Pressurized biofilm reactor for the cleansing of gaseous pollutants.

Dr. Morteza Hosseini
Mazandaran Univ. techn.Un. Babol(Noshirvani)
Dep. Chemical engineering

Summary

The motive for this work was the biological cleansing of waste air, especially the cleansing of NOx and CO.
The carboxydotrophic culture were enriched in laboratory reactors. Trickling filters were chosen as biological cleansing reactors.
The enrichment in the reactors was carried out under continuous exposure to CO and NO gas and semicontinuous exposure to a nutrient medium.
The micro-organisms adhere to the rough surface of the Leca stones. Then they catalyse the oxidation NO.
The adjustment of the concentration of waste air is carried out with compressed air. The analytic control of gaseous components is carried out at the inlet and the outlet of the reactor.
The metabolic creation is controlled through circulated water. The inoculation of the trickling filter is carried out with actively overgrown Leca stones.
A CO elimination rate of 99% was reached, but the NO elimination rate did not cross more than 7%. To improve this result I used different bioreactors such pressure reactor in the laboratory.
The filter volumes were at about 1,5 till 3 liters.
By using the pressure reactor I was able to achieve the best result for the NO elimination rate of 33 % in this research project.

Keywords:
Trickle bed, pressur bio reactor, waste air

Introduction

It is clear that pollution has fatal consequences for living organisms.
The causes of air pollution are on one hand in Nature itself, e.g. occurrences like volcanic eruptions and forest-fires which produce poisonous gases like sulfur dioxide and nitrous gases and release them into the atmosphere. On the other hand, the main reason for actual pollution problems is the industrialization of societies. Since the number of air polluting substances rises year for year the scientists, engineers but also public decision makers are forced to find ways for the solving of the above mentioned problems. Directing lines as well as the limiting values of the concentrations of exhaust gases have to be stated clearly.

Materials and methods

In this part, a very brief summary of the exchange of substances and the cleansing of waste air as well as the corresponding kinetics of events is given.

$$P_{i,I}^* = H_i \cdot c_{i,I}^* \quad \text{.....(eq. 1)}$$

$$P_{i,\infty}^* = H_i \cdot c_{i,\infty} \quad \text{.....(eq.2}$$

With

$$P_{i,\infty} = H_i \cdot c_{i,\infty}^* \quad \text{.....(eq.3)}$$

H_i……Henry-constant
c^*_i……..concentration of saturation
P_i…….. .partial pressure