Molybdate reduction by Pseudomonas sp. strain DRY2.

ABSTRACT

Aims: To isolate and characterize a potent molybdenum-reducing bacterium. Methods and Results: A minimal salt medium supplemented with 10 mmol l⁻¹ molybdate, glucose (1Æ0%, w/v) as a carbon source and ammonium sulfate (0Æ3%, w/v) as a nitrogen source was used in the screening process. A molybdenum-reducing bacterium was isolated and tentatively identified as Pseudomonas sp. strain DRY2 based on carbon utilization profiles using Biolog GN plates and partial 16S rDNA molecular phylogeny. Strain DRY2 produced 2Æ4, 3Æ2 and 6Æ2 times more molybdenum blue compared to Serratia marcescens strain DRY6, Enterobacter cloacae strain 48 and Eschericia coliK12, respectively. Molybdate reduction as optimum at 5 mmol l⁻¹ phosphate. The optimum molybdate concentration that supported molybdate reduction at 5 mmol l⁻¹ phosphate was between 15 and 25 mmol l⁻¹. Molybdate reduction was optimum at 40°C and at pH 6Æ0. Phosphate concentrations higher than 5 mmol l⁻¹ strongly inhibited molybdate reduction. Inhibitors of electron transport system such as antimycin A, rotenone, sodium azide and cyanide did not inhibit the molybdenum-reducing enzyme activity. Chromium, copper, mercury and lead inhibited the molybdenum-reducing activity. Conclusions: A novel molybdenum-reducing bacterium with high molybdenum reduction capacity has been isolated. Significance and Impact of the Study: Molybdenum is an emerging global pollutant that is very toxic to ruminants. The characteristics of this bacterium suggest that it would be useful in the bioremediation of molybdenum pollutant.

Keyword: Molybdate-reduction; Molybdenum blue; Pseudomonas sp.