

# Toxicity Testing for Chemicals and Environmental Samples

A Microbial Assay for Risk Assessment (MARA)



MARA is a multi-species test employing an array of 11 microbial species consisting of 10 prokaryotes and 1 eukaryote. These organisms represent a diverse genetic range exhibiting a spectrum of sensitivities to different toxicants.

MARA is a 'battery of tests within a test' and can be utilised for toxicity assessment of both aquatic and terrestrial environments. Its broad environmental application can be for regulatory or monitoring purposes.

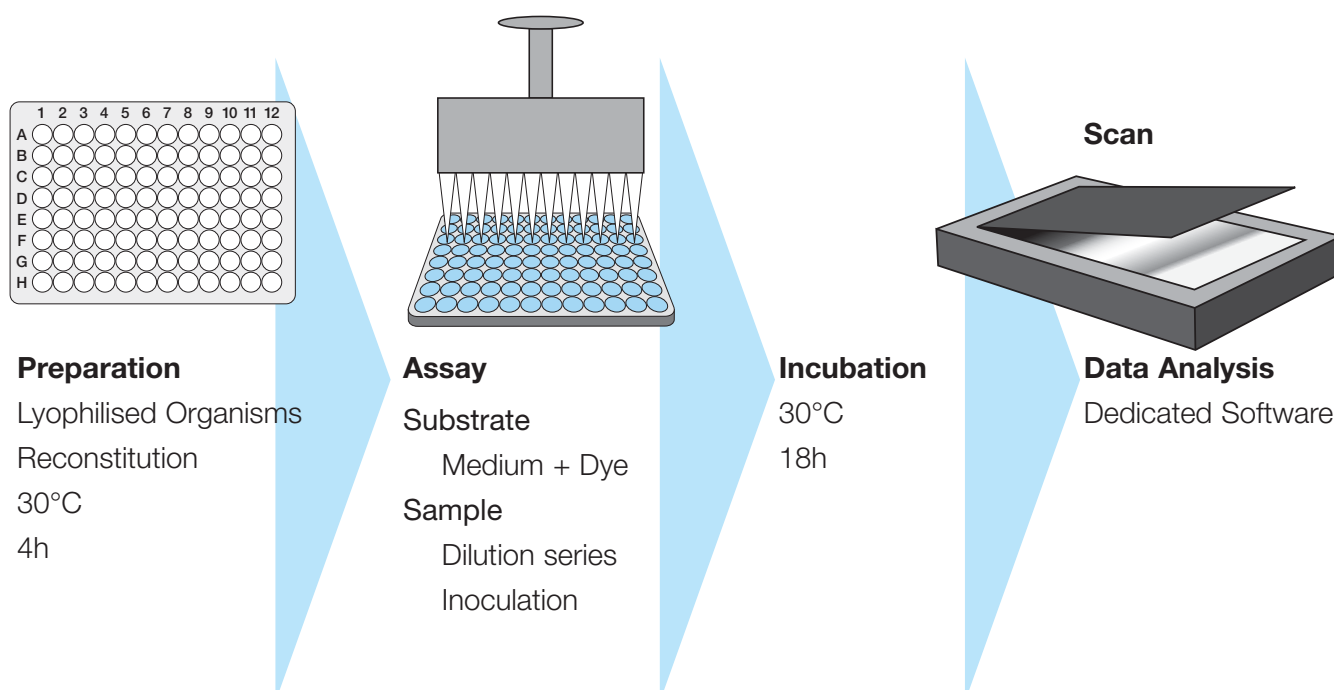
## Potential Application Scope – toxicity testing of:

- Effluents
- Waste
- Sediments
- Sewage Sludge
- Agrochemicals
- Cosmetics
- Soils
- Treated/Untreated Waters
- Landfill leachates
- Biocides
- Pharmaceuticals

MARA results are conveyed as Microbial Toxic Concentration (MTC) for each of the species. The combined integrated evaluation of all 11 species constitutes a unique toxicity fingerprint for the sample tested.

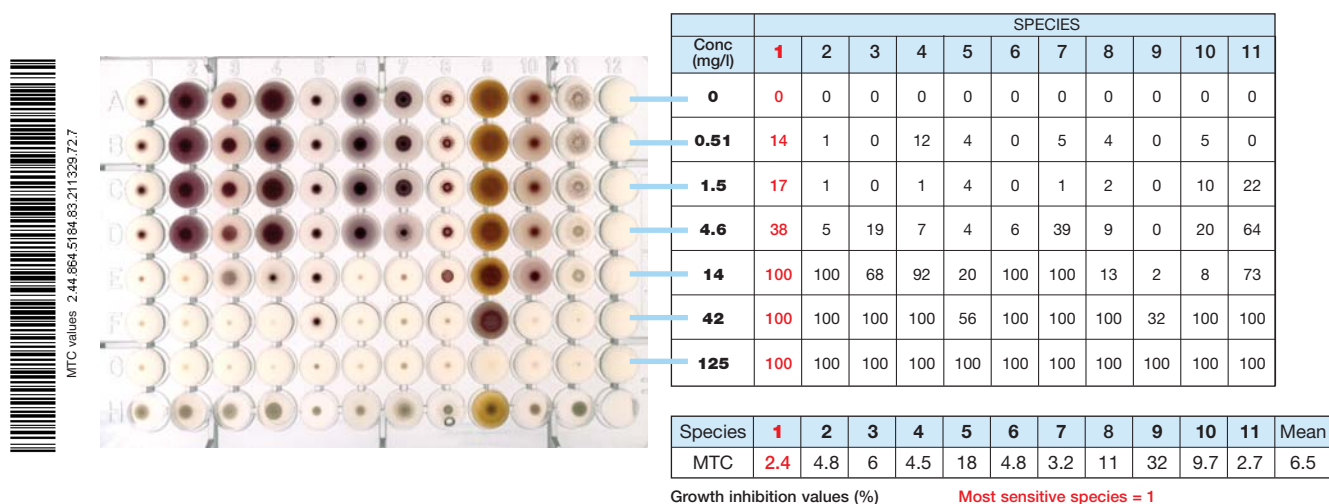
Screening mode allows for simultaneous multiple testing of samples.

## Assay Procedure





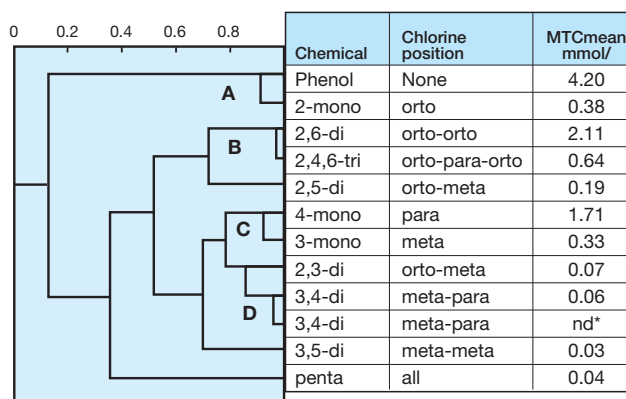
## Sample Scan – Toxicity Fingerprint



Dendrogram of clustered MTC-arrays obtained with tests can potentially provide insight into mode of toxic action.

Example of chlorophenol clusters (A-D) with similar toxicity fingerprints.

(x-axis = correlation coefficients)



## MARA Benefits

- multi-species
- simple protocol
- observations readily made
- easy image storage
- software – easy inference
- concurrent testing of numerous samples
- minimal space requirement
- low cost

### NCIMB Ltd