EXTRACELLULAR BIOSYNTHESIS OF IRON-BASED NANOPARTICLES BY BACTERIA ISOLATED FROM WATER SEDIMENT

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ABSTRACT

EXTRACELLULAR BIOSYNTHESIS OF IRON-BASED NANOPARTICLES BY BACTERIA ISOLATED FROM WATER SEDIMENT

This research is focus on the formation of iron-based nanoparticles by bacteria isolated from water sediment in local area through extracellular biological synthesis method. The biological synthesis of iron-based nanoparticles is believed to be one of the safer alternatives as it does not involves the toxic substances and the cost is comparatively low to other method. The objectives of this project are to isolate the potential bacteria in producing iron-based nanoparticles and to screen the potential bacteria that have capabilities to synthesis large amount of iron-based nanoparticles. The bacteria were isolated from water sediment polluted with iron area such as marine water, well water and contaminated water with pH of water was 6.7, 7.3 and 7.2 respectively. Whereas, temperature was 30°C of all water sample. The isolation of potential bacteria that capable to synthesis the iron (II, III) oxide, (Fe_3O_4) was observed by the growth of bacteria in the presence of iron (III) oxide, (Fe_2O_3). Meanwhile the presence of Fe_3O_4 was observed by color changes and by using UV-Visible spectrophotometer. The formation of Fe_3O_4 nanoparticles was measured indirectly by calculating the reduction of Fe_2O_3 reduced. Eight different pure isolates were managed to obtain during isolation process. Based on colony morphology formed, it can be summarized that most of the cultures were in irregular formed. The colonies also appeared as opaque and mostly show white-creamy pigmentation. Six out of eight isolates were managed to show a good growth on Luria agar which was supplemented with Fe_2O_3. The brown color supernatant was assumed containing Fe_3O_4 nanoparticles. Four out of six isolates were capable to reduce the concentration of iron. Isolate 6 was the highest in reducing the iron while, isolate 7 was the lowest. As a conclusion, isolate 1 and 6 were capable to oxidize more Fe_2O_3 which is indirectly related to the formation of Fe_3O_4 nanoparticles.