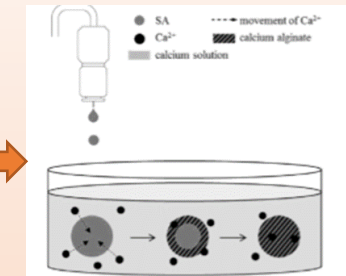
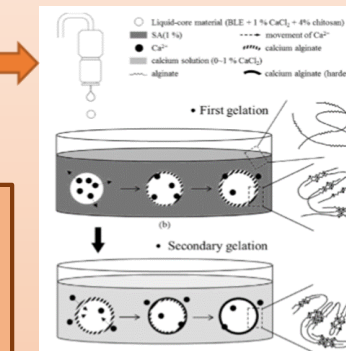


Reverse spherification vs. direct spherification

TYPE OF MECHANISM	TYPE OF FOOD	PRODUCTION PROCESS	PRODUCT OBTAINED
Direct spherification	Aqueous non-dairy and non-acidic liquids (Ph> 5)	<ol style="list-style-type: none"> 1) Liquid food + Alginate 2) Calcium salt + Water 3) Add drop by step 1 in step 2 4) Formation of calcium alginate 	Formation of gelled spheres in the interior.
Reverse spherification	Aqueous liquid	<ol style="list-style-type: none"> 1) Liquid food + Calcium salt 2) Alginate + Water 3) Add drop by step 1 in step 2 4) Formation of calcium alginate 	Formation of spheres encapsulating fat



Direct spherification

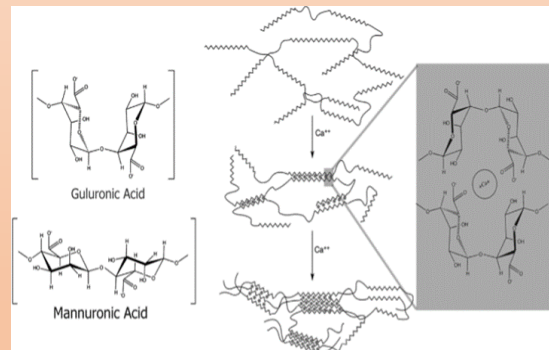


Reverse spherification

Current uses:

- Food technology
- Biotechnology
- Medical and pharmaceutical sciences
- Waste water treatment
- Immobilization of enzymes and their controlled release
- Covering of bad flavors of the ingredients
- Delivery of bioactive substances, drugs and food ingredients

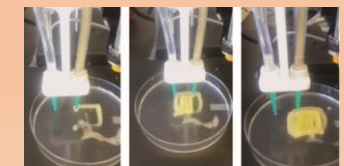
Reasons why they are used: the lack of toxicity, relatively low cost, simple preparation, high compatibility and biodegradable capacity.



Alginate:

- ❖ It is randomly composed of two monomers: β -D-mannuronic acid (M-blocks) and α -L-guluronic acid (G-blocks), linked by glycosidic beta and alpha 1-4.
- ❖ Multivalent cations such as Ca^{2+} , Ba^{2+} , Zn^{2+} can be combined with G-blocks replacing the hydrogen of the carboxyl group and forming calcium alginate (egg box structure).
- ❖ The resistance of the gel is correlated with the proportion and duration of the G-blocks.
- ❖ It is a polymer sensitive to changes in pH: it is only capable of gelling at pH between 5 and 7. Below 5 (acid solutions) or above 8 (basic solutions), gelation can not be carried out → In order to reduce acidity, sodium citrate (E-331) is used, since it dissolves easily and acts in an instantaneous manner.

A future project → Molecular Gastronomy meets 3D Printing: Layered Construction via Reverse Spherification



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