

**UNIVERSITI TEKNOLOGI MARA**

**HEAVY METALS REMOVAL FROM WELL  
WATER IN GUA MUSANG, KELANTAN USING  
CHARCOAL AS ADSORBENT**

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Project submitted in fulfillment of the requirements for  
the degree of  
**Bachelor in Environmental Health and Safety**  
**(Hons.)**

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## DECLARATION BY STUDENT

Project entitled “Heavy Metals Removal from Well Water in Gua Musang, Kelantan using Charcoal as Adsorbent” is a presentation of my original research work. Whenever contributions of others are involved, every effort is made to indicate this clearly, with due reference to literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Project Supervisor, Assoc. Prof. Dr. Hazilia Binti Hussain. It has been submitted to the Faculty of Health Sciences in partial fulfilment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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*In the name of Allah, The Most Gracious, The Most Merciful.*

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## ABSTRACT

This paper presents the result of research on heavy metals removal from well water by using charcoal as the adsorbent which is low cost treatment. The location selected is Gua Musang, Kelantan. Physical parameters were measured in situ, and the collected well water samples was measured in the laboratory using atomic absorption spectrophotometer (AAS). From the 30 wells only three sampling point was chosen to conduct the treatment. A series of batch studies were conducted using different adsorbent dosage (adsorbent dosage 2gm and 4gm) shaken with different contact time (contact time 1hour and 2hours) to observed the percentage removal of heavy metals. This study also observed the effect of turbidity to remove heavy metals in well water. This result showed that copper and zinc comply with the standard, whereas lead, manganese and iron exceeded the standard of Recommended Raw Water Quality in Drinking Water Quality Standard 2009. Average reading for copper is between 0.030 mg/L to 0.055 mg/L, and for zinc is between 0.020 mg/L to 0.300 mg/L. Six sampling point for manganese, four sampling point for lead and one sampling point of iron exceeded the standard. Turbidity, pH and dissolved oxygen reading comply with the standard except total dissolved solid did not comply with the standard. The final result showed that the highest percentage of removal of heavy metals is manganese, followed by zinc and iron. The optimum condition for manganese is using 2gm of adsorbent dosage in 1 hour. The best percentage removal against turbidity is iron with 88.31%. Comparison between groups showed no significant difference between groups. Charcoal is an effective adsorbent to remove heavy metals in well water. Adsorption process is a techniques for wastewater and groundwater treatment that become popular in recent years with regard to their efficiency in the removal of pollutants and low cost treatment, especially heavy, metal ion, color odor and organic pollution.

Keywords: *Well water, Treatment, Charcoal, Adsorption*