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Effect of temperature and concentration on removal of lead by adsorption using China clay

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ABSTRACT

China clay was found to be most efficient adsorbent for removal of lead from Gomati river water in Sultanpur district. At temperature 20 $\pm$ 1^{0}C, Particle size <53µm and 2.0 ppm concentration, china clay brings 100% absorption at time of 100 minutes at pH 6.0.

Key words : Adsorption, Lead, China clay, Temperature.

Indian rivers receive city sewage, industrial and textiles wastes from various urban and rural agglomerations. These effluents are mainly untreated, and thus pose of threat to human health, since they pollute the river water, which is use for irrigation, recreation and drinking. A number of heavy metals are being released into the rivers (Asthana *et al.*,1997; De,1984).These heavy metals *viz.* Titanium, Vanadium, Chromium, Iron, Nickel, Copper, Zinc, Niobium, Cadmium, Tin, Mercury and Lead (Pb) are harmful and toxic pollutants because of their non biodegradable nature and potential to cause adverse effects on human beings (Ambusht, 1990). Keeping in view the above facts present experiment was conducted to remove the heavy metal lead from Gomati river water using China clay.

MATERIALS AND METHODS

The adsorbent China clay was obtained from Patharghat village of Bhagalpur district of Bihar India. The sample was sieved to <53 µm size and was used with out any pretreatment. The standard stock solution of Pb(II) was prepared by dissolving a known amount of $Pb(NO_3)_2$ in deionized water. The temperature varied from 20 $\pm$ 1°C to 40 $\pm$ 1°C and concentration varied from 2 to 6 ppm.

RESULTS AND DISCUSSION

Effect of temperature on the removal of Pb(II) by adsorption:

Results presented in Table 1 clearly indicate that removal of Pb(II) from water and waste water using china clay is rapid through the initial stages of adsorption and then gradually decreased by increasement in time till it attain the saturation stage beyond which adsorption remains independent of temperature. The equilibrium temperature for the adsorption was observed on 20 x 1^{0}C. The maximum percentage of adsorption with china clay has been found 96.62 at contact time 100 minutes beyond which remains unchanged. Corresponding to increase in temperature 10°C there is relative decrease in percentage adsorption by 9.82 and 17.10, respectively. On the basis of above, findings it may be concluded that china clay

Table 1: Variation in adsorption of Pb on China clay at different temperature
(Initial cone. 6.0 ppm, Particle size <53µm, pH 6.0)

Time (Min.)	Temperature 20 x 1^0 C		Temperature 30 x 1^0 C		Temperature 40 x 1^0 C	
	Amount adsorbed (ppm) x10^2	% adsorption	Amount adsorbed (ppm) x10^2	% adsorption	Amount adsorbed (ppm) x10^2	% adsorption
20	0.183	61.52	0.154	51.50	0.121	41.75
40	0.240	80.52	0.220	73.65	0.192	64.25
60	0.280	93.40	0.240	80.75	0.211	70.46
80	0.286	95.80	0.255	85.00	0.229	76.67
100	0.289	96.62	0.259	86.80	0.237	79.52
120	0.289	96.62	0.259	86.80	0.237	79.52
140	0.289	96.62	0.259	86.80	0.237	79.52
160	0.289	96.62	0.259	86.80	0.237	79.52