

Glyphosate by Direct AOx.

Author	Ayush Tripathi
Project Leader	JL Kindler
Project	Drinking water Project
Keywords	Drinking water, glyphosate
Test date	08/16/2017

Summary

An initial solution of 50 ppb glyphosate, using commercial herbicide roundup, with 300 ppm salt is prepared. The concentration of initial solution reported by lab is 270 ppb. The difference in prepared concentration and tested concentration may be attributed to uneven density distribution of the roundup solution. The initial solution is treated with direct oxidation reactors with a total residence time of 9 min with residence time for each run being 3 mins.

Major results are:

1. Glyphosate is not detected after 1st, 3 min run through the reactor. Minimum detection limit reported by lab was 1.8 ppb. A glyphosate reduction of >99.33% is achieved.

Objectives

The objective of this trial was to demonstrate the effectiveness glyphosate removal by direct AOx.

The aim of this document is to describe the conditions under which glyphosate was treated and quantified.

Method

Test 1: Direct Oxidation

Duration: 9 min total residence time for 3 separate equal run of 3 min each.



Equipment:

- A concentric reactor of 190 ml shell volume with electrodes of diameter 1 inch and 1.5 inch.
- Connection to a 2 Litre tank filled with water, salt, and glyphosate solution.
- Effluent from initial runs are directed to collection tank for recycle and sampling.
- A water pump and a flow control valve is connected to feed tank.

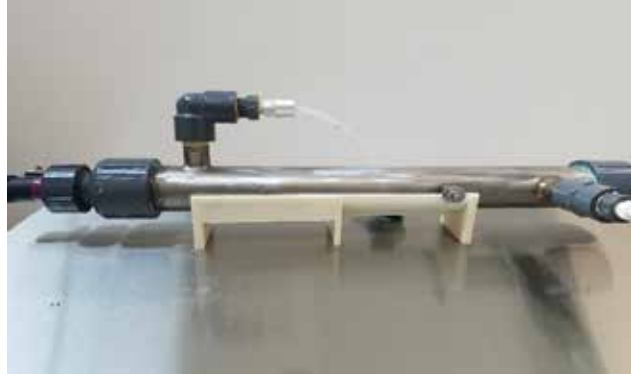


Figure 1. Direct oxidation reactor.

Sampling:

- Samples were collected after every run according to method: EPA547.
- Independent variables:
 - Water quality.
 - Applied voltage
- Dependent variables:
 - Glyphosate concentration in effluent.
 - Standard water quality parameters.

Procedure

Direct Oxidation

A 2-litre reactor cell was filled with solution containing 270 ppb glyphosate, 300 ppm salt solution. Samples were prepared from commercial herbicide solution containing 53.8% glyphosate. The solution was pumped into the reactor inlet via pump and flow is controlled to have 3 min residence time in the reactor. A flow rate of $\sim 62\text{ml/min}$ gives a residence time of ~ 3 minutes. The voltage was set at 15.5V using external power supply. Three runs were done using the effluent of previous runs. The samples were taken after each run and sent to offsite lab for testing. Current reading was taken at every 5 minutes.



Results and Discussion

The concentration of herbicide treated by direct oxidation is shown in Table 1. A reduction greater than 99.33% is achieved after the first run. The concentration of glyphosate was below the detection limit of 1.8 ppb for each of the samples taken after each run.

Table 1. Concentration of glyphosate treated by direct AOx.

	Initial	RUN 1	RUN 2	RUN 3	% Removal
Time (min)	0	3	6	9	
Concentration (ppb)	270	Not Detected	Not Detected	Not Detected	>99.33

