



# Mathematical model for predicting the generation of Methane and Carbon Dioxide in the Topocoro Reservoir

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## Introduction

Hydropower plants are an alternative power source (Farrè et al., 2007). However, these systems could be potential sources of greenhouse gases (GHG) due to flooded organic matter biodegradation after filling stage or entering organic matter via the tributaries (Guérin et al., 2008; Del Rocío et al., 2014). An action taken for GHG studies is the development of mathematical models to predict the formation and behavior of these gases during reservoir's useful lifetime, for possible goals to decrease atmosphere emissions (Silva et al., 2015; Weissenberg et al., 2010).

## Study area

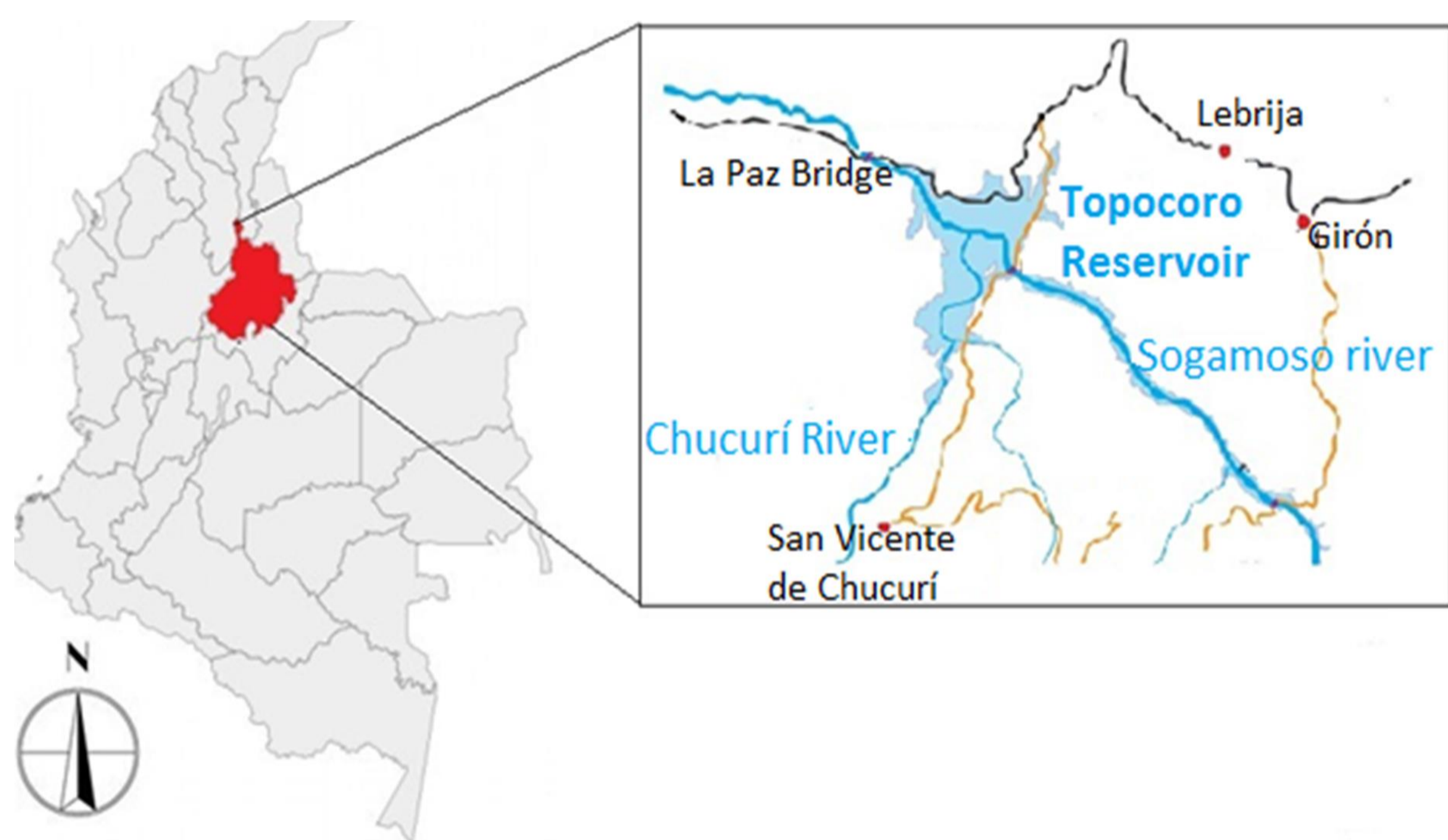


Fig 1. Topocoro Reservoir area.

## Methods

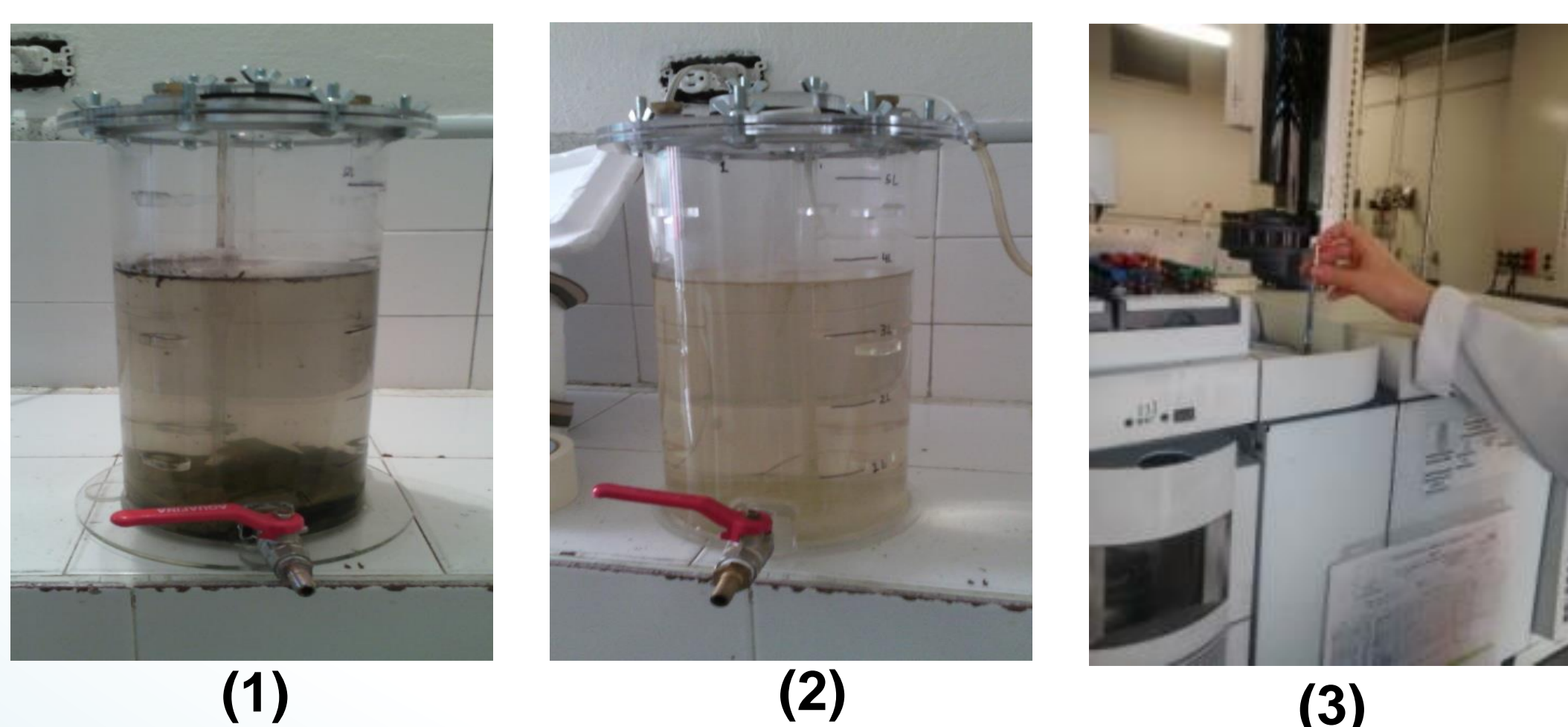
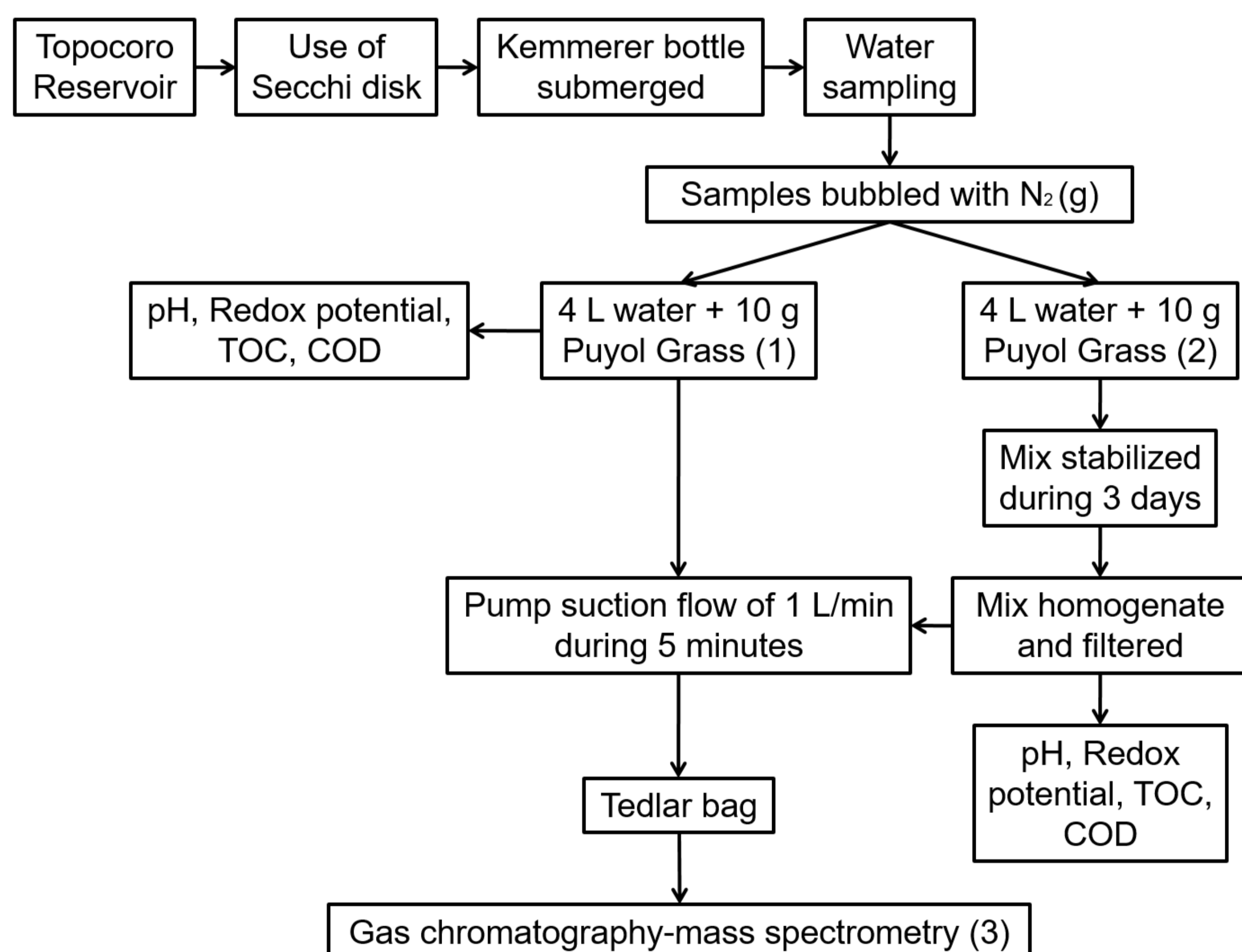


Fig 2. Methodology scheme.

## Results

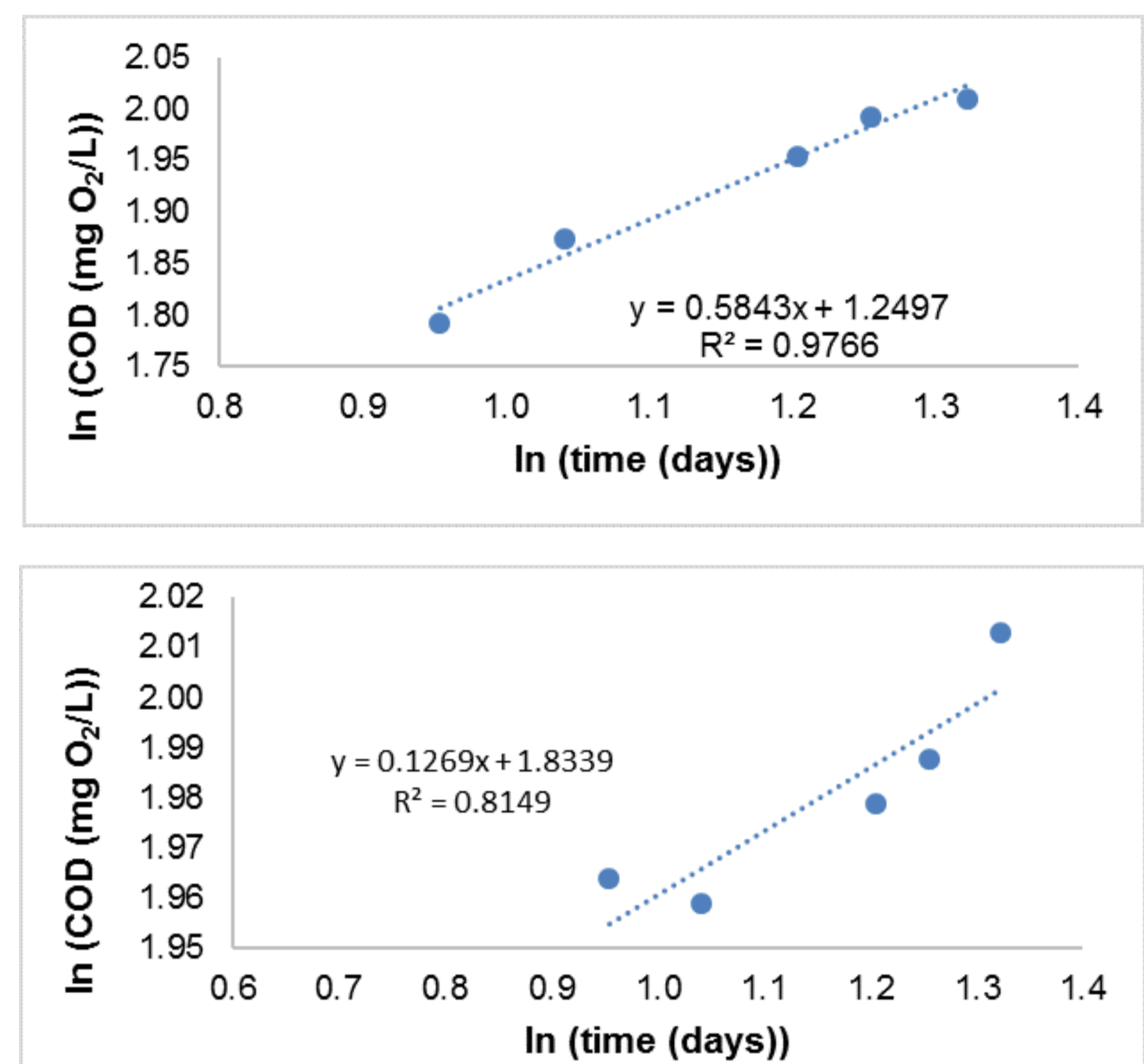


Fig 3. COD data for the reactor containing dissolved organic matter (top) and particulate organic matter (bottom).

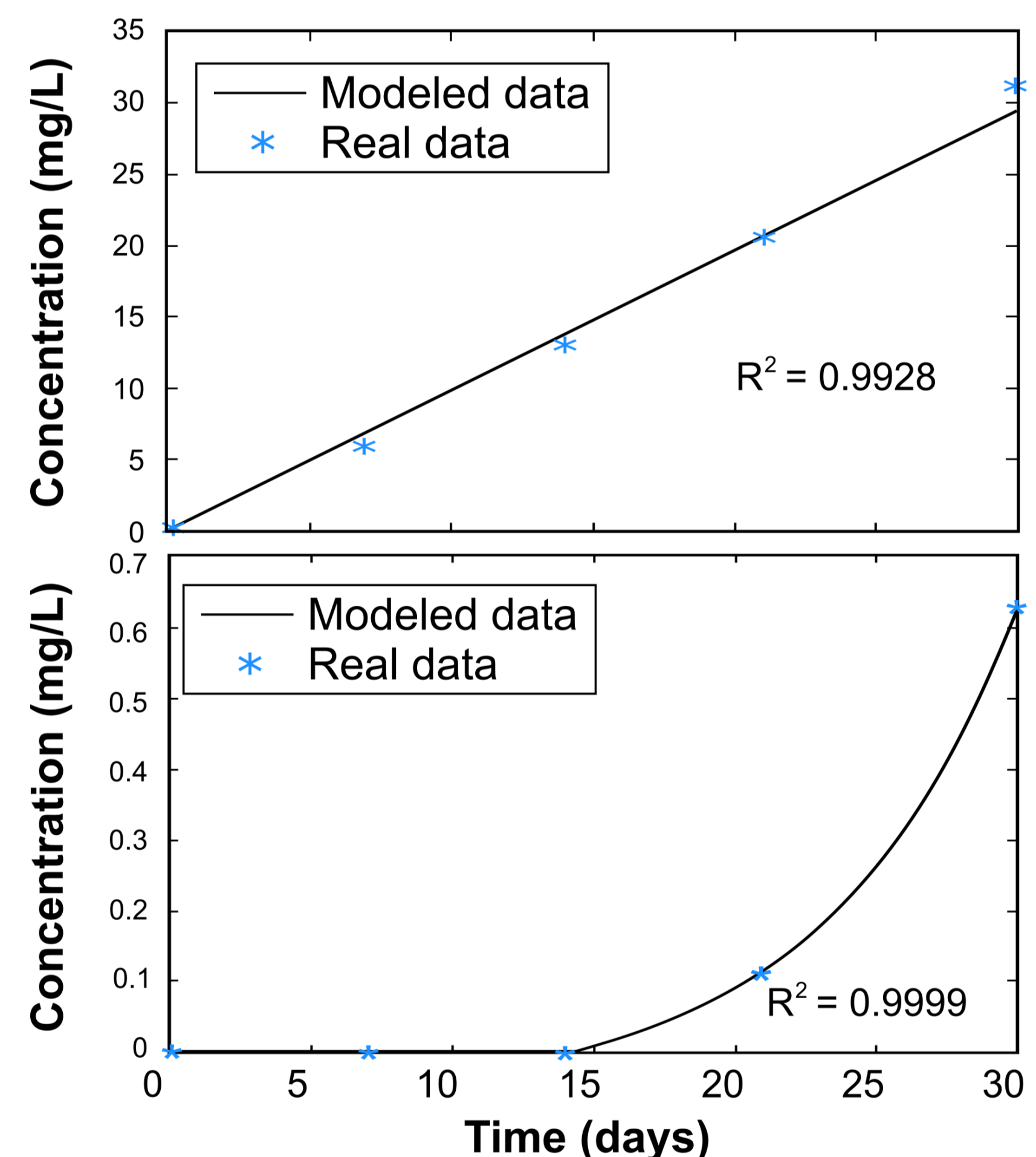


Fig 3. CO<sub>2</sub> Linear model (top) and CH<sub>4</sub> exponential model (bottom).

## Conclusions

- It was found that CO<sub>2</sub> and CH<sub>4</sub> generation, due to organic matter biodegradation from a reservoir, present different behaviors: CO<sub>2</sub> is fitted to a linear model and conversely, CH<sub>4</sub> is fitted to an exponential model.
- Biodegradation rate is a good estimate to predict the production of these gases because it depends on the physicochemical variables that affect reaction rate and gas production.

## References

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