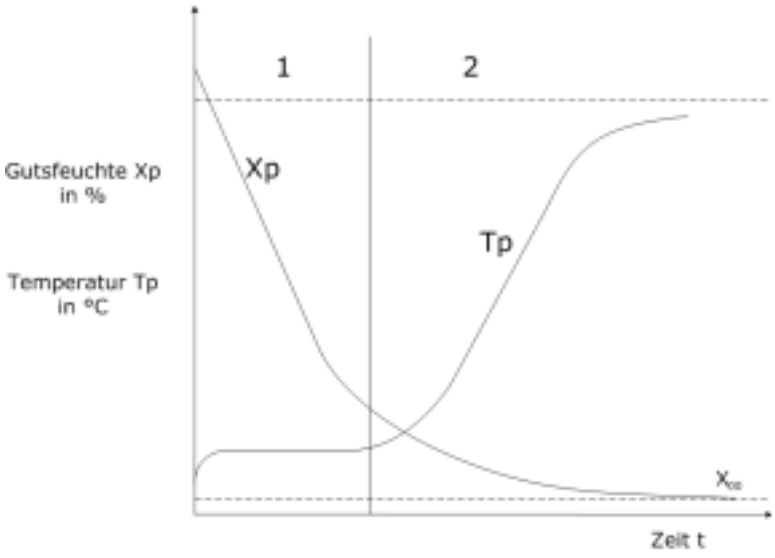
Drying

Drying is the separation of excess solvent from product. This common method is used for stabilisation of substances, reduction of quantity, sample dosage, analysis or change of physical and chemical characteristics.

Theoretical background

The drying process involves the separation of liquid from material by volatilisation or evaporation. Evaporation occurs if the vapour pressure of the liquid is greater than that of atmospheric pressure. Thermal drying process consists of three subprocesses: the heat transfer from the atmosphere to the damp material, phase conversion of the solvent (from liquid to gas) and evacuation of the solvent vapour. Energy required for the drying process is conducted from the surface of the sample into the centre using thermal conduction. This heat conductivity depends on the humidity content of the sample, the less moisture content, the less conductivity. Hence, drying processes can lead to thermal decomposition, therefore protocols and methodology have been developed to ensure product quality.



The diagram above shows that moisture content decreases significantly over time, t, until it reaches an equilibrium value. The temperature of substance T_P increases until it reaches the value of drying temperature. In the 1st drying section the temperature of the material is almost constant and moisture content of the material decreases linearly with the time.

BÜCHI Glass Oven B-585

Method

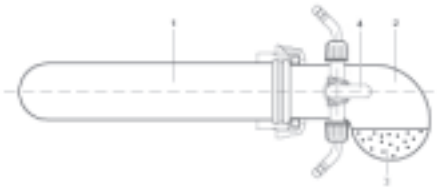
The BÜCHI Glass Oven B-585 is the perfect product for drying small quantities, as it heats the sample indirectly, via radiation. The glass oven essentially consists of two glass tubes, one placed inside the other. Heating takes place through a completely transparent, electrically conductive semiconductor layer on the inner tube, whereby the resistance under voltage, produces heat.

The second, outer glass tube prevents the damage of heat tube and at the same time protects against direct contact with the charged part.

The operating angle can be adjusted from 0° to 90° using a lever. This flexibility of being able to tilt the oven chamber increases the quality and speed of the drying process.

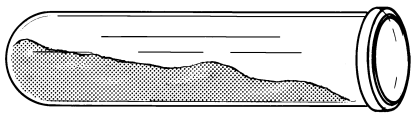
Drying accessory

The drying accessory consists of three parts. The drying tube (1) in which material can be placed directly or in a container. This tube is inserted into the oven for the drying process. To improve the drying process, a drying agent (3) may be placed in the drying hood (2), to absorb the evaporated moisture. The stopcock (4) is used for the evacuation and aeration of the sample chamber. Because the oven utilises radiant heat, heat transfer to the sample is fast and efficient.



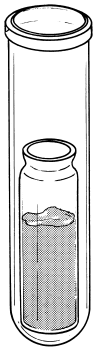
The drying process can be performed in two ways:
Large quantity of the material can be filled directly into the drying tube or in a sample container placed inside the drying tube itself, providing it can withstand the temperature.

This type of drying is normally avoided in hydroscopic samples, because it can absorb moisture whilst being transferred to another container.



The second method, the material is filled placed in the intended storage container before drying and this is placed in the drying tube.

The drying oven is then operated in vertical position. The advantages of this method is that it avoids the need to transfer the sample into another container and that the sample container may be closed immediately.



Drying of solid substances with rotation

While drying, some substances form solid layer on their surface, which substantially extends the drying time. This can be prevented by rotation preferably in a drying flask with grooves. The flask can be rotated using the electrical ball tube drive, glass frit is melted in the corresponding vapour duct in order to prevent material loss by drying with rotation.

Quality in your hands

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