REDUCTION OF SULPHATE CONCENTRATION BY SULPHATE-REDUCING BACTERIA IN AN EFFLUENT FROM A PRODUCING IRON OXIDE FACTORY

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Sulfate, Sulfate-Reducing Bacteria (SBR), Effluent

Introduction. Iron oxide exists naturally, however, synthetic form is obtained by reacting sulfuric acid with slag of this metal, in the presence of zinc sulfate and magnesium, generating significant effluent concentrations of sulphates. Their presence in water has a corrosive effect on piping and equipment. Its removal can be done by physicochemical methods, however there are microorganisms capable of releasing sulphate ions, producing elemental sulfur or hydrogen sulfide. Sulfate reducing bacteria (SRB) are a group of prokaryotes which have the ability to use sulphate as terminal electron acceptor in breathing (1). They are anaerobic bacteria, where oxidative and metabolic capacity depends on the gender, using as substrates lactate, acetate, pyruvate, ethanol or glucose (2). The media for growth are Postgate possessing lactate, or sulphate reducing medium, containing ascorbic and thioglycolic acid as reducing agents.

The aim of this study was to isolate a SRB present in sludge and a water effluent from a producer of iron oxide factory.

Methods. Concentration of sulfates and pH of the effluent from the producer of iron oxide factory were determined. Two methods were used for the isolation of the SRB; the Winogradsky column and an effluent from a producer of iron oxide factory as inoculum on selective media. This column was inoculated with sludge from this factory at a height of 7 cm and it was incubated at room temperature for 21 days. The isolation on selective media was carried out using as the insulation medium the Postgate, containing sodium citrate and the sulfate reducing medium with sodium ascorbate as a reducing agent. Both media were inoculated with 0.1 mL and 0.1 g of effluent and sludge respectively. The inoculated media were incubated in anaerobic jar with a gas pack at 20 ° C for 21 days.

Results. The average pH of the effluent from the producer iron oxide factory was 6.08 and the concentration of sulphates recorded an arithmetic mean of 4.53 mg/L. SRB were not successfully isolated in the Winogradsky column. However, SRB were obtained in both the Postgate (FeS, black precipitate) and sulfates reducer (FeO, ocher color precipitate) media. (See Figure 1) using sludge as inoculum. (See Table 1).

Figure 1. SRB isolation in Postgate medium (black precipitate), and sulfate reducing medium (ocher precipitate).

Table 1. BSR isolation results in two selective media.

Medium	Sample	Growth
Postgate	Sludge	Positive
Postgate	Effluent	Negative
Sulphate Reducing	Effluent	Negative
Sulphate Reducing	Sludge	Positive

Conclusions. SRB were isolated in both media using sludge as inoculum at a concentration of sulfates of 4.53 mg / L, and pH 6.08. It is suggested to evaluate the removal of sulfates in solution at known concentrations using the isolated SRB.

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