

Spray Drying of aqueous solutions or mixed with organic solvents under inert conditions

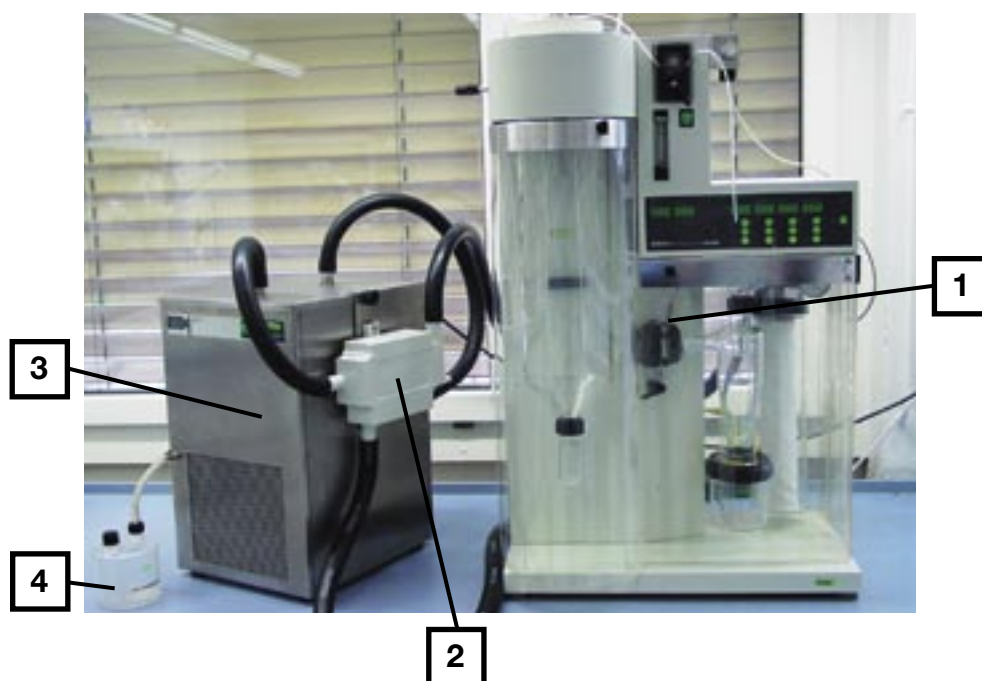


When mixtures of water and organic solvents are used in spray drying processes, the use of a closed loop is of advantage due to safety, emission reduction and reproducibility.

Spray Drying is a growing drying method not only in classical applications, but also in food and feed, also in the pharmaceutical and biotechnological field. This results in using different kind of solvents and mixtures of water and organic solvents.

For pure organic solvents the Mini Spray Dryer B-290 can be extended to a completely closed system with the Inert Loop B-295. This enables a safe operation, as the lack of oxygen prevents a flammable mixture, and the condensation of solvent minimizes emission to the lab and environment.

In case of mixtures of organic solvents and water (with less than 50% organic solvent), Buchi offers a simple way to work under inert conditions. Taking up the demand to increase the safety and environmental aspects, the Dehumidifier B-296 has been introduced.



Method

The Dehumidifier B-296 is an electrically driven cold trap that enables the efficient cooling of a gas stream. The inert gas, in most cases Nitrogen, is loaded with the solvent and water mixture in the Mini Spray Dryer [1]. After pre-cooling in an external heat exchanger [2], the vapours are condensed in the Dehumidifier B-296 [3] at 2-5°C and collected in a bottle [4].

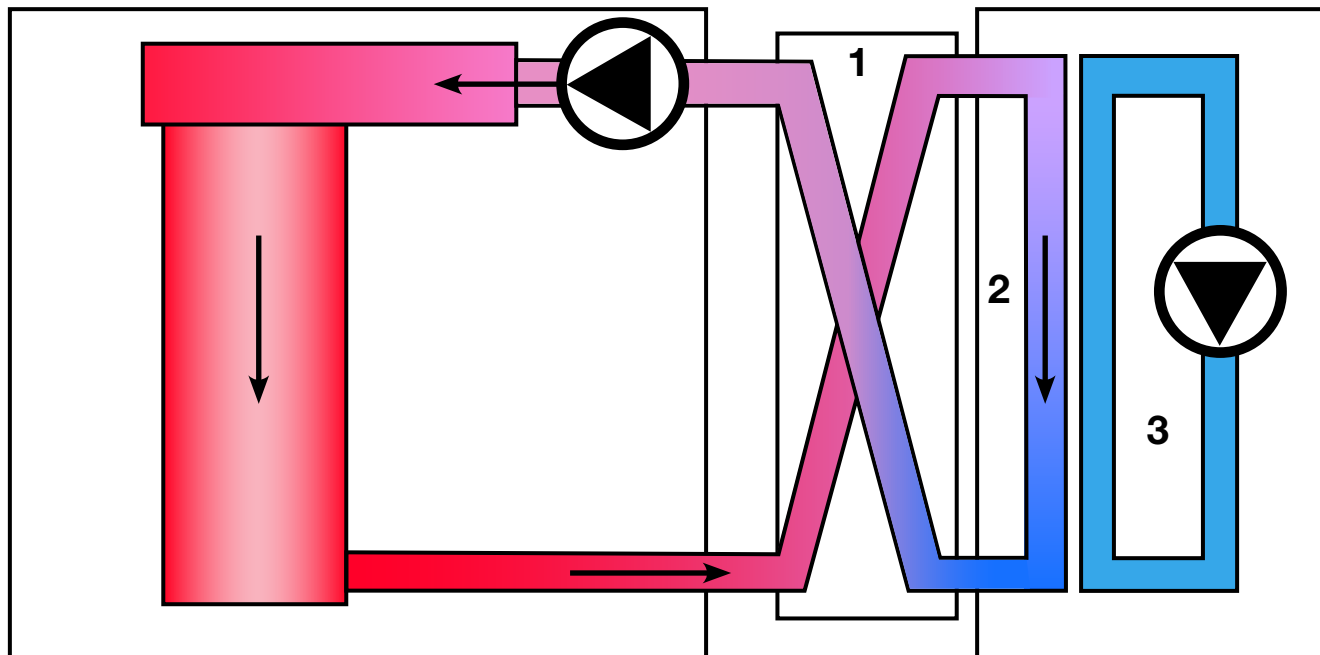
The cleaned gas stream is then heated up in counter-current flow to the inlet gas [2] and flows back into the Mini Spray Dryer.

Results

The heat exchanger increases the efficiency of the condensation. The following table and schematic give some examples of the temperature distribution in the closed loop:

Mini Spray Dryer B-290

Dehumidifier B-296



Schematic representation of the closed loop with indication of the measurement points

Temperature °C	Feed flow (ml /min)	Aspirator Rate (m3/h)	Temperatures in the loop (°C)			
			1	2	3	4
70	6	36	37	23	3	26
120	6	36	51	26	2	33
180	0	36	68	38	2	35
180	6	36	62	37	3	35
180	50	36	60	39	3	36

Conclusions

The combination of the Mini Spray Dryer B-290 with the Dehumidifier B-296 enables to work with water / organic solvents mixtures using the closed loop method. If oxygen-sensitive materials have to be dried, this design can be used to work under inert conditions.

Furthermore, the Dehumidifier can be used in the open mode as inlet air conditioning that the spray drying process is independent from season, weather and region.

BÜCHI Labortechnik AG
Postfach
9230 Flawil
Schweiz
Tel. +41 71 394 63 63
Fax +41 71 394 65 65
buchi@buchi.com
www.buchi.com

BÜCHI Labortechnik GmbH
Postfach 10 03 51
45003 Essen
Deutschland
Freecall 0800 414 0414
Tel. +49 201 747 490
Fax +49 201 237 082
deutschland@buchi.com
www.buechigmbh.de

BÜCHI Labortechnik GmbH
Branch Office Netherlands
Postbus 142
3340 AC Hendrik Ido Ambacht
The Netherlands
Tel. +31 78 684 94 29
Fax +31 78 684 94 30
netherlands@buchi.com
www.buchi.nl

BÜCHI Italia s.r.l.
Centro Direzionale, Milano Fiori
Pal. A-4, Strada 4
20090 Assago (MI)
Italia
Tel. +39 02 824 50 11
Fax +39 02 57 51 28 55
italia@buchi.com
www.buchi.it

BUCHI (THAILAND) Ltd.
ASEAN Competence Center
300 Phaholyothin Road
Samsennai, Phayathai
Bangkok 10400
Thailand
Tel. +66 2 278 54 95
Fax +66 2 279 05 48
bacc@buchi.com
www.buchi.com

BUCHI SMP
Services Private Ltd.
201, Magnum Opus
Shantinagar Industrial Area
Vakola, Santacruz (East)
Mumbai 400 055,
India
Tel. +91 22 56 98 94 50
Fax +91 22 56 98 94 52
smplisp@vsnl.com
www.buchi.com

BUCHI Analytical Inc.
19 Lukens Drive
New Castle
Delaware 19720
USA
Tel. +1 302 652 3000
Fax +1 302 652 8777
us-sales@buchi.com
www.buchi-analytical.com

BUCHI Hong Kong Ltd.
1305, Hang Seng Mongkok Bldg.
677 Nathan Road
Kowloon, Hong Kong
China
Tel. +852 2389 2772
Fax +852 2389 2774
china@buchi.com
www.buchi.com

Nihon BUCHI K.K.
3F IMON Bldg.,
2-7-17 Ikenohata, Taito-ku,
Tokyo 110-0008
Japan
Tel. +81 3 3821 4777
Fax +81 3 3821 4555
nihon@buchi.com
www.nihon-buchi.co.jp

BUCHI Sarl
5, rue du Pont des Halles
Z.A. du Delta
94656 Rungis Cedex
France
Tél. +33 1 56 70 62 50
Fax +33 1 46 86 00 31
france@buchi.com
www.buchi.fr

We are represented by more than 100 distribution partners worldwide. Find your local representative at

www.buchi.com

Quality in your hands