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Introduction

Results and Discussion

Maximum amount of bird bone powder adsorbed chromium at pH 7 and at 5g of adsorbent used, 14.45 ± 0.98 ppm of chromium found in the raw titanium industry e uent (a er sludge o). At pH 0.5, at 5 g bird bone powder, 39.66 ± 0.53 ppm of chromium was found in the e uent (Table 1).

Similarly in the case of Table 2, maximum adsorption of Cr found at pH 7 and 10.00 ± 0.89 ppm of Cr has le in the e uent a er adsorption by the bird bone powder at the dosage of 5 g/l and 41.94 ± 0.82 ppm of Cr found in the e uent a er adsorption at pH 0.5 at the dosage of 1 g/l.

e highest amount of chromium was adsorbed at the adsorbent concentration of 5 g/l temperature of 28°C and the concentration of chromium le in the e uent a er adsorption was 20.28 ± 0.70, 18.41 ± 0.42, 15.78 ± 0.85, 14.32 ± 0.86 and 13.35 ± 0.75 ppm at the adsorbent concentration of 1,2,3,4 and 5 g/l (Table 2). e lowest amount of Cr adsorption occurred when temperature (42°C) was high (Table 3).

Highest adsorption was recorded at temperature (28°C) at the adsorbent dosage of 5 g/l as 8.83 ± 0.45 ppm (amount of Cr le in the e uent a er adsorption) and lowest adsorption recorded at 42°C the dosage of 1 g/l as 41.04 ± 0.38 ppm (amount of Cr le in the e uent a er adsorption) Table 4.

Bird bone powder e ectively adsorbed chromium from the titanium industry e uent. Higher dosages of the adsorbent removed more quantities of Cr compared to low dosages, indicating an additive e ect. But the e ectiveness of the adsorbent is more when administered in lower dosages. At pH 7, 1 g bird bone powder removed about 22.33 ppm of Cr while 5 g removed only 32.19 ppm, thus adsorption is not directly proportionate to the quantity of adsorbent used. us adsorption is not directly proportionate to the quantity of adsorbent used. e sites available for adsorption seemed to decrease when more quantities of the adsorbent are administered.

e pH in uenced adsorption of Cr by bird bone powder. At acidic pH levels, the quantity of Cr adsorbed much less compared to neutral and alkaline pH levels. us pH plays a vital role in determining the quantity of Cr adsorbed from the medium by bird bone powder. e pH seemed to modify the adsorption potential of bird bone powder and the pH should be maintained at 7.0 to achieve maximum adsorption of Cr. Agarwal and Gupta [9] found out that animal bone charcoal acts as a low cost adsorbent for Cr(vi) from aqueous solution.

Zhu et al. [10] reported that uorine removal e ciency increased from 21 to 95.80% with increase in adsorbent dose of 0 to 40 g/l of modi ed bone char. Olaniyi et al.[11] reported that at a particle size of about 355 µm of cow bone charcoal, maximum adsorption of 2.49

S. No	S.No	Amount (in g) of bird bone powder	Chromium **in efþuent** (ppm)	**Cr concentration (ppm) in efþuent**					
				pH					
				0.5	2	4	7	8	9
	1	1	0.93 “	“	“	“	“	“	“
	2	2		“	“	“	“	“	“
	3	3		“	“	“	“	“	“
	4	4		“	“	“	“	“	“
	5	5		“	“	“	“	“	“

Note: 3HUFHQW GHFUHDVH LQ &U FRQFHQWUDWLRQ LQ SDUHQWKHVHV 'HYLDWLRQV VLJQL¿FDQW DW 3 ”

Table 1: $GVRUSWLRQ RI &U IURP UDZ WLWDQLXP LQGXVWU\ HIÀXHQW DIWHU VOXGJH RII E\

S. No	Amount (in g) of bird bone powder	**Chromium in efþuent** (ppm)	**Cr concentration (ppm) in efþuent**					
			pH					
			0.5	2	4	7	8	9
1								

chromium and 1.42 mg/g of lead was adsorbed from aqueous solution.

Chojnacka [12] and Chen et al. [13] pointed out that cow bone charcoal is used as a microporous adsorbent, metals penetrate easily in to these pores, when the ionic size becomes small. Han et al.[14] and Jain et al. [15] pointed out that di erent chemical functional