Problem

What happens if an HPLC user just guides the mobile phase through capillaries In nopen caps[4], Instead of using S.C.A.T. SafetyCaps?

Test chromatograms of 3 PAHs (polycyclic aromatic hydocarbons) were used for a 31-day comparison.

Procedure

All 4 bottles were filled at the beginning with the identical mixture of water + methanol = 20 + 80 (percentage by weight). Using bottle Bas a reference, a chromatogram of a mixture of three PAHs (polycyclic aromatic hydrocarbons) - naphthalene, pyrene and chrysene - was acquired for comparison. After the reference chromatogram was recorded, all bottles were stored at room temperature in a fume hood, which guaranteed a gentle airflow over the top of the bottles, for 31 days.

1214 Lit. No. 191173W

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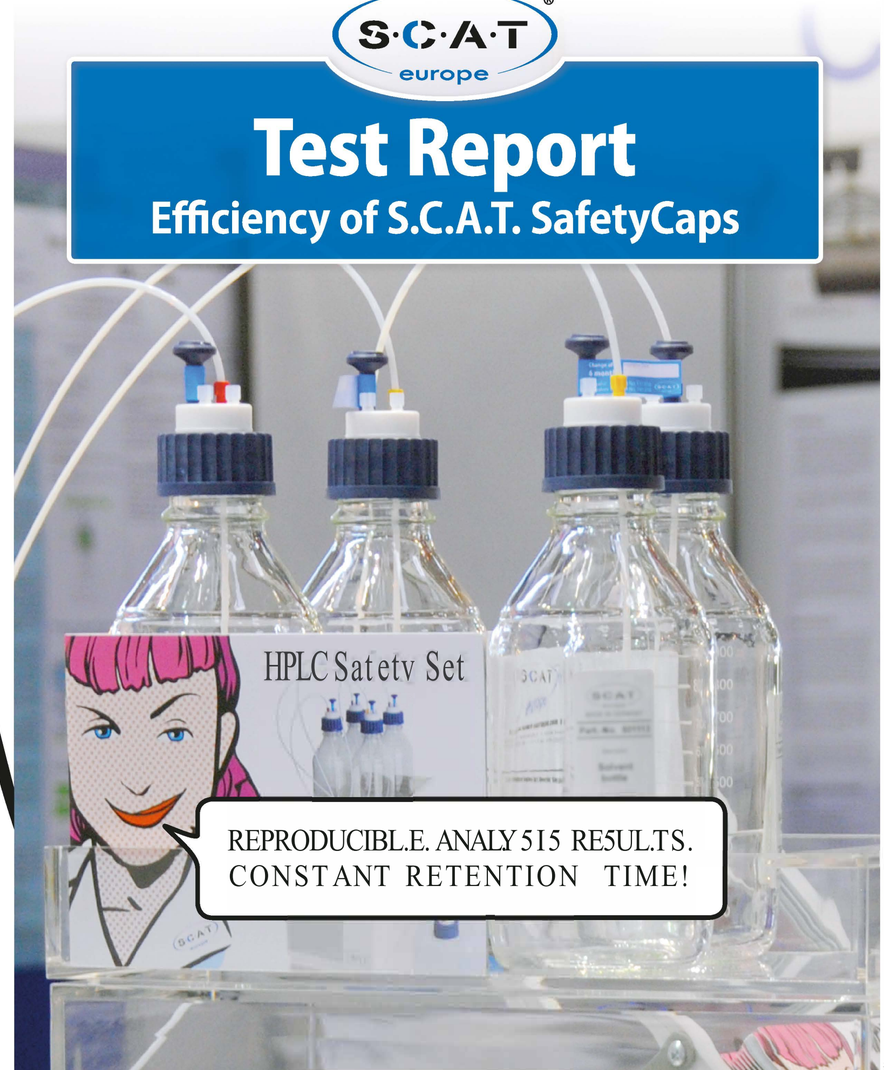
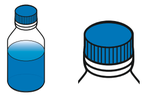
Test Report

Efficiency of S.C.A.T. SafetyCaps



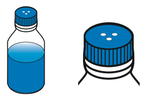
Test Conditions

Bottle A: This bottle was closed using a **S.C.A.T. SafetyCap** with a GL-45 thread. (Part No. 107 019)



Bottle B: This bottle was tightly closed with its standard GL45 cap, which includes a PTFE film disk for sealing.

Bottle C: This bottle was closed using a cap with a 10-mm hole in the plastic material, yielding an open exit area of approximately 0.785 cm^2.



Bottle D: This bottle was closed using a cap with three 3-mm holes in the plastic material, yielding an open exit area of approximately 0.212 cm^2.

HPLC-System: VWR HITACHI LaChrom Elite® system with Diode Array Detector, EZChrom Elite™ Software, Isocratic pump conditions and premixed mobile phase.

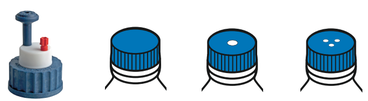
HPLC-Column: Purospher® RP-18e (5 μ), 125 x 4 mm.

Test Results

The test clearly revealed that unless closed solvent delivery systems - like the ones guaranteed by using the **S.C.A.T. SafetyCaps** - are used, unreliable retention times may be encountered even after a relatively short time.

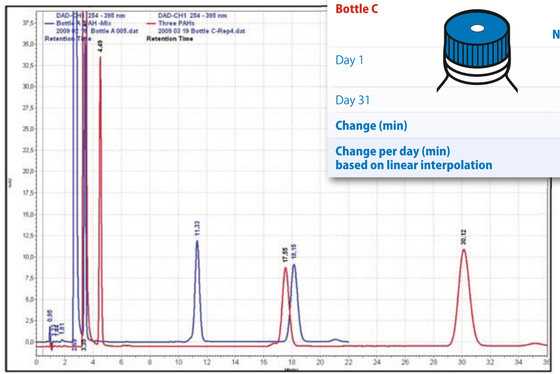
As expected, **bottles A and B** did not show any significant changes in their weights, so no solvent vapors escaped from those two bottles. In contrast, **bottles C and D** showed significant and uncontrolled loss of liquid through evaporation **(see chart below)**. **After 31 days**, the separation of the three PAHs was repeated under identical HPLC conditions (same HPLC system, same column, etc.) using the liquids from **bottles C and D**. The result was a significant prolongation of all retention times of the test compounds, which would make compound identification based on retention times impossible. Assuming a more or less linear relationship between evaporation of the mobile phase and time, it becomes clear that even after one day of using mobile phase bottles that are not tightly closed, the user can expect changes in retention times.

Weight loss of bottles over a period of 31 days:



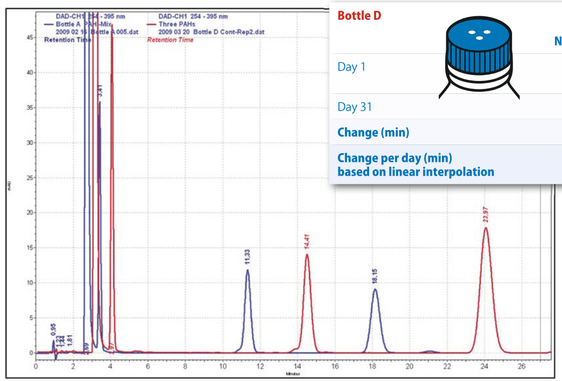
	Bottle A	Bottle B	Bottle C	Bottle D
Day 1	457.45	539.26	724.14	715.08
Day 31	457.43	539.26	672.45	687.36
Loss (g)	**0.02**	**0.00**	**51.69**	**27.72**
Loss (%)	**0.004**	**0.000**	**7.138**	**3.876**

With S.C.A.T. SafetyCap closed bottle and bottle C



Bottle C	Retention time changes		
	Napthaline	Pyrene	Chrysene
Day 1	3.53	11.33	18.15
Day 31	4.49	17.55	30.12
Change (min)	**0.96**	**6.22**	**11.97**
Change per day (min) based on linear interpolation	**0.031**	**0.201**	**0.386**

With S.C.A.T. SafetyCap closed bottle and bottle D



Bottle D	Retention time changes		
	Napthaline	Pyrene	Chrysene
Day 1	3.41	11.33	18.15
Day 31	3.97	14.41	23.97
Change (min)	**0.56**	**3.08**	**5.82**
Change per day (min) based on linear interpolation	**0.018**	**0.099**	**0.188**

Conclusion

If tightly sealed reservoir bottles for mobile phases are not used, there is a clear risk of uncontrolled vaporization, possibly resulting in wrong retention time assignment for eluting compounds. The use of **S.C.A.T. SafetyCaps** definitely prevents such uncontrolled evaporation, and in addition protects your laboratory air from constant contamination with toxic compounds!