentrated by membrane filtration to reduce transport costs.

3.1 Fat and Casein Recovery

- Casein fines are always present in whey.
- They have an adverse effect on fat separation and should therefore be removed first.
- The collected fines are pressed; after which they can be used in processed cheese manufacture and, after a period of ripening, also in cooking.
- The whey cream, often with a fat content of 25 – 30 %, can partly be reused in cheese-making to standardize the cheese milk.



3.2 Pasteurization and Chilling

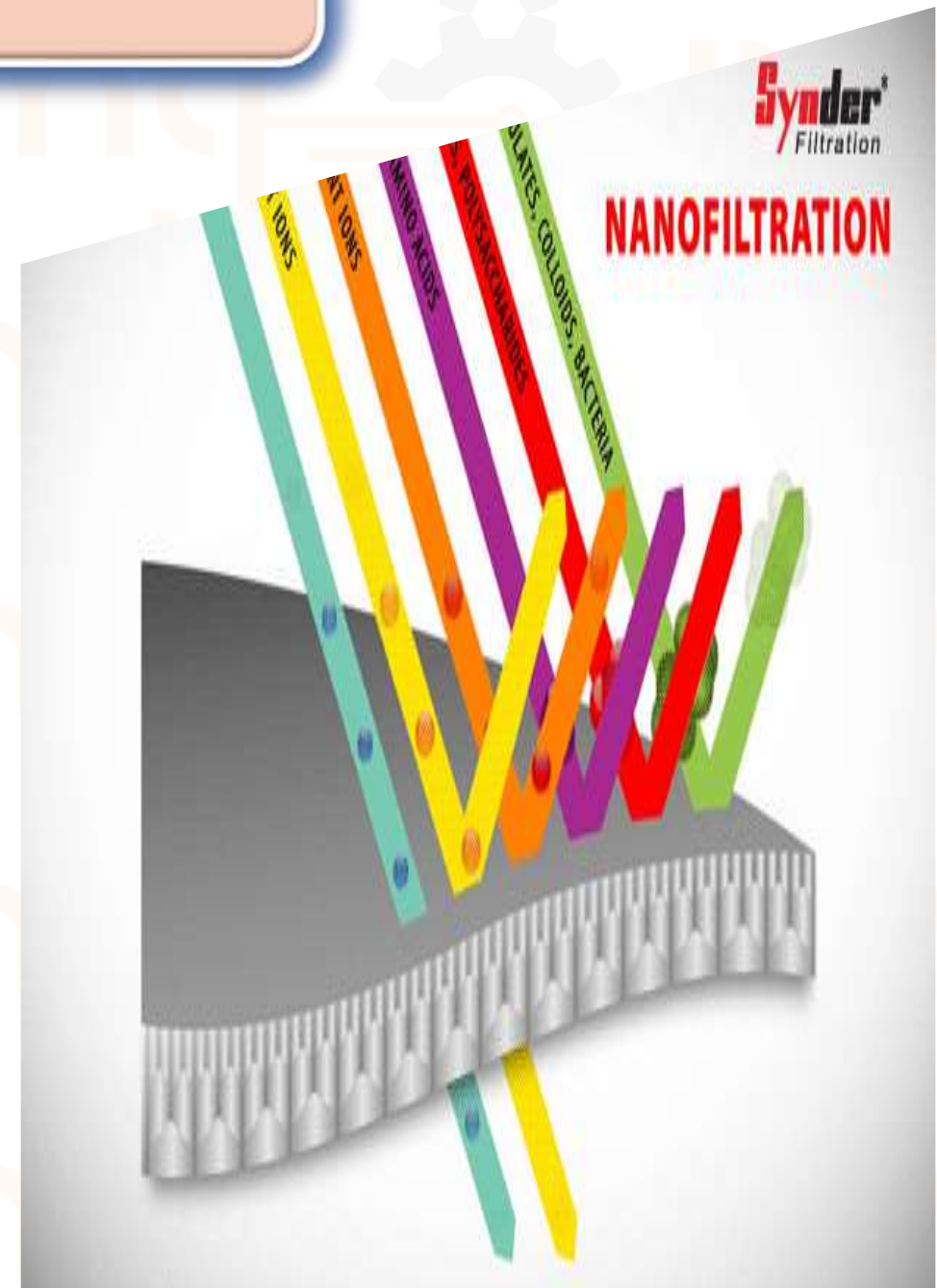
- Whey that is to be stored before processing must be either chilled or pasteurized and chilled as soon as the fat and fines have been removed.
- For short-time storage (< 8 hours), chilling to $< 5^{\circ}\text{C}$ is usually sufficient to reduce bacterial activity.



3.3 Concentration Of Total Solids

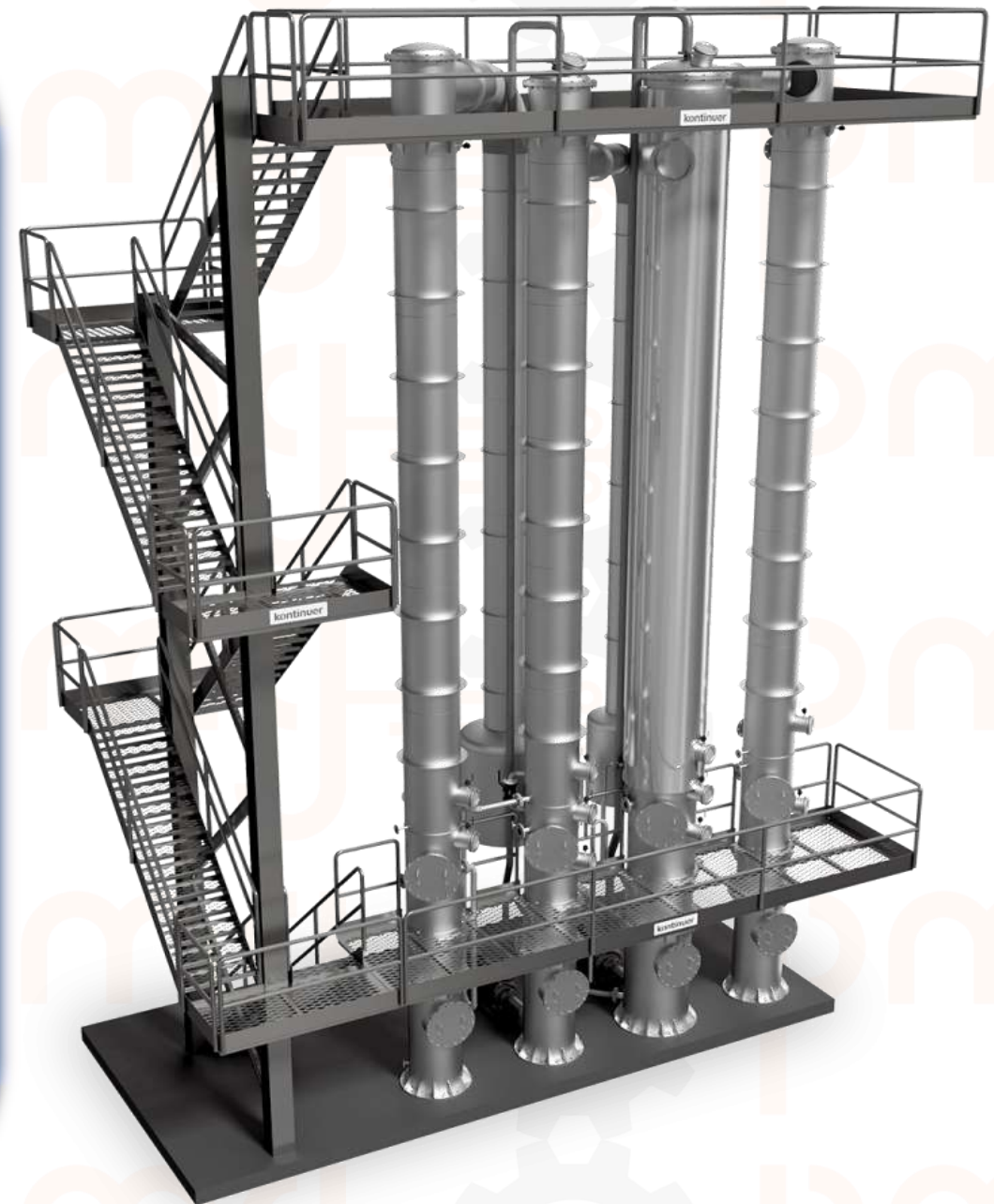
Nanofiltration:

- The first step(optional) typically involves increasing the dry matter(TS).
- The dry matter is increased from around 6 % to 18 – 25 % using RO or a combination of RO-NF.



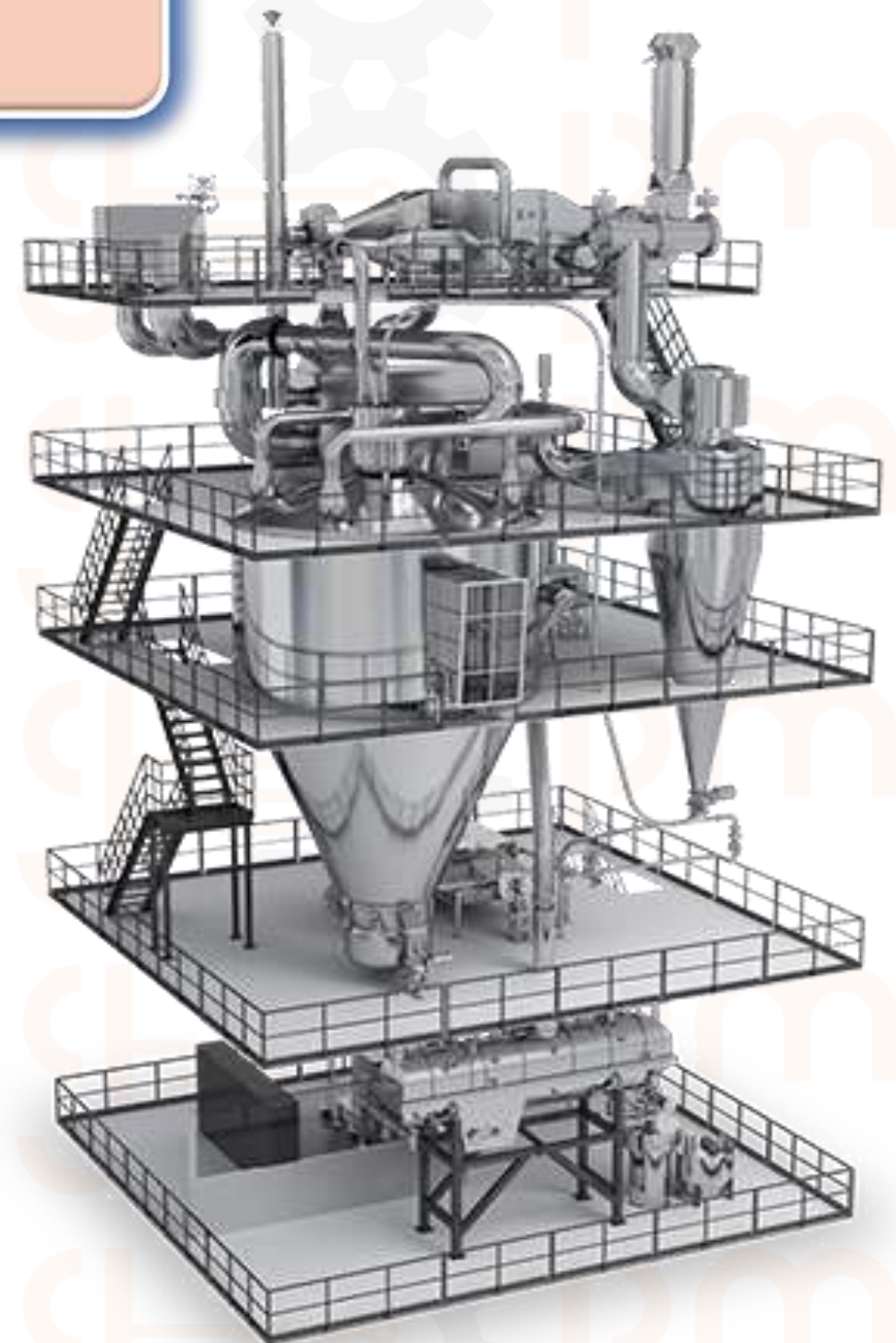
Evaporation :

- With TS above 25-30 %, it is more economical to use mechanical vapour recompression (MVR) evaporation to concentrate whey.
- Utilizing MVR in this second step to whey concentration can increase dry matter from as low as 20 % to 45 – 65 %.
- After evaporation, the concentrate is flash cooled rapidly to 30 – 40 °C thus initiating nucleation of lactose crystals. The product is held in the crystallizers for 4 – 8 hours.



3.4 Drying

- Basically, whey is dried in the same way as milk, i.e., in drum or spray dryers.
- Spray driers are widely used recently because of many drawbacks in the product while doing drum drying.
- Before being dried, the whey concentrate is usually treated as mentioned above to form small lactose crystals, as this results in a non-hygroscopic product which does not go lumpy when it absorbs moisture.



4. Dried Products From Whey.

WPC/WPI – Whey Protein Concentrate/ Isolate:

- WPC is Produced via Ultrafiltration.
- WPI containing > 92 % protein in dry matter is growing rapidly in applications such as body-building supplements.
- Advances in membrane Filtration have drastically improved the quality and economics of products available.

Lactose Permeate:

- UF permeate from the production of WPC and WPI can be spray-dried or used for lactose production.



5. Conclusion



- There is really a boom in the process industry of whey and its by products as more and more health benefits of it are getting popular.
- New techniques are being designed wherein whey powders are made from skim milk, to reduce the adverse effects caused by the action of rennet, acid etc.
- Consequently, there is an absence of GMP (glycomacropeptide), lactic acid levels above those that are naturally occurring, degradation of proteins.

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