

# HCS

## Hyperbaric Centrifugation System

During a normal centrifugation, saturation and residual moisture equilibrium is reached. It depends on the product, process parameters, acceleration factor (G-factor), capillaries diameters, liquids surface tension.

Capillaries diameters depend on particles granulometry and their distribution. If the centrifugal force is not as strong as it is necessary to empty the capillaries (existing hydrostatic head), the cake is gas tight. *Area I in Fig. 2.*

This is the area of the so called **Hyperbaric Centrifugation**.

If the pressure inside the basket increases, the dewatering speeds-up so that the hydrostatic head inside capillaries of the packed bed reduces and residual moisture drops below. This process is called **Hyperbaric Centrifugation**. If dewatering time is shorter, it means that the specific filtration rate increases.

Increase of efficiency depends on process parameters, means particles granulometry, porosity and compressibility of the packed bed, liquid viscosity, etc.

As soon as the basket is pressurized, hydraulic head inside capillaries is reduced.

*The graph residual moisture versus time is shown in Fig. 1*

As soon as major capillaries are emptied and gas starts to stream through, the additional advantage of the **Hyperbaric Centrifugation** comes to an end. *Area II in Fig. 2.*

According to Darcy's law, emptied capillaries number keeps increasing and gas stream climbs up to the maximum value, as if a gas were pressed to a dry packed bed. The graph is still climbing up a little bit after all the major capillaries are opened because there is still water on the surface and in the contact points to be drained out (toroidal liquid).

If gas stream through the packed bed is high, the real thermal drying starts. The film of liquid on the particles will be discontinued. Saturation equilibrium related only to liquid surface tension is possible no longer and as soon as drops grow up, they are driven out by the centrifugal force. *Area III in Fig. 2.*

The great advantage of the drying in the inverting filter centrifuge is that **two forces** are working, centrifugal force and pressure difference, whereas in a Nutsche filter there is one only force!

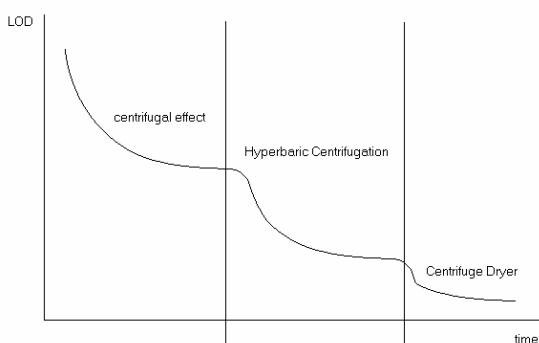


Fig. 1

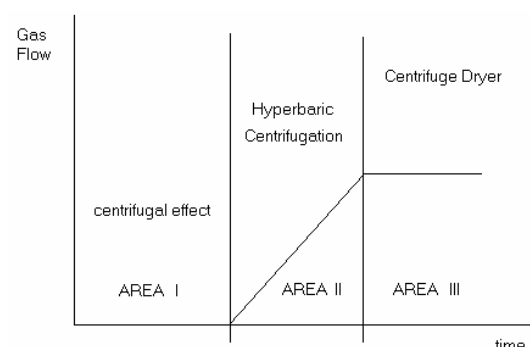


Fig. 2