Virus concentration from aqueous solutions by ultracentrifugation

Biosafety

BECKMAN COULTER
Life Sciences

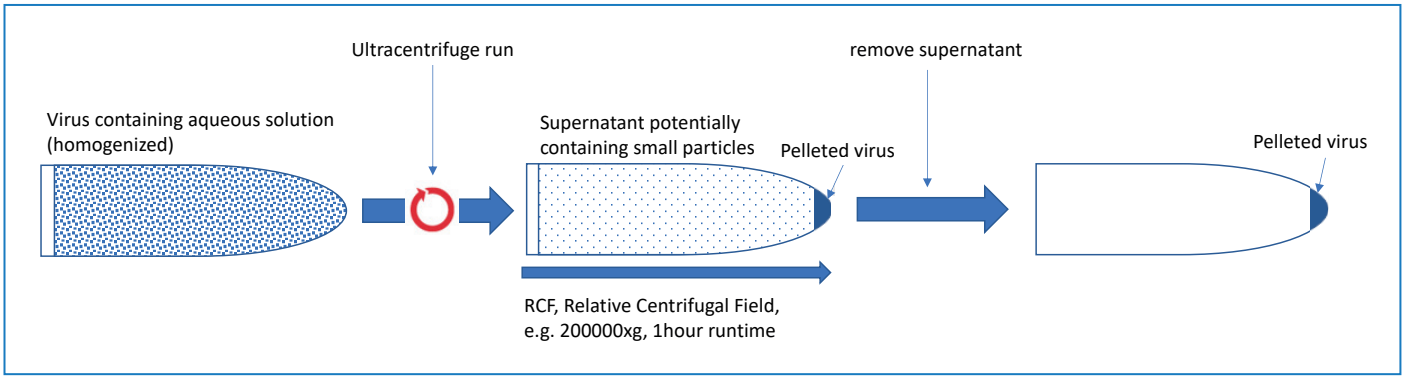
Virus concentration by Ultracentrifugation

Introduction

Ultracentrifugation has been an important technique for virus preparation since early experiments e.g. on the Tobacco Mosaic Virus. Classical applications include virus purification in density gradients and the characterization via Analytical Ultracentrifugation, modern applications include the preparation and characterization of virus particles for Gene Therapy.

A quite simple and ubiquitous application – the concentration of viruses from aqueous solutions - is returning today typically used for sample preparation for a quantification of viruses in various aqueous solutions. The possible application range is wide – it reaches from a basic harvesting of viruses from cell culture medium, preparation of viruses for Electron Microscopy, to more exotic applications like the quantification of viruses in oysters or shellfish to the quantification of viruses for epidemiological studies and disease control in wastewater.

Ultracentrifugation is a technique capable of concentrating viruses from aqueous solutions, basically this is done by a simple pelleting step that concentrates the virus from a solution in a small pellet at the bottom of a centrifuge tube.



The workflow "Virus concentration from aqueous solutions":

Typical configurations process 6 or 12 samples in approx. 1 hour*, each sample with a volume between 10ml and 94ml.

**optimal runtime varies for different viruses and their specific sedimentation coefficients*

Options are available for more samples per run or larger sample volume.

Why concentrate viruses by ultracentrifugation ? The characteristics:

Predictability, reproducibility: Ultracentrifugation is a first principle technique; the separation can be described by Hydrodynamics. This means the steps are predictable and reproducible.

Few and simple manual steps: Pelleting steps require a minimum of manual steps: Basically loading the homogenized sample into a tube, running the centrifuge, loading and programming the centrifuge, decanting and re-solubilization of the pellet.

Good control over the virus concentration after resolubilization: The virus pellet can easily be quantified (e.g. by weighing the tube after decanting the supernatant) and the liquid volume for the re-solubilization can be well defined.

Scaleability: Generally the centrifugation steps can be scaled to your needs, e.g. to the starting volume or to the number of samples per run.

Biosafety: Ultracentrifugation offers multilevel-options to enhance Biosafety: BioSafe or Bio-Enhancing labware, rotors, and finally the Beckman Coulter ultracentrifuges can be equipped with sterilizing filters (optional).

Control over the consumables cost: The cost of ultracentrifuge labware is relatively low when compared to alternative methods and can be managed by selecting specific labware.

Ultracentrifuge Systems Example configurations

Optima XPN preparative Ultracentrifuge

The Optima™ XPN is the premier ultracentrifuge.
The Optima XPN offers multi-layered BioSafety* features for a safe and productive work environment.
Available in 100k, 90k, and 80k RPM configurations
Compatible with extensive rotor and labware options

Optima XPN Ultracentrifuge:

- BioSafe Model available on request

SW 41Ti

Sample volume up to 13ml (x6)

Labware options:

- Open top labware
- Quick-Seal labware for additional seal
- konical tubes for concentrating viruses in a smaller pellet area
- Sterile & Cfree labware

SW 32Ti

Sample volume up to 38.5ml (x6)

Labware options:

- Open top labware
- Quick-Seal labware for additional seal
- Opti-Seal tubes
- konical tubes for concentrating viruses in a smaller pellet area
- Sterile & Cfree labware

45Ti

Sample volume up to 94ml (x6)

Labware options:

- PC bottles with plug and screw cap (cold sterilization)
- Quick-Seal tubes
- Thick wall and thin wall tubes

50.2Ti

Processing of 12 samples / run (up to 39ml/sample)

Labware options:

- PC bottles with plug and screw cap (cold sterilization)
- Quick-Seal tubes
- Thick wall and thin wall tubes

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we've been building a global reputation
in hospitals, labs, and universities, where our
life science research instruments are relied upon
to perform vital roles day in and day out.

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