

Advice Sheet 47 RBP Inoculum Inhibition Procedure

RBP test and invalid results

The residual biogas potential (RBP) test is used to assess the stability of digestates under the PAS110 certification scheme for biofertilisers. The test sample is mixed with an inoculum to provide a source of microorganisms. As part of the quality control requirements the gas produced by the sample + inoculum should be positive (in terms of gas production) within 5 days of starting the test. If this is not the case, the result must be reported as invalid as the test is unable to demonstrate sample stability.

Inoculum inhibition

The conclusion in the instance of negative gas production after 5 days is that the inoculum has been inhibited by the nature of the digestate sample. Current understanding indicates samples with higher ammonium content (>3500 mg/l) are more likely to cause inoculum inhibition. Anaerobic digestion (AD) plants processing nitrogen rich feedstocks (e.g. poultry litter or fish waste) may experience this issue or plants processing food waste.

Overcoming inhibition

The inoculum used should be from *'a mesophilic anaerobic digester treating municipal wastewater biosolids'* as dictated in the reference method. However, elsewhere in the WRAP report (which contains the RBP test method) it states *'an ideal inoculum is one that is fully acclimated to the incoming waste while also being depleted of residual primary and intermediate substrates.'*

Trials have been carried out testing digestate samples with inoculum taken from site alongside the standard lab inoculum. This has demonstrated that inoculum from site is better acclimated to the digestate sample chemical makeup and valid RBP test results have been reported.

Procedure for operators experiencing this issue

If an operator finds their digestate sample is causing inoculum inhibition, they should contact REAL immediately to discuss via info@realschemes.org.uk

REAL will discuss with individual operators or their representatives the feedstock composition and process parameters and any recent changes to either of these.

Following discussion (and confirmation of the issue) REAL will authorise sending an alternative inoculum with a digestate sample for parallel RBP testing.

REAL requests that completed parallel test results are shared by the operator or their representative to provide further insight into the longer term management of this issue.

Operators wishing to adopt this approach for future tests should again contact REAL for authorisation unless otherwise indicated.

Parallel tests runs are required to ensure a suitable alternative inoculum can be provided by the individual site *i.e.* to ensure confidence in the approach for individual sites. To minimise the cost of parallel RBP testing for operators, REAL will authorise operators to only use a site inoculum after a minimum of two successful sets of parallel tests runs.

In the event authorisation is given for testing with site inoculum a new PAS110 Analysis Request Form will be issued by REAL with a code to enter on the form. This code will be different for parallel testing or site inoculum only.

Submitting a sample to NRM

Around 8L of inoculum (this needs to be fairly stable *i.e.* from secondary digester) is required labelled 'SITE INOCULUM'.

For RBP testing with site inoculum the sample (2L bottle) must be accompanied by the new 'site own inoculum for RBP' analysis request form. This should include the code provided by REAL.

For parallel testing with the lab inoculum a second 2L sample should be provided along with the standard PAS110 analysis request form.

A pdf plot will be sent after 28 days showing the biogas production for the sample, QC and inoculum.

Site own inoculum charge

Testing samples with site own inoculum involves preparing the inoculum and analysing the dry matter and volatile solids content in triplicate. The inoculum is then run with the sample in triplicate, with the QC material in triplicate and on its own in triplicate. This requires a lot of additional resource and limits capacity on the spaces available in the equipment. To help cover these costs an additional prep / admin charge of £300 will be added for all samples run with site own inoculum. This is on top of the usual RBP test rate (both samples charged for with parallel tests).

Further Information

<https://www.biofertiliser.org.uk/pdf/BCS-position-on-RBP-inoculum-inhibition.pdf>

info@realschemes.org.uk