ECHA
EUROPEAN CHEMICALS AGENCY

Technical Agreements for Biocides

Efficacy (EFF)

Version 2.0, November 2018

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Preface

The Technical Agreements for Biocides (TAB) intends to provide in a concise format the general agreements of the Working Group (WG) which have not yet been included in any other BPR related guidance documents.

This document is intended to cover the technical/scientific WG agreements that have general relevance and to create a general database of questions where an agreement has already been reached. Only agreements of general relevance have been included.

The TAB is publicly available on the ECHA website and on the public S-CIRCABC Interest Group[1].

The answers presented in the document are those agreed by the WG. They are not the official view of ECHA, nor are they legally binding. It is not an authoritative source of information, and when in doubt, the original documents cited should always be consulted. The main sources for the TAB are the adopted minutes of the WG, and in all cases, a reference is given to the WG meeting or the Technical Meeting (TM) where the agreement was reached.

Starting from TAB Version 2.0 there is a separate document for each WG and version numbers are included in the second row of each entry. Entries included in versions 1.0 to 1.3 are referred to as "Version 1".

Changes made in a TAB entry are marked as "Included in Version x, updated in Version y.y".

Procedure

TAB does not require a formal endorsement by the Biocidal Products Committee or the WG because the document records agreements made at the WG and included in their minutes. It is a living document that will be updated over time. Any suggestions on the need to change the content can be sent at any time to BPC-WGs@echa.europa.eu.

The text will be updated regularly by uploading a revised version in the Newsgroups of the BPC-WG S-CIRCABC site for a commenting period of 4 weeks for the WG members. After the commenting period, ECHA will revise the TAB if necessary, and publish it on the ECHA website. The procedure does not involve discussions at the WG. However, the TAB entry may be discussed at the WG if necessary.

[1] https://webgate.ec.europa.eu/s-circabc/w/browse/ae26a5d2-a19b-42b8-a173-19bef3375d49

Efficacy

1. Limited virucidal activity

Version 1 (WGII2016)

Is modified Vaccinia Virus Ankara (MVA) acceptable test organism to prove virucidal activity of biocidal products used as disinfectants in PT1, 2, 3 and 4?

MVA representing enveloped poxviruses is a sufficient test organism to confirm efficacy against enveloped viruses for biocidal products used in PT 1: *Human hygiene* as hand disinfectants (hygienic and surgical) and PT3: *Veterinary hygiene* as skin disinfectants, e.g. teat disinfection with a claim against enveloped viruses.

Regarding biocidal products used in PT 2: *Disinfectants and algaecides not intended for direct application to humans or animals* and in PT 4: *Food and feed area* it is necessary to point out that for the time being a claim against enveloped viruses is not accepted. For biocidal products used in other PTs a virucidal activity within the meaning of full virucidal activity can only be claimed, i.e. against both enveloped and non-enveloped viruses.

2. PT14: Applications for major changes with lower concentration of an active substance

Version 1 (WGIV2016)

What kind of efficacy data are requested as a part of application for major change of PT14 biocidal products with lower concentration of an active substance?

Based on current experience the following approach applies:

- laboratory tests

  palatability - in choice tests it should absolutely be validated (criteria of 20 % should be met without exceptions) and the same amount of bait as well as challenge diet should be provided.

  Proposal for laboratory tests:

  - systematic comparison between laboratory tests with old and new formulation to check the increase of palatability (valid if active substance is the only change);
  - longer exposure time accepted only if palatability > 20 % and no signs of animal suffering.

- field tests[2]: efficacy must be demonstrated according to the claims for two reasons:
  - environmental risk assessment takes into account the application rate per surface unit, then quantities applied in the field tests has to be considered;

[2] Only for roof rat (Rattus rattus) it is acceptable to demonstrate efficacy:
- in two or more well-conducted semi-field trials, in regions where infestations of roof rats are quite rare, or
- two (or more) well-conducted field trial(s) in regions with infestations of roof rats.

- in case of high infestation, bait stations should be checked and refilled more often than every 2/3 days or once a week;

Proposal for field tests:

- quantities in bait stations must follow the label claims, particularly in case of an active substance decrease.

In case a complete efficacy data package for the 'old' formulation has been submitted including at least 20% of palatability in the laboratory tests and the product composition remains unaltered except lower concentration (≥25 ppm) of an active substance only new field tests are required.

In case the palatability in the 'old' formulation is lower that 20%, choice and field tests are required.

For products with active substance concentration <25 ppm, choice and field tests are required.

For any other change in product composition other than lower concentration of an active substance, efficacy and palatability have to be demonstrated in choice and field tests.

3. Devices generating the active substances by electrolysis

Version 1 (WGV2016)

Should the devices generating the active substances by electrolysis be taken into account when authorising biocidal products?

If the active ions are produced *in situ* by electrolysis the device can affect the efficacy. Therefore, at product authorisation stage the efficacy tests should always be done with the electrodes in a specified device or devices with a defined output range. Information on how the device is protected for under- and overdosing should also be given. However, it shall be noted that the device itself is not subject to product authorisation.

4. Shelf life of PT18 bait products

Version 1 (WGV2016)

Could 'a long period storage' agreed for PT14 products be accepted with reference to the requirements on palatability studies corresponding to more than 24 months also for PT18 biocidal products?

The palatability testing defined for PT14 products can also be applied to PT18 biocidal products. Therefore, efficacy testing should only be provided for the following cases:

- bait products with preservatives that claim a shelf life longer than 24 months;
- bait products without preservatives that claim a shelf life longer than 12 months;
- bait products for which the degradation of the active content is >10% and assessment of the degradation on the efficacy is needed to substantiate the shelf life claim.

For bait products with a shorter shelf life claim than stated above, no efficacy tests of aged bait (i.e. product at the end of maximum storage) have to be provided. For these products it is sufficient to provide tests on fresh bait (i.e. newly produced product).

5. Insecticide against crawling and flying insects intended to be used in aircrafts

Version 1 (WGI2017)

In the context of the authorisation of an insecticide (against crawling and flying insects) intended to be used in aircrafts, shall a field test (i.e. in the specific environment of aircraft in realistic settings) be submitted?

There is currently no guideline available that describes a possible set-up for semi-field trials in a laboratory. For biocidal products authorised as insecticides for aircraft disinsection semi-field tests in line with the WHO guidelines (specific to mosquitoes) simulating realistic conditions of use, using cabin crew training sites or decommissioned aircrafts shall be submitted.

6. Co-formulant(s) being a potential active substance in disinfectant products

Version 1 (WGII2017)

How to exclude or confirm that a co-formulant in a disinfectant product is a potential active substance?

In case during evaluation phase of biocidal product containing one or more co-formulant(s) the evaluating Competent Authority regards one or more of the co-formulant(s) to be an additional active substance the applicant should provide a justification on its function in the formulation and how this will not influence efficacy of the product. Only in cases where a justification is not conclusive tests should be provided to demonstrate the 'non-activity' of the co-formulant(s). The following strategy has been developed[3].

A) Three kinds of tests have been identified. The eCA may request one, two or all of them – as necessary and appropriate.

Test 1: The biocidal product without active substance is tested.

The active substance(s) are replaced by water or, when justified, any other suitable substance(s). The test should be performed at the recommended concentration of the product[4].

If the active substance(s) cannot be replaced for whatever reason, the concentration of the product without active substance has to be decreased accordingly.

[3] The conclusions of the test performed according to this strategy are only valid when at least one active substance is identified.
[4] Example: Amount of the active substances is 30g/100g in the biocidal product. Concentration used for claiming bactericidal activity is 2.0 %. Concentration in Test 1 should be 2% of 70.0g = 1.4 %.

In cases where in this test a high lg reduction is seen, further tests 2 with each co-formulant under question would be required to verify which co-formulant is causing this effect.

Test 2: Each co-formulant under question is tested alone.

The concentration (of the co-formulant) in the test has to be adapted to the relative amount of the co-formulant in the biocidal product[5].

Test 3: The biocidal product without the co-formulant is tested.

Two products are tested in parallel: the biocidal product and the same product, but without the co-formulant that should be replaced by water or, when justified, any other suitable substance(s). Separate testing may be performed for each co-formulant under question removing only one co-formulant at a time. The test should be performed at the recommended concentration of the product.

Any deviation from a test method above must be clearly described and a justification for any deviations provided.

B) Each test should be performed as a (modified) Phase 2, step 1 test. For all tests it is requested to show a definite lg reduction considering the detection limits of the respective tests, i.e. within the detection limits precise lg reduction values need to be given such as 2.68 lg instead of <5.00 lg. The EN tests may be adapted accordingly, if necessary. For instance, extra dilution steps will be needed for these tests to show lg reductions around 3.00 and 3.50.

C) Generally, these tests should be performed with bacteria.

D) Test 3 should be performed under the test conditions (interfering substance/soiling, contact time) used for a product claim, demonstrating that the product without the co-formulant is still efficacious under use conditions.

Since both tests, 1 and 2 are tests without active substance the conditions should not be as severe as under use conditions. These Phase 2 step 1 tests should be performed with proportionate amount of interfering substance and with the longest contact time claimed for the product.

E) In all tests the pH of the test solution should be adjusted to the pH of the biocidal product.

F) To demonstrate in tests 1 and 2, that the co-formulants under question are not active substances the lg reduction should be at least 2 lg lower than the required lg reduction in the EN Phase 2 step 1 test performed. For test 3, the lg reduction of the two products should be similar, i.e. show no more than 1.50 lg difference.

[5] Example: Amount of the co-formulant is 3.0g/100g in the biocidal product, concentration used for claiming bactericidal activity is 3.0 %, concentration of the co-formulant in Test 2 should be 3% of 3.0g=0.09 %.

G) Schematic overview of possible test results and conclusions

Test	Test product*	Result (lg reduction)	Conclusion
Test 1	BP without AS	<3**	all CFs are not active substances in this product
		≥3**	one or more or the combination of the CF might have biocidal activity in the product
Test 2	Only CF	<3**	this CF is not an active substance in this product
		≥3**	this CF might be acting as an active substance in this product
Test 3	BP without CF	≥3.5**	this CF is not an active substance in this product
		<3.5**	this CF might be acting as active substance

* BP = biocidal product; AS = active substances; CF = co-formulant.
** lg reduction in an EN Phase 2 step 1 tests for bacteria (EN1276; EN13727; EN1656).

7. Disinfection of packaging before filling

Version 1 (WGII2017)

What are the testing requirements for aseptic packaging applications (PT 4) before filling in relation to:

1. Tests needed to demonstrate efficacy, taking into account that standard phase 2, step 1 and phase 2, step 2 tests cannot be validated for the high temperatures and short contact times,
2. Typically high temperature of application for this use,
3. Variations in packaging machines for testing,
4. Target organisms relevant for this claim (basic requirement?) - which test organisms should be used?

The following data should be provided to demonstrate efficacy of a product for aseptic packaging applications:

1. Efficacy should be demonstrated by validation of the product in the disinfection process using aseptic filling devices and packaging material that are representative for the intended use of the product[6]. Phase 2, step 1 and phase 2, step 2 tests are not required;

[6] Test protocols for hygienic/aseptic devices according to class III, IV and V have been published by the Association of German Machinery and Plant Constructions (VDMA). Taking into account the data requirements listed in this TAB, appropriate test protocols to demonstrate efficacy can be developed based on these VDMA methods.

2. A negative control with all claimed target organisms should be performed (with e.g. water) to demonstrate that the high temperature alone is insufficient to achieve sufficient control of microorganisms. Since it might be expected that bacterial spores survive the use conditions, it can be possible to exclude a negative control for bacterial spores if sufficient scientific justification is provided;
3. Products are efficacious under certain conditions, e.g. temperature, concentration, contact time, etc. Products can be tested in aseptic filling machines that meet/use the (worst-case) conditions for the product to be efficacious. The conditions to be taken into account and reflected in the test report:
    - surface temperature;
    - concentration;
    - amount of product applied;
    - contact time;
    - relative humidity;
    - dose/application rate;
    - inner surface properties of the packaging.
4. Generally, only bacterial spores survive these conditions, while vegetative bacteria and yeasts will be killed in the negative control. Therefore, demonstrating efficacy against bacterial spores (e.g. *Geobacillus stearothermophilus*) is sufficient for an efficacy claim against other groups of microorganisms for aseptic filling applications. However, when the negative control shows survival of any other target organisms (e.g. fungal spores) these should also be tested by validation of the product in the disinfection process.

8. Room disinfection - how to ensure the proper use

Version 2 (WGV2017)

Should the advice for biological validation[7] and, in cases where there are monitoring methods available, also for chemical validation[8] be included in the use instruction in the SPC?

Yes, this advice should be given to validate the use instructions for the vaporisation regime (dosing, temperature, humidity, concentration in the air, and contact time during each

[7] Biological validation demonstrates which dosing and parameters for vaporisation (temperature, humidity, concentration in the air, and contact time during each phase: preparation, conditioning, disinfection, and terminal phase) should be used for optimal disinfection of the room in question, i.e. sufficient killing of organisms on all surfaces in the room. Biological validation is performed by monitoring efficacy against a challenging test organism (e.g. *Geobacillus stearothermophilus* spores) during the room disinfection process. Chips with spores are placed at places that are difficult to reach. After the disinfection the chips can be processed according to, for instance, the AFNOR test NF T72-281.

[8] Chemical validation demonstrates which dosing and parameters for vaporisation (temperature, humidity, concentration in the air, and contact time during each phase: preparation, conditioning, disinfection, and terminal phase) should be used for optimal disinfection of the room in question, i.e. sufficient active substance (according to the dosing instructions) on all surfaces in the room. Chemical validation is performed by monitoring the amount of active substance in the air (or on the surfaces) during disinfection.

phase) for specific circumstances of the room (volume, presence of furniture, equipment, cables etc.).

If room disinfection with vaporised biocidal product is claimed, it is highly recommended to include in the use instructions in the SPC the advice that biological validation shall be performed for each room to be disinfected (or in a suitable "standard" room in a facility, if applicable) with the devices to be used after which a protocol for disinfection of these rooms can be made and used thereafter.

In case there are methods available for chemical monitoring the active substance in the air or on surfaces, it is highly recommended to include in the use instructions in the SPC the advice that besides biological validation chemical validation should be performed. In case of hydrogen peroxide this can be done with H_2O_2 test strips, or with a device that measures ppm H_2O_2 in the air.

9. Textile disinfection

Version 2 (WGV2017)

9.1 Efficacy testing

What kind of efficacy tests should be performed for biocidal products used as disinfectants for textile either or not in combination with detergents?

For biocidal products used as disinfectants in combination with detergents, e.g. in the pre- and main-wash the following approach should apply:

- Phase 2 step 1 test should be done in combination with the detergent and disinfectant. All claimed disinfectant/detergent combinations and the claimed conditions should be tested, unless worst case conditions can be justified (e.g. testing only lowest and highest concentrations of same disinfectant/detergent combination).
- Phase 2 step 2 test should be done according to EN 16616. Furthermore as a minimum the disinfectant/detergent combination should be tested. In principle all claimed disinfectant/detergent combinations and the various conditions claimed should be tested, unless worst case conditions can be justified (e.g. testing only lowest and highest concentrations of same disinfectant/detergent combination).

For biocidal products used as disinfectants and applied separately without a detergent, e.g. disinfection in the last rinse for textile the following approach should apply:

- Phase 2 step 1 test should be performed without a detergent.
- In case a disinfectant is applied in a such way that it does not come into contact with a detergent, a justified suitable test procedure for the Phase 2 step 2 test should be provided, e.g. a modified EN 16616 test without detergent, with justification for the use of soiling that mimics the clean conditions. To demonstrate efficacy in this modified test, test organisms should be added at the same step of the process as the disinfectant.

For combined cleaner-disinfection products used as disinfectants for textile the following approach should apply:

- Phase 2 step 1 and Phase 2 step 2 tests should be done with the combined cleaner-disinfection product (without adding an extra detergent since the detergent is already included in the product).

Table 1. Efficacy testing versus disinfection at various steps of the washing process.

Disinfection in	Presence detergent / disinfectant in washing step	Testing	Test conditions
Pre wash*	detergent and disinfectant	Phase 2, step 1 Phase 2, step 2	Detergent and disinfectant at use concentration Temperature and contact time as in use instructions Dirty conditions
Main wash*	detergent and disinfectant	Phase 2, step 1 Phase 2, step 2	Detergent and disinfectant at use concentration Temperature and contact time as in use instructions Dirty conditions
Last rinse*	disinfectant	Phase 2, step 1 Phase 2, step 2	Temperature and contact time as in use instructions Clean conditions**

* Steps of the assumed washing cycle are: 1) pre-wash, 2) main wash, 3) rinse.

** EN 16616 describes dirty conditions only. When clean conditions are in line with the intended use testing can be done with a modified EN test with justified modifications.

9.2 Test organisms for elevated temperatures

What test organisms should be used for textile disinfection at elevated temperatures?

The recommended test organisms for efficacy testing of textile disinfection processes are listed in Table 2. Depending on the intended claims the following test organisms can be chosen to be tested at the claimed temperature. Minimally a bactericidal and yeasticidal claim should be made for textile disinfection.

Table 2. Overview of test organisms versus temperature

Claimed temperature (T)	**BPR Guidance**	**EN 16616**	**Recommendation**
T < 40ºC	Organisms as indicated in EN 16616	*Pseudomonas aeruginosa* *Escherichia coli* (K12) *Staphylococcus aureus* *Enterococcus hirae* *Candida albicans* *Aspergillus brasiliensis* *Mycobacterium terrae* *Mycobacterium avium*	Organisms as indicated in EN 16616
40C ≤ T < 60ºC*	*Enterococcus faecium*	*Pseudomonas aeruginosa* *Escherichia coli* (K12) *Staphylococcus aureus* *Enterococcus hirae* *Candida albicans* *Aspergillus brasiliensis* *Mycobacterium terrae* *Mycobacterium avium.*	*Pseudomonas aeruginosa,* *Escherichia coli* (K12) *Staphylococcus aureus* ***Enterococcus faecium*** *Candida albicans* *Aspergillus brasiliensis* *Mycobacterium terrae* *Mycobacterium avium*
T ≥ 60ºC	*Enterococcus faecium*	*Enterococcus faecium*	*Enterococcus faecium*

* Volume II Efficacy, Assessment + Evaluation (Parts B+C), section 5.4.0.4.4 is still applicable: "When efficacy against mycobacteria, yeasts and fungal spores is claimed and no temperature resistant strains are available, the standard test organisms should be tested at the maximum temperatures for which the test is validated." These tests (Phase 2 step 1 tests) should be done in addition to the tests above when the claimed temperature is higher than the maximum validated temperature for that test organism (standard organisms as for <40 ºC).