

## Assessment of Nickel Tolerance of Bacterial Isolate

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### ABSTRACT

*Waste water contaminated with heavy metals discharged from any source has a deleterious impact on all life forms existing on earth.*

*In the present investigation the Maximum Tolerable Concentration (MTC) of bacterial isolate obtained from the effluent was found to be 100 mg/l while the same isolate recovered from metal shock uptill 160 mg/l nickel when time duration was enhanced.*

**Key words:** MTC, Nickel, Bacterial Isolate, Heavy Metals.

### INTRODUCTION

Water is an indispensable for the continued existence of life on earth. The waste water subsequently coming out from industries may be used for irrigation or it runs off to natural sources of water which may also be used for drinking<sup>1</sup>. Industrial waste water may contain be enriched with heavy metals in it. Nickel is a toxic heavy metal present in waste water from industries involved in processes such as galvanization, smelting, mining, dyeing, batteries manufacturing and metal finishing in various industries<sup>5</sup>. This causes greater than ever burden of the Ni (II) on the ecosystem and causes deterioration of water quality<sup>3</sup>. According to the environment (protection) rules, 1986 the permissible limit of Ni (II) in discharge of industrial effluents in different water bodies namely inland surface water, public sewers and marine coastal areas is 3.0,

3.0 and 5.0 mg/l respectively. The concentrations in industrial wastewaters range from 3.40 to 900 mgL<sup>-1</sup> while maximum contaminant limit for nickel in potable water has been fixed as 0.05 mg/l by the European Economic Community<sup>4</sup>.

Presence of heavy metals in water bodies has led to the development of resistant microbial populations.

This study focuses on isolation of nickel resistant bacteria isolate and further biosorption studies in varying concentrations of nickel were also done.

### MATERIALS AND METHODS

#### SAMPLING

For the present study the effluent sample was collected from industrial effluent site of discharge of metal plating in the vicinity of Jaipur city in Rajasthan, India.

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### Isolation of Ni Resistant Bacteria-

Nickel resistant bacterial strains were isolated from effluent samples using nutrient agar amended with 0,2,20,50,100 and 200 ppm of Ni as NiSO<sub>4</sub>.7H<sub>2</sub>O. The inoculated plates were incubated at 37°C for 24-48 h. Resistant strain was isolated from plate containing 100 ppm Ni (maximum tolerable concentration (MTC)).

### Studies on Heavy Metal Tolerance

The isolate from 2.3 was tested for nickel tolerance by growing in Nutrient broth containing different concentrations 0, 2, 20,50,100,120,140,160,180,200 mg/L of Ni (II) supplemented as Nickel Sulfate heptahydrate. For the study of tolerance, the cell growth was monitored as absorbance at 540 nm using a UV-Vis Spectrophotometer.

### RESULTS AND DISCUSSION

It has been reported that Nickel is fatal to bacteria within the range, 50-1000 ppm<sup>5,6,7,8</sup>.

A single colony was observed growing on the plate containing 100mg/l nickel (up to 6hr) Higher concentration of lethal heavy metals has an injurious impact on the efficiency of microbial communities to survive in adverse conditions

Microorganisms exposed to higher dosage of heavy metals have been found to develop resistance against elevated levels of these metals<sup>10</sup>. In the present study the maximum tolerable concentration of isolated nickel resistant bacteria was found to be 100 mg/l while it recovered from metal shock uptill 160 mg/l of Nickel when grown in nutrient broth.

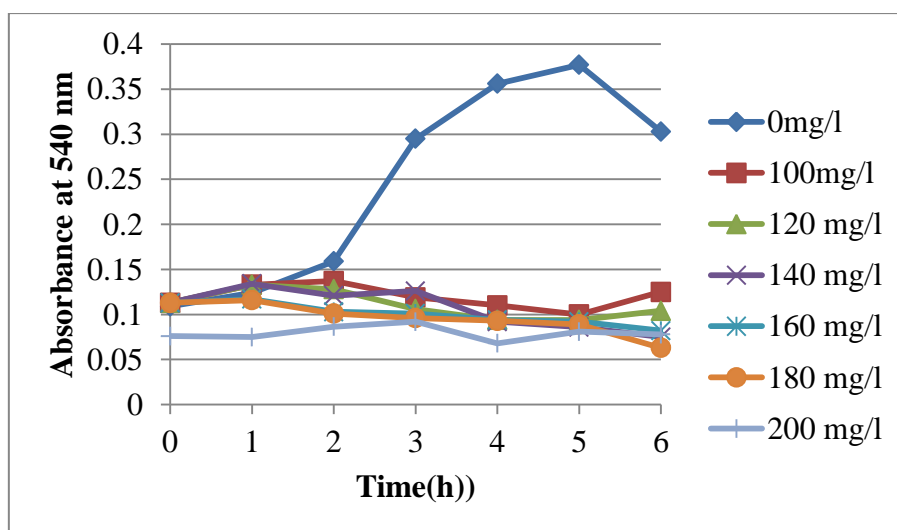


Fig. 1: Growth up to 6h of Nickel resistant isolate in varying concentrations of Nickel

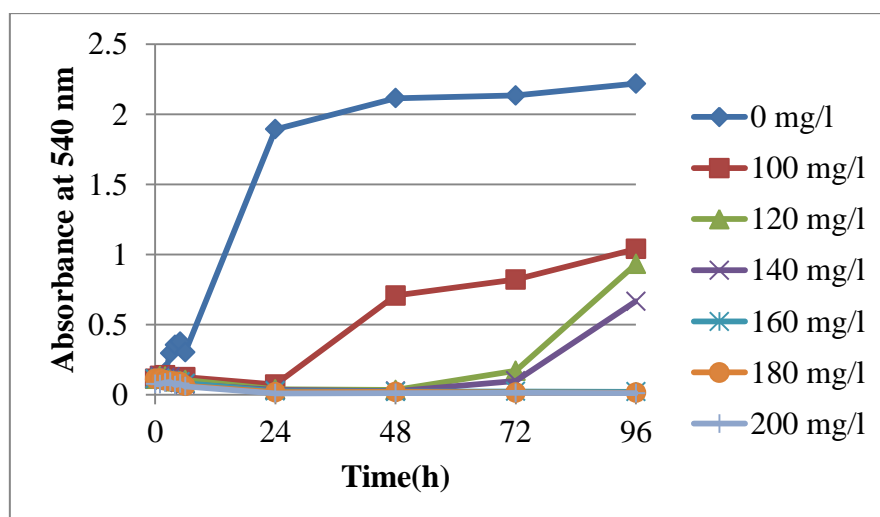


Fig. 2: Growth up to 96h of Nickel resistant isolate in varying concentrations of Nickel

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