Memorandum for a safe, unmistakeable C14/H3 collecting container BVP “ATnc”

Introduction.

Reminder: in 2014 the initiative for developing a new molecular sieve came from Mr Ewald Müller, who at the time was Head of Radiation Chemistry at Grafenrheinfeld nuclear power plant. The initial statement was:

“Baltus, you should finally think of something to eradicate the annoying error messages.”

Several times Mr Müller had already been on the way home when he was called back to his workplace because of an incorrect error message. Each time he had to be subjected once again to the access procedure controls for the control zone; each time he took the bottles out of the collector, banged them against the wall (and hence shook free the mini dust barrier), fitted it back in again – and it then functioned for a while without any errors. However, this troubleshooting approach was and is not mentioned in any operating instructions.

I also received from Mr Müller and other specialists – for instance the German Technical Inspection Agency (TÜV) – the instruction that when I was developing the “AT” container I should take a precise look at the KTA 1503, because this regulation contained clear instructions to be used on the bottles, respectively on the container “AT”. This instruction was followed: we listen to the clients.

There is a short description of the convenient collecting container “AT” with couplers from Swagelok.

At the end of the document there is the brief information on an additional innovative product: the C14/H3 collector “AT”.

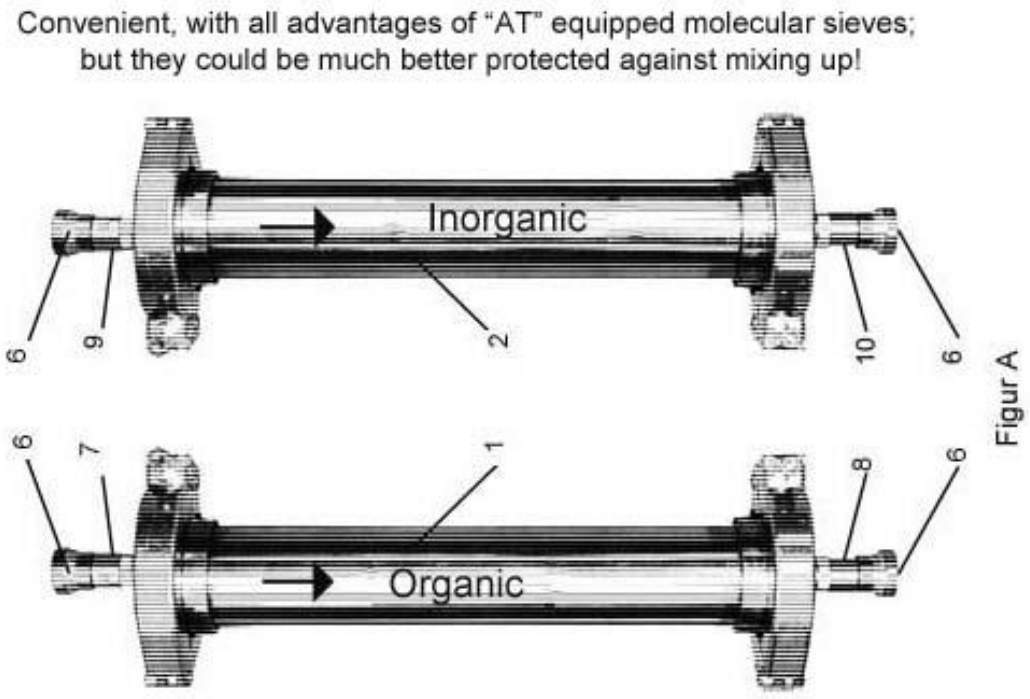
<u>Important notification</u>:

The ^{3}H /^{14}C collecting BVP “AT” is definitely not suitable for measuring ^{3}H and ^{14}C! The collecting container pairs “AT“ or “ATsw” and “ATnc” are also just as unsuitable. The “AT” products – not only the collectors but also the containers for molecular sieves – are only used for collecting ^{14}C and ^{3}H in molecular sieves; measuring and evaluation is later performed in suitable laboratories.

“The collecting container “ATsw” with Swagelok coupler”

We have already proposed the variant shown above. However, we were not satisfied with this, because we couldn’t rule out the risk of incorrect interpretation.

Previously:



Property rights registered. (6) Coupling socket or body © BVP GmbH Bonn

Collect $^{14}CO_2$ / ^{3}H with the very convenient, reliable and – because unmistakable – also safe C14/H3 collecting container BVP "ATnc".

Photo above: a pair of unmistakable "ATnc" with Swagelok couplers.
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Criterion / properties of collecting containers	ATnc	
✓ = Yes, X = No		
All-round KTA-conformity	✓	
Tight at underpressure (BfS test mode 0.8 bar negative pressure)	✓	
Tight at overpressure (BVP test mode 1.5 bar overpressure)	✓	
Tight during long-term storage	✓	
Volume 500 ml; in the case of "AT" +/- 1%	✓	
Thanks to the clearance width of 45 mm, rapid emptying and rapid	✓	
filling of the collecting container with molecular sieve, therefore:	✓	
minimal dust generation during emptying and filling	✓	
With approx. 20 cm² very generously dimensioned dust barriers, therefore:	✓	
quick pressure build-up and pressure reduction during operation, and therefore:	✓	
high operating safety, **no cost-intensive incorrect error messages**	✓	
No use of fittings with brass threads or sealing of Teflon tape, and	✓	
therefore no residues of foreign material such as Teflon tape or brass chips	✓	
No routine screwing onto brass components that are not envisaged for this,	✓	
and therefore no fracturing of fittings with brass threads	✓	
Clearly assignable to the operator, because of abrasion-proof labelling	✓	
The measuring gas flow direction is clearly shown	✓	
Secured against mixing up the containers organic - inorganic	✓	
The containers are tested for leak tightness during the WKPs	✓	
Separate test bottles **are not necessary** (but they can be supplied)	✓	
There are no temperature problems with the leak tightness tests	✓	
Thanks to the radiation protection, they can be easily measured and decon-taminated!	✓	
Connections are leak tight and “convenient”	✓	
Fall test from a height of 2 meters performed without any damage	✓	
Defined fields for handwritten entries, e.g. weights	✓	
Manufacturing country: Germany; Swagelok components: USA	✓	
Including reusable shipment packaging	✓	

	C14/H3 collector “AT”. The result from 35 years of construction, installation, commissioning, maintenance and repair of more than 250 C14/H3 collectors throughout the world		
	35 years of international experience and 35 convincing arguments		
1	Tested active and passive electromagnetic compatibility and correct conformity declaration as a matter of course!	✓	
2	**Continuous sampling with tried-and-tested piston pumps from up to 600 mbar underpressure ...**	✓	
3	... and hence a slow, continuous flow of gas through the catalyser guaranteed!	✓	
4	**Mass throughflow measurement** with totalisator currently shows the collected volumes	✓	
5	Both sides of the pump cylinder are being used and hence ...	✓	
6	... there is no open connection of the process to the environment!	✓	
7	... a static seal tightness test is completely sufficient	✓	
8	A dynamic seal tightness test can be performed if required	✓	
9	Apart from the main switch and 2 control lamps, all equipment is protectively arranged in the interior of the cabinet	✓	
10	Control displays for volumes, heater temperature, pressures and throughflow display can be viewed through a window at any time	✓	
11	Individual lockable doors are not necessary	✓	
12	“Change switch” stops pumping operations while the containers are being exchanged, and reset the totalisator	✓	
13	Maintenance switch stops pumps for maintenance work, and for seal tightness tests or repairs	✓	
14	Thanks to the radiation protection, mixing, stock or buffer containers can be measured	✓	
15	**Stock or buffer containers can be decontaminated**; technologies, such as collecting container "AT"	✓	
16	Thanks to the clearance width of 45 mm, if necessary, a visual inspection of the buffer containers can be easily performed	✓	
17	The collecting and buffer containers which are used are an in-house production and **conform with KTA**,	✓	
18	Clear, uninterrupted pressure monitoring with max and min contacts	✓	
19	It is not necessary to count strokes for detecting leakage or blockage	✓	

20	Exact displays of disturbances to pressure, throughflow quantity, heater temperature and data loggers with four LEDs	✓	
21	Direct recording of real number of strokes using reed contact on the pump cylinder and display on a stroke counter	✓	
22	The seal tightness test is performed easily and consistently separated for both circulation systems –	✓	
23	2 pneumatic switches with clear settings for testing and operating are used for each of the process stages	✓	
24	The collecting containers are arranged **frontally and therefore easily accessible** on the fitting plate	✓	
25	Secured against mixing up the containers organic - inorganic	✓	
26	Collecting containers are also tested for their seal tightness during the WKPs	✓	
27	**Separate test bottles are not necessary** (if required, we also supply 2 empty test collection containers)	✓	
28	Temperature problems no longer occur during the seal tightness test	✓	
29	Without fragile plugs and connection sockets for the recommended collecting containers	✓	
30	Thanks to the radiation protection, perfectly **capable of being decontaminated**!	✓	
31	The connections of the recommended collecting containers "AT" are robust, break-free and can be decontaminated	✓	
32	Optional: data logger writes, triggered by each stroke, system pressures and cabinet temperature	✓	
33	Catalytic heaters from in-house production	✓	
34	Space-saving design, cabinet depth only 300 mm	✓	
35	The wiring and hose system of the collector is produced in-house without outside companies or service providers	✓	

Continuous sampling with tried-and-tested piston pumps from up to 600 mbar underpressure.