] î0 5r • KAWASAKI STEEL GIHO Vol.11 (1979) No.2

È4ß ì'" 2 5r ÿ Š b#Õ B _ | • >' - œ å b7V d

Removal of Ions from Aqueous Solutions by Formation of Ferric Hydroxide Flocs

Æ5 ô \$ (Kazuhiro Uchino) ''Ÿ N J – (Takeshi Ogasawara)

0[" :

Synopsis:

Removal of some hazardous jons from aqueous solutions by the formation of ferric hydroxide flocks has been investigated under various conditions. Fe(OH)3 flocks were most stable and easily filtered when formed form solution of pH 6 >|9, which contained 50mg/l>|50g/l of Fe(3+) In this method, the concentration range of ions to be removed was 1mg/l>|1g/l. Heavy metal cations such as Cu(2 +), Cd(2+) and Pb(2+) were removed by copercipitation with the Fe(OH)3 flocks, and anions such as CrO4(2-) that did not from in soluble salts with Fe(3+) were remove d by adsorption on the flocks below pH7. Necessary addition of Fe(3+) was about 20 to 30 times of these ions in molar ratio. Anions such as PO4(3-) that formed slight ly soluble salts with Fe(3+) were removed mainly by the formation of the salts below pH7, and in this case, the necessary molar ratio of Fe(3+) to these ions was 2 to 3 times. Discussions are also made on the adsorption equilibrium of chromium(í) with the Fe(OH)3 flocks at room temperature and a constant pH of about 6.

(c)JFE Steel Corporation, 2003

水酸化第2鉄沈殿の生成による各種イオンの除去

Removal of Ions from Aqueous Solutions by Formation of Ferric Hydroxide Flocs

内 野 和 博*
Kazuhiro Uchino

小笠原 武 司*' Takeshi Oqasawara

Synopsis:

Removal of some hazardous ions from aqueous solutions by the formation of ferric hydroxide flocks has been investigated under various conditions.

Fe(OH), flocks were most stable and easily filtered when formed from solution of pH 6 ~ 9, which contained 50 mg//

Heavy metal cations such as Cu⁺⁺, Cd⁺⁺ and Pb⁺⁺ were removed by coprecipitation with the Fe(OH)₃ flocks, and anions such as CrO₄⁺ that did not form in soluble salts with Fe⁺⁺ were removed by adsorption on the flocks below pH7. Necessary addition of Fe⁺⁺ was about 20 to 30 times of these ions in molar ratio. Anions such as PO₄⁺ that formed slightly soluble salts with Fe⁺⁺ were removed mainly by the formation of the salts below pH7, and in this case, the necessary molar ratio of Fe⁺⁺ to these ions was 2 to 3 times.

Principles and the military and the later of the first of the first of the first of the first of the

2. 水酸化第2鉄沈殿による金属イオンの 除去に関する報告例

2-1 イオンの除去例

Fe(OH)₃ 沈殿の生成による各種金属イオンの 除去に関する報告は多い。

Wilms ら¹⁾は、 ビックリング廃液からクロム酸 塩を除去することを見的として 30.2~343mg/J の As(V) が固定され、溶出試験でも0.05mg/I 以下 となることを発表している。

3. 実験方法および結果

3·1 実験方法

実験を行った有害イオンは Cu²⁺ (処理 **B**,初 濃度 100 mg/*t*)、 Cd²⁺ (処理 **B**,初濃度 5 mg/*t*)、 Ph²⁺ (処理 **A** - 知濃度 100 mg/*t*)、Cr(VI) (処理 **A**

 $Cr(VI)(イオンとしては CrO_4^2 など)の Fe(III) 塩 (Fe₂(SO₄)₃) と NaOH による除去効果を調べ、① <math>pH \approx 6$ で溶液中の残留イオン濃度が最小になること、②モル比 $Fe^{3+}/Cr(VI) \geq 20$ では残留イオン濃度はあまり減少しないこと、などを明らかにした。

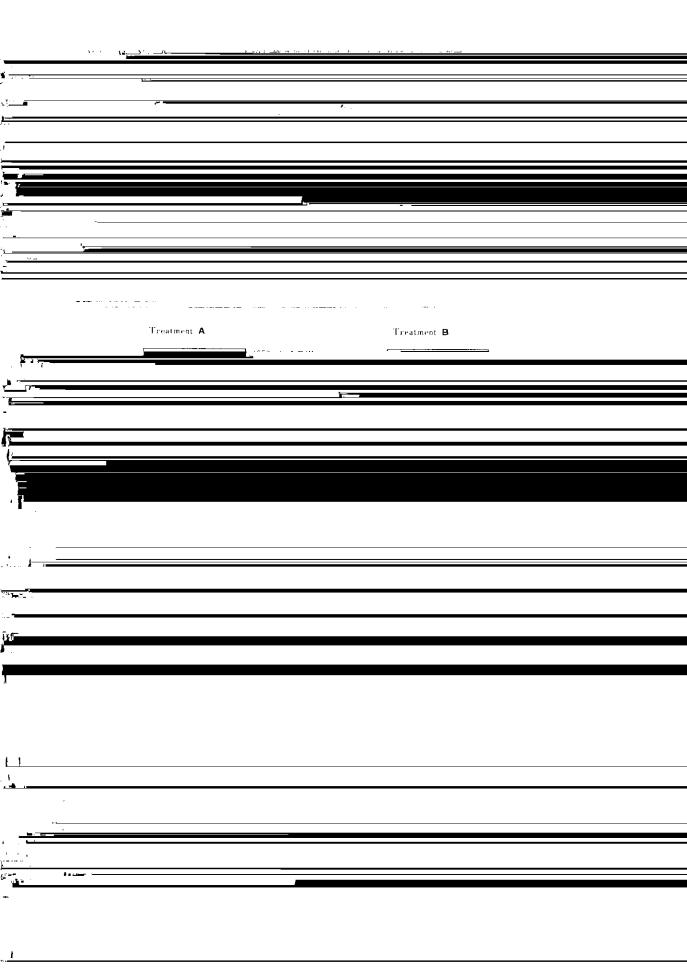
<u>白根2) は製錬所露水电の Cd2</u> を<u>除去する</u>Ц的

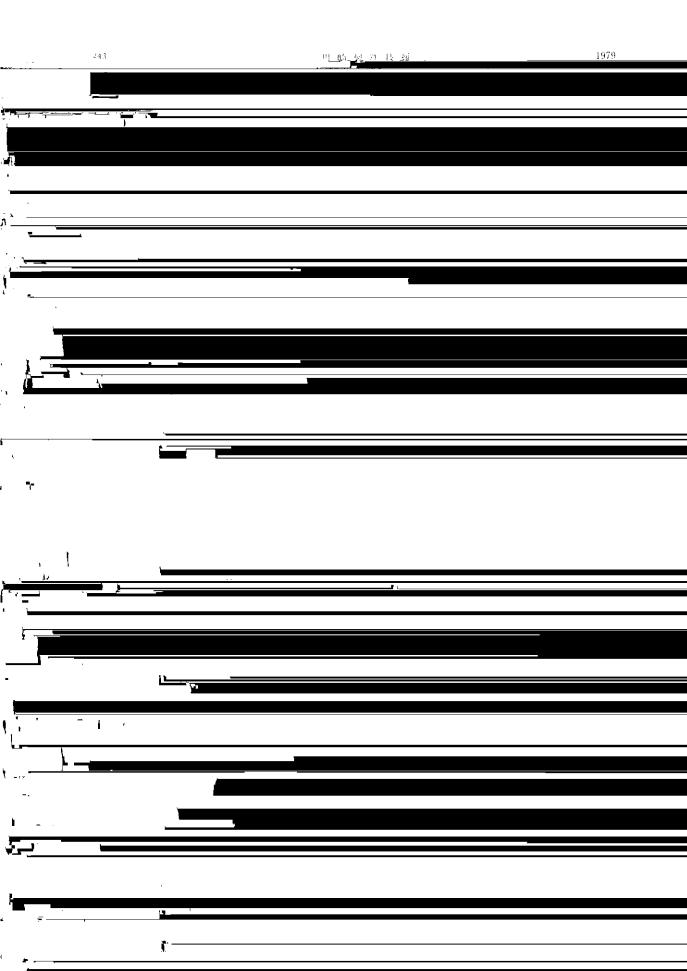
および**B**、初濃度は主に $100 \,\mathrm{mg}/l$), PO^{\pm}_{1} (処理**A**、初濃度は PO^{3+}_{1} として $100 \,\mathrm{mg}/l$)の5種類である。処理方法**A**および**B**の内容を**Fig.1**に示す。

3·2 Fe(OH)₃沈殿の特性

処理Aにより Fe(OH)a 沈殿の特性を調べた。 約5000mg/Iの Fe³¹ から生成した沈殿の 5A 濾

 $\mathbf{Fe^{3+}}$ $(\mathbf{Fe_2}(\mathbf{SO_4})_3, \ \mathbf{Fe^{3+}}/\mathbf{Cd^{2+}} + \mathbf{201})$ を加えて るが、 $\mathbf{3.5-4.5}$ では沈殿が生成しているにもかか





4. 考 察

4・1 Fe(OH)₃沈殿の生成条件と イオン除去効果



次のとおりである⁽ⁱ⁾。

 $\mathrm{H_2CrO_4} \stackrel{0.74}{\sim} \mathrm{HCrO_4} \stackrel{6.49}{\sim} \mathrm{CrO_4^2}$

- <u>に</u> F_e3 け oH≥25で Fe(OH). 波殿を形成).

Fig. 4 のアロットから求めた $q_{\rm M}$ の飽和値は 0.121、まなわち ${\rm Cr}({\rm N})$ の飽和吸着量はモル比で ${\rm Fe}({\rm OH})_8$ の 12.1% である。

生た Fig. 3 (b), 4 上り - 販着平衡を決定する

(1) Fe(OH)₃ 沈殿(t pH - 6.0 + 9.0 で最も濾過性 がよく安定になる。このことがこの pH 領域であ 2 ほの ペチャ 888 じんな田がい チブロマーム - で 1.Z.

皆である.

