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Photocatalytic Degradation of Lead from Aqueous Solution Using TiO2 as Adsorbent

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Abstract : Heavy metals such as lead, cadmium and mercury do not have biological significance hence they are known to be extremely toxic heavy metals. Water contains various heavy metals like Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Arsenic (As), Lead (Pb), and Zinc (Zn) etc., when it gets polluted with industrial waste water. These heavy metals cause various health effects even at low concentration when consumed by humans. Most of the heavy metals are poisonous to living organisms. Heavy metals are non-degradable and are preserved in the environment through bioaccumulation. Therefore removal of heavy metals from water is necessary. In recent years, a great deal of attentions has been focused on to the application of nanosized metal oxides to treat heavy metals, especially titanium oxides, ferric oxides, manganese oxides, aluminium oxides and magnesium oxides as adsorbent and photocatalyst. TiO2 based photocatalysts have attracted continuously increasing attention because of the excellent properties such as high light -conversion efficiency, chemical stability, nontoxic nature, low cost. The catalyst displays high photocatalytic activity because of its large surface area. In this study, the photocatalytic degradation of Lead (Pb) from aqueous solution was investigated in natural sunlight by using TiO2 as Nanomaterial. This study was performed at laboratory scale. All the experiments were carried out in the batch process. The concentration of lead was constant (25mg/lit) in the experiment and effect of titanium dioxide dose and pH were varied to study the removal efficiency of the lead by adsorption. Further study was performed on the dependence of photocatalytic reaction on the reaction temperature. The aqueous solution was prepared by Lead metal powder. TiO2 photo catalyst nanopowder used was Sisco-74629 grade. The heavy metal is analyzed with VARIAN AA 240 atomic adsorption spectrophotometer. The study shows, with increasing TiO2 dose and pH the lead removal increases. According to study, it can be concluded that the utilization of titanium dioxide accounted for higher efficiency in the removal of lead from aqueous solution.

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