Guide for Sachet Use in Monitoring Methyl Bromide Fumigations

Back ground
The Cross Check fumigation sachet was developed as a simple device that measures the total exposure (i.e. dose) achieved in any fumigation with Methyl Bromide (CH_3Br) gas.

The sachets have been in use by the fumigation industry, for the determination of successful methyl bromide fumigation, for over 20 years.

The sachets work by absorbing methyl bromide from the headspace of the fumigation. The sachet is comprised of two small plastic bags of solution welded together. The plastic is of a thickness to contain the solutions but allows the methyl bromide gas to penetrate, one solution is an ABSORBER, and the other is the REAGENT.

The absorber traps the methyl bromide molecules as they permeate the thin plastic of the envelope, once in solution the bromide is bonded to the absorber- the process is one way. The number of gas atoms penetrating in a given time is strictly proportional to the gas concentration around the sachet, so the effect is to integrate concentration with time (dose). This is expressed as a value – milligram hours per liter (or mg.h/l) – this is known as the concentration: time product (c:t for short). When removed from the fumigation the two solutions can be mixed together in a white container and the resultant colour change used to verify that the c:t value has been achieved. Pink through to red indicates a successful fumigation, while white to opaque indicates a failed fumigation. All sachets used to monitor a single fumigation must pass (unless damaged) for the fumigation to be deemed successful. The sachets can be stored for any length of time after fumigation and still be tested. Care must be taken when handling and testing the sachets as the solutions contain a mixture of chemicals including strong acids.

Currently Cross Check sachets are available in four c:t values, 32mg.h/l (blue), 64mg.h/l (green), 150mg.h/l (yellow) and 1000mg.h/l (red). This range of sachets will be expanded.

Use of Sachets
A minimum of two sachets per fumigation must be used according to the table below for both exports and imports. In large fumigations more sachets should be used, a guide is one additional sachet for every $100m^3$ of gas space above $100m^3$. Putting the sachets in an envelope and tied with a string can allow retrieval and testing prior to removal of the covers to confirm the result.

Sachets should be placed in a variety of locations within the fumigation space, but preferably within air space comprising the top third portion of the product requiring fumigation, including the colder side of the fumigation stack.
The placement of sachets is critical to achieving a result that is indicative of the fumigation and is not to be compromised by undue influences such as gas entry

points, or sachets wedged between cargo and fumigation sheets, or placing sachets at floor level as methyl bromide is known to stratify in low temperatures (below 15°C). All sachets used to monitor a single fumigation must pass (unless damaged) for the fumigation to be deemed successful.

Fail				Pass		
Clear	Milky	Yellow	Orange	Light Pink	Pink	Red

Clear Liquid with white precipitate	Fumigation narrowly failed, Re-fumigation required
Clear or Yellowish Liquid	Fumigation is a clear failure, Re-fumigation required
Palest Pink to Dark Red:	Fumigation has been successful

Storage of Sachets
Sachets need to be kept out of the sunlight, kept cool i.e. chilli bin during transport and daily fumigation activities, but do bring the sachet up to ambient temperature prior to placing in the fumigation particularly for the short duration schedules. For longer term storage it is recommended that sachets are kept in a fridge.

Non-Compliance
It is easy for auditors to check for pre-exposed sachets by randomly testing "unused" sachets prior to them going into fumigation. It will be a critical non compliance and may result in suspension if any operator is found to be pre-exposing sachets.

Which sachet?

Concentration grams	Time	Sachet
24	2 hrs	Blue
32	2 hrs	Blue
40	2 hrs	Blue
48	2 hrs	Green
32	3 hrs	Green
40	3 hrs	Green
38	3 hrs	Green
48	3.5 hrs	Green
48	4 hrs	Green
80	4 hrs	Yellow
120	4 hrs	Yellow
16	12 hrs	Yellow
40	12 hrs	Yellow
48	12 hrs	Yellow
56	12 hrs	Yellow
72	12 hrs	Yellow
96	12 hrs	Yellow
120	12 hrs	Yellow
16	24 hrs	Yellow
24	24 hrs	Yellow
32	24 hrs	Yellow
40	24 hrs	Yellow
48	24 hrs	Yellow

56	24 hrs	Yellow
64	24 hrs	Yellow
72	24 hrs	Red
80	24 hrs	Red
120	16 hrs	Red
120	24 hrs	Red
240	24 hrs	Red
Most common rates		