

SUMMARY

1. Ten drinking water samples; six tap water and four bottled water, were collection from different localities in Sharqia Governorate.
2. Physical and chemical analysis of the ten water samples revealed high concentrations of Pb^{+2} & Fe^{+3} ranging between 0.0204 – 0.0671 mg/l.
3. Bacteria naturally inhabiting water samples were isolated using membrane filter technique.
4. The nine most frequent strains out of 127 were encoded I, II, III, IV, V, VI, VII, VIII and IX.
5. The effect of increasing concentrations of Pb^{+2} & Fe^{+3} on growths of nine tested strains revealed varying responses. Strains I, III, IV and VIII survived high concentrations of Pb^{+2} and Fe^{+3} : (400& 500 ppm); (450& 500 ppm); (500& 500 ppm) and (200& 500 ppm) respectively.
6. Examination the capability of the nine strains for Pb^{+2} & Fe^{+3} uptakes revealed that strains I, III, IV and VIII were also the most efficient isolates.

7. The four most efficient and resistant bacterial isolates were identified as *Corynebacterium jeikeium*, *Pseudomonas putida* biotype A, *Acinetobacter calcoaceticus* and *Acidovorax delafieldii*.
8. Examining the efficiency of the four tested isolates for Pb^{+2} & Fe^{+3} under static and shaking conditions revealed the inhibitory effect of shaking.
9. Maximum biosorption of Pb^{+2} & Fe^{+3} by the four tested strains was achieved at 100 ppm concentration.
10. Studying the effect of different incubation temperatures revealed that 25°C was optimum temperature except for Pb^{+2} uptake by *Acinetobacter calcoaceticus* at 35°C.
11. Removal of Pb^{+2} & Fe^{+3} from broth media was influenced by pH values. Maximum removal capacities were obtained at pH 5 while pH 9 was suppressive value.
12. Studying the effect of increasing concentrations of Cu^{+2} on growth of the four selected strains showed that 50 ppm caused an increase in CFU% of *Corynebacterium jeikeium*, *Pseudomonas putida* biotype A, *Acinetobacter calcoaceticus*. Meanwhile, *Acidovorax delafieldii* was the most sensitive strain.
13. The capability of four tested strains to uptake Cu^{+2} from their solutions varied where they could be arranged descending in the

following order: *Acinetobacter calcoaceticus*, *Corynebacterium jeikeium*, *Pseudomonas putida* biotype A and *Acidovorax delafieldii*.

14. Addition of Cu^{+2} ions caused significant decrease in Pb^{+2} & Fe^{+3} biosorption processing revealing its antagonistic effect and competition between different cations.
15. Using drinking water sample as metal- cell contact medium resulted in decrease in biosorption of Pb^{+2} & Fe^{+3} compared to that in case of nutrient broth medium. Yet the four strains accumulated promising amounts of Pb^{+2} & Fe^{+3} (25.2& 17.1%); (34.6& 14.7%); (30.7& 19.5%) and (28.3& 12%) respectively.
16. Plasmid profile of the four selected strains showed that *Acinetobacter calcoaceticus* contained plasmid of size 23.13bp while the other three strains were plasmidless.
17. Ultrastructure study using transmission electron microscope revealed that Pb^{+2} was adsorbed and accumulated by *Acinetobacter calcoaceticus* on cell surface. Meanwhile, Fe^{+3} was absorbed and accumulated intracellularly.