

WATER IN SWITZERLAND

- Water consumption has steadily decreased during recent decades. It is estimated that Swiss households use only 162 liters of water per day for drinking, cooking, washing and cleaning, on average.
- Even though the country has plenty of water and the average price of Swiss francs 2.40 per 1000 liter means it is hardly possible to save money by economizing, it is still important that this resource be handled with utmost care: water-saving fixtures, sealed faucets, rain barrels for watering the garden, economical dishwashers and washing machines are just a few examples of how this can be done.
- From an environmental and economic point of view, it is particularly advisable to use warm water sparingly, due to the amount of energy required to produce it.
- The virtual water imported with many products from regions affected by water shortages also plays a role. Some people think it makes more sense not to buy raspberries in wintertime than to turn off the tap while brushing their teeth.

Minor cause— major effect

Switching synthesis equipment from water to air cooling saves more than just precious water.

Daniel Zimmerli is responsible for laboratory equipment in research building number 92. A chemist with a predilection for innovative technologies, in his role he is often a contact person for representatives trying to sell new kinds of laboratory products. This was the case last year, for example, when the company Radleys presented a product known as the Findenser, which enables 95 percent of all laboratory synthesis processes to be switched from water to air cooling.

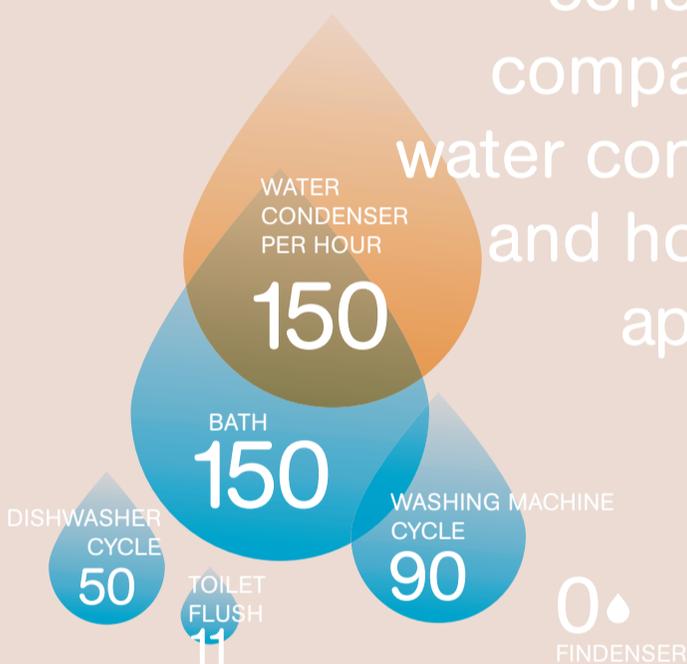
The potential of such a changeover is clear, at least to chemists. Every day, hundreds of chemical reactions are performed in the Roche laboratories, most of them in solvents and at high temperatures. To keep the amount of solvent lost through evaporation to a minimum, condensers fitted to the reaction vessels ensure that the liquid constantly condenses and drips back into the vessel. Conventional condensers are attached directly to a cold water tap, consuming about 2.5 liters of water per minute. That equates to 600 liters over four hours of operation and an impressive 3600 liters in 24 hours. At an average price of Swiss francs 2.40 per 1000 liter, the costs of the water used for synthesis in a reaction lasting 24 hours would come to Swiss francs 2160 per year. If laboratory air is used as a coolant instead of flowing water, the savings for multiple reactions running at the same time add up to considerable sums. At least that is what the manufacturers claim.

Daniel initially tested ten devices in a continuous operation together with an intern: “We were able to confirm all the manufacturer’s claims and are confident that this small, relatively inconspicuous laboratory device will bring about considerable improvements for Roche.” The new condenser does indeed look rather unspectacular. A finned aluminum case surrounds an internal glass condenser, and between them there is a small, permanently sealed layer of water for improving heat transfer. Thanks to the case’s large surface area, the normal ambient temperature of 20 to 25 °C is entirely sufficient to cool the vast majority of reactions.

At a big company like Roche, the effect of saving fresh and waste water may seem relatively minor, but it also has an entirely different benefit according to Daniel: “Reactions run for many hours, often overnight. Once or twice a year, water supplies can become disconnected or spring a leak, and this can very quickly flood the laboratory. Thanks to air cooling, we have eliminated this risk.”

Two hundred air condensers are now in use in various research laboratories and even one or two production laboratories at Roche. The feedback is positive and there have been no complaints. If Daniel Zimmerli had his way, good old water or intensive condensers would soon be a thing of the past: “For me, this is a successful example of how supposedly small innovations can make a big difference.” *sus*

Average water consumption compared with water condensers and household appliances in liters.



Finned aluminum jacket

Encapsulated thermofluid

Internal glass condenser

WATER AT ROCHE

Just under 200,000 cubic meters of industrial wastewater were produced at Roche’s Basel site in 2014. As in the previous year, biodegradability was well over the stipulated limit of 85 percent, standing at 95 percent. In 2014, the quantity of cooling water used in connection with production facilities was 13 percent lower than in 2013. New systems for recycling water in a circuit introduced in some areas and the relatively cool summer contributed to this reduction. Industrial water, of course, accounts for most of the water used, the volume being significantly higher than the quantity of drinking water consumed on the site.

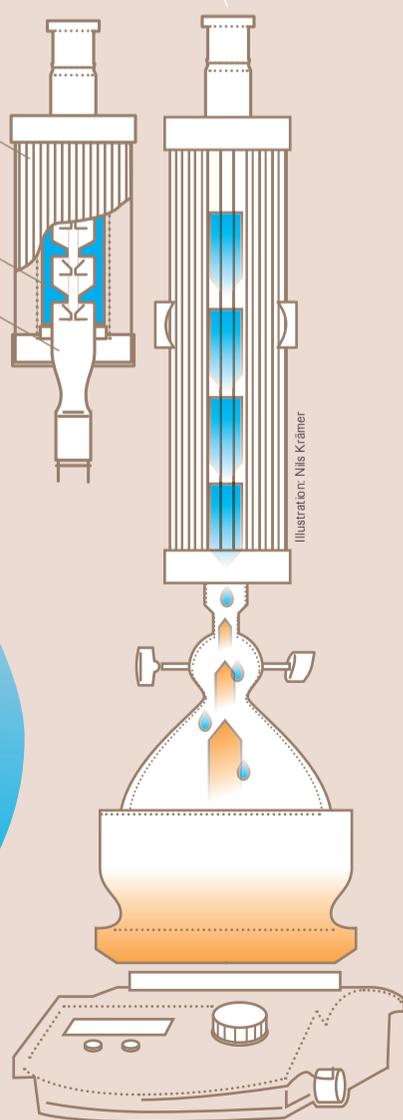


Illustration: Nils Krämer