Encapsulation Unit – VARV1

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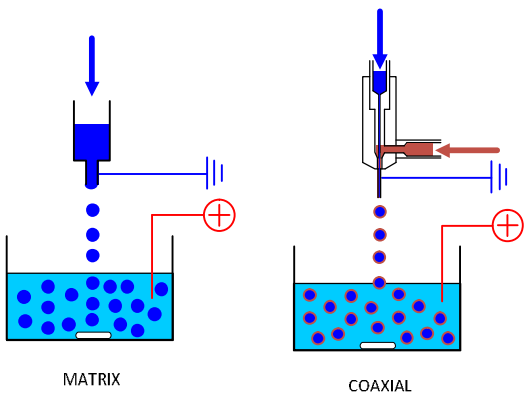
In most applications involving immobilization of living cells or other biological materials, the bead size needs to be small (<1 mm) and carefully controlled because of diffusion limitations of nutrients within hydrogel beads. An excellent method of production for small alginate beads in a controllable manner is the use of an electrostatic bead generator. The basic principle of the instrument is the use of an electrostatic force to pull droplets from a needle tip into a gelling bath. The Nisco Instrument is designed for research and production of small quantities of spherical alginate beads ranging in size from 200 to 2400 µm.

The Bead Generator consists of a Power Unit of 0-10 kV, with a switch for fine-tuning the voltage magnitude, an autoclavable needle holder and an electrical safety cage. The alginate (or other) solution is fed into the instrument with a syringe pump. A magnetic stirrer is placed underneath the gelling bath to keep the beads separated during gelling via a magnetic stir bar. Needles used in the instrument are made of stainless steel, and are available in different diameters. The instrument is shipped with needles of 0.17 mm and 0.40 mm inner diameter. The instrument is designed to produce up to 2400 capsules/minute with a Single Nozzle and approximately 24000 capsules/minute with a Multiple 10 Nozzle configuration with the production rate depending on the matrix and other physical parameters. On average, the standard deviation of the bead diameters is 3-6%. The bead generator has been used successfully in several studies involving immobilization of living cells.



Principle of electrostatic bead generator

Bead size will be dependent on the following parameters: voltage, distance between the needle tip and gelling bath, solution viscosity, flow rate of the solution and needle diameter. The average distance between the needle tip and the gelling bath for this instrument is 10 mm and the bead size is determined by adjusting the voltage. The bead diameter will decrease with smaller needle diameter and increasing voltage.

To complete the System, a syringe and syringe pump (or equivalent) is required (not included).

Included with the System are:
- 2 nozzles (Ø 0.17 / 0.40mm)
- Beakers
- Magnetic stirrer
- Silicon Tubing

Available Options:
- Syringe Pump
- Peristaltic Pump