Laboratory Safety with Passion

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If a cartoon character sniffs a solvent bottle too much, he becomes a mad professor. In real life, solvent fumes have less entertaining consequences and are therefore to be avoided at all costs. The SCAT company has made this its mission - and thus made laboratory safety its main task.

Fig.1: Laboratory safety can also be done with humor: Jan Rittgasser, director of marketing at SCAT, impersonates the "mad professor" at an exhibition - the company's trademark. An early model of the Safety Caps can be seen in the foreground.

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In the beginning there was caution, maybe even a bit of fear when you stand in the laboratory for the first time during your training or studies and are confronted with various toxic solvents and carcinogenic chromates. Every move is carefully considered, every test setup is checked twice and three times. Then, over the years, comes practice. The processes become familiar, the safety precautions become known and the handling of hazardous substances becomes routine and safe. From here, it is important to maintain awareness of the potential dangers in the laboratory. Because otherwise, there is a risk of stepping into the next trap: carefree habit. Even the best lab workers, after years of routine, become lax about personal protective equipment or other safety precautions in the lab.

This dilemma is also known to the team at SCAT, the "Safety Center for Analytical Technologies". The company has set itself the goal of supporting users in the analytical laboratory in protecting themselves from harmful substances in the working environment. For almost 25 years, the experts have been developing new technical devices that are intended to make the handling of solvents in wet-chemical laboratories and in HPLC applications safer. The team is there with creative ideas and full commitment and passion. One employee quickly tested his idea of sealing a filling funnel with a rubber lip for practicality: fill the Tupperware container with vinegar water, add a rubber seal and then put it under the bed overnight to do the smell test. This commitment has not only led to SCAT using just such rubber seals on the funnels since then, but also made the committed employee in the company virtually immortal.

Since then, the funnels have been named after him: MARCO. Other team members have also immortalized themselves in product names, for example in the ARNOLD funnel or in the Universal Waste Hub JAN.

"All of us at SCAT are driven by the idea of making the laboratory a safe place to work," says Managing Partner Peter Rebehn, summing up the corporate philosophy. In an interview with LABORPRAXIS, he admits that the only exception was the name of the LISA Safety Waste Caps. "It's an artificial name. We already had so many men's names, so it was just about time to include a product with a woman's name."

The company SCAT

The "Safety Center for Analytical Technologies" SCAT was founded in 1998 to protect users in analytical laboratories from harmful substances in the working environment. The reason was the initial requirement of a large German chemical company to reduce the concentration of pollutants that was too high in a laboratory in which organic solvents were used. SCAT developed its Safety Caps for solvent bottles so that no major conversion work was necessary - the starting point for the success of the almost 25-year-old company. Since June 2020, the developers at the new location of the SCAT headquarters near Frankfurt Airport have been providing improved and new safety solutions for handling solvents in the laboratory.

The mission: safety – and saving money as a side effect

Peter Rebehn has been Managing Partner at SCAT since 2018, and knows the challenges of everyday laboratory work. "We prefer to visit our customers on site and advise them directly in the laboratory. Since it is our daily bread, we immediately recognize where there are still gaps in occupational safety," he says. A typical picture, which is still far too common in the university context, are HPLC systems whose solvent supply is provided by more or less creative self-sealed storage bottles: sometimes the bottle opening is covered with aluminum foil, sometimes with glass wool, often the hose also stuck through parafilm and sometimes even simply placed in the open neck of the bottle without any further covering.

Even a simple cap is not enough. All of this is more or less insufficient, since the solvent can be so easily dispersed in the air and there is a risk that employees will inhale the noxious fumes. After all, despite increasing efforts to replace toxic substances in the laboratory with less dangerous ones, hazardous substances such as methanol and acetonitrile are still frequently used eluents in HPLC.

In its "Safety Solutions" division, SCAT has therefore specialized, among other things, in safe, hermetically sealing caps for solvent containers, both on the supply and disposal side, for storage bottles as well as for waste containers - and thus apparently hit the right nerve. "I've never met anyone in the lab who said: No, I don't need that," says Peter Rebehn. The Safety Caps are equipped with a ventilation valve, which allows emission-free pressure

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equalization in the solvent bottle. In addition, an exhaust air filter is screwed on, which adsorbs the solvent vapours and binds vapours from alkalis and acids. The inner surface of the activated carbon achieves a top value of 1,500 m^2/g, as the expert points out. In this way, workplace limit values for toxic solvents such as methanol or acetonitrile are easily complied with, and the occupational safety of employees is guaranteed.

Fig. 2: The Safety Waste Caps contain three different types of activated carbon for additional safety: 1st layer adsorbs solvent vapours, 2nd layer binds alkalis, 3rd layer binds acids.

Hermetically sealed Safety Caps have another advantage in addition to the safety aspect, emphasizes Rebehn: "Hermetically sealed caps have fewer emissions and therefore less consumption. This is currently becoming more important again, because the prices for solvents are also rising." In addition, thanks to the better sealed solvent containers, the air exchange rate in the laboratory can be reduced from 8 to 5 times without compromising safety, which in turn saves costs in the laboratory, how Security expert Rebehn added. According to a sample calculation for an HPLC laboratory with 15 systems on 120 m^2, 10,000 to 15,000 euros can be saved every year (you can read more about this in the article "The underestimated value of laboratory air").

"Laboratory safety is not limited to products, it also involves a lot of persuasion and educational work."

Peter Rebehn, Managing Partner of SCAT

SCAT-Connect-Box for automation in large HPLC laboratories

The latest development by the SCAT team is intended to further improve safety in the HPLC laboratory and also increase user-friendliness. In the spirit of increasing digitization and automation, the product developers have launched a system that can be used to control and monitor the filling level of the storage bottles and waste containers: SCAT-Connect. The heart of this is the SCAT Connect Box. Silicone tubes lead from the central control unit to the individual storage containers. Oxygen is pumped through the tubes and escapes at the tubing's end. The required amount of pressure changes depending on the filling level of the vessel. This relationship allows the fill level to be calculated after a one-off calibration for the solvent used and the associated vessel. "This hydrostatic measuring principle is not new, but it has never been used in our industry in a laboratory context," says Peter Rebehn.

The filling levels determined in this way can then be conveniently viewed in real time via an app on a computer, tablet or smartphone. Another advantage: The system

Fig. 3: With the app for SCAT-Connect, users in the laboratory always have an eye on the fill levels of their solvents.

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automatically refills the storage bottles from a larger storage tank via pumps, so that it is not necessary to top up with solvent as often. The managing director promises that supply and disposal systems can be fully digitized in the future. This not only saves work, but also reduces the risk of exposure because there is less direct interaction with the solvents. Especially for large analytical laboratories with many HPLC systems, more freedom is created for the laboratory technicians, because sample runs are automated over a longer period of time and work without intervention by the staff. When the waste container is full, the employee receives a message via app to empty or change the container. An audible alarm can also be turned on to indicate critical levels. "We are investing a lot of money here in the future," says Peter Rebehn and is confident that this investment is worthwhile - not only for his own company, but also for the large HPLC laboratories that should benefit from the new technology. Two pilot systems with the SCAT Connect Box are already in use, and more will follow.

A "Mad Professor" becomes the brand image

The Safety Caps and the SCAT Connect Box are just two examples of how SCAT wants to make work in the laboratory more efficient and above all safer. However, the more than 1,600 items developed in-house for the safe handling of hazardous liquids are not the only part of improving laboratory safety. "It also requires a lot of persuasion and educational work," emphasizes Rebehn.

"We are often at trade fairs to sensitize users to the topic and to train them with lectures." This is the only way to counteract the downside of too much routine and avoid careless handling in the laboratory in the long term.

Finally, the comic-like "Mad Professor" of SCAT's branding shows what happens when you don't take laboratory safety seriously. "It was originally intended as a deterrent example," reveals the application specialist. "Because if you inhale too much solvent, it will eventually soften your head."

However, it does not seem to have a real deterrent effect, but rather attracts interested and curious looks, e.g. at trade fairs. The face of the maniacally laughing character now adorns SCAT bags, presentation slides and product packaging and has ensured a high recognition value for the brand. And those who regularly sensitize themselves to the dangers in the laboratory and take appropriate precautionary measures do not have to fear becoming a "Mad Professor" themselves, due to too much inhaled solvent vapour.

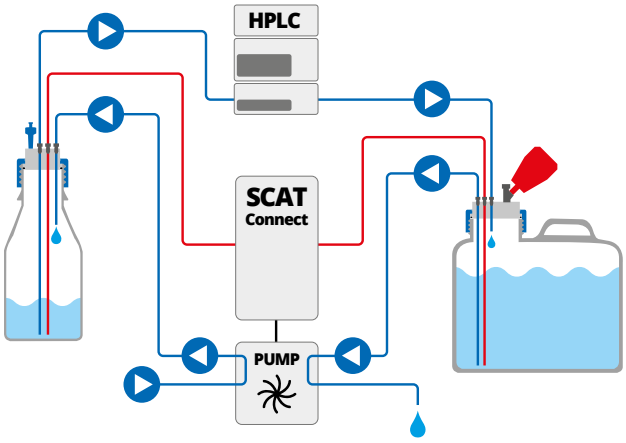

Fig.4: Functional diagram for SCAT-Connect: The system continuously measures the fill levels of solvent and waste containers with millimetre precision using a hydrostatic measurement method. External devices such as pumps can be controlled.