



重金屬污染防治技術

Heavy metal pollution prevention technology

-多用途重金屬乳化劑分段過濾處理設備

Multi-purpose heavy metal blending agent staged filtering processing equipment

-含重金屬六價鉻廢液及污泥之處理

Treatment of hexavalent chromium-containing waste liquid and sludge containing heavy metals

-酸洗廢液分段處理

Staged treatment of pickling waste liquid



前言

Foreword

- 六價鉻廢液的產生

Production of hexavalent chromium waste liquid

- 電鍍、染料、鹼氯、化肥、石化、製革、紡織、造紙等各業之廢料

Wastes from various industries such as electroplating, dyes, alkali chlorine, chemical fertilizers, petrochemicals, tanning, textile, papermaking and other industries

- 六價鉻的危害

Harm of hexavalent chromium

- 對人體及動物具致癌或誘發突變的危害

Carcinogenic or mutagenic harm to humans and animals



前言

Foreword

操作簡單 easy to use

儘量利用已有設備 Make best use of existing equipment

效果穩定 Stable effect

污泥符合一般事業廢棄物管制標準

Sludge meets general business waste control standards

廢液符合排放水標準

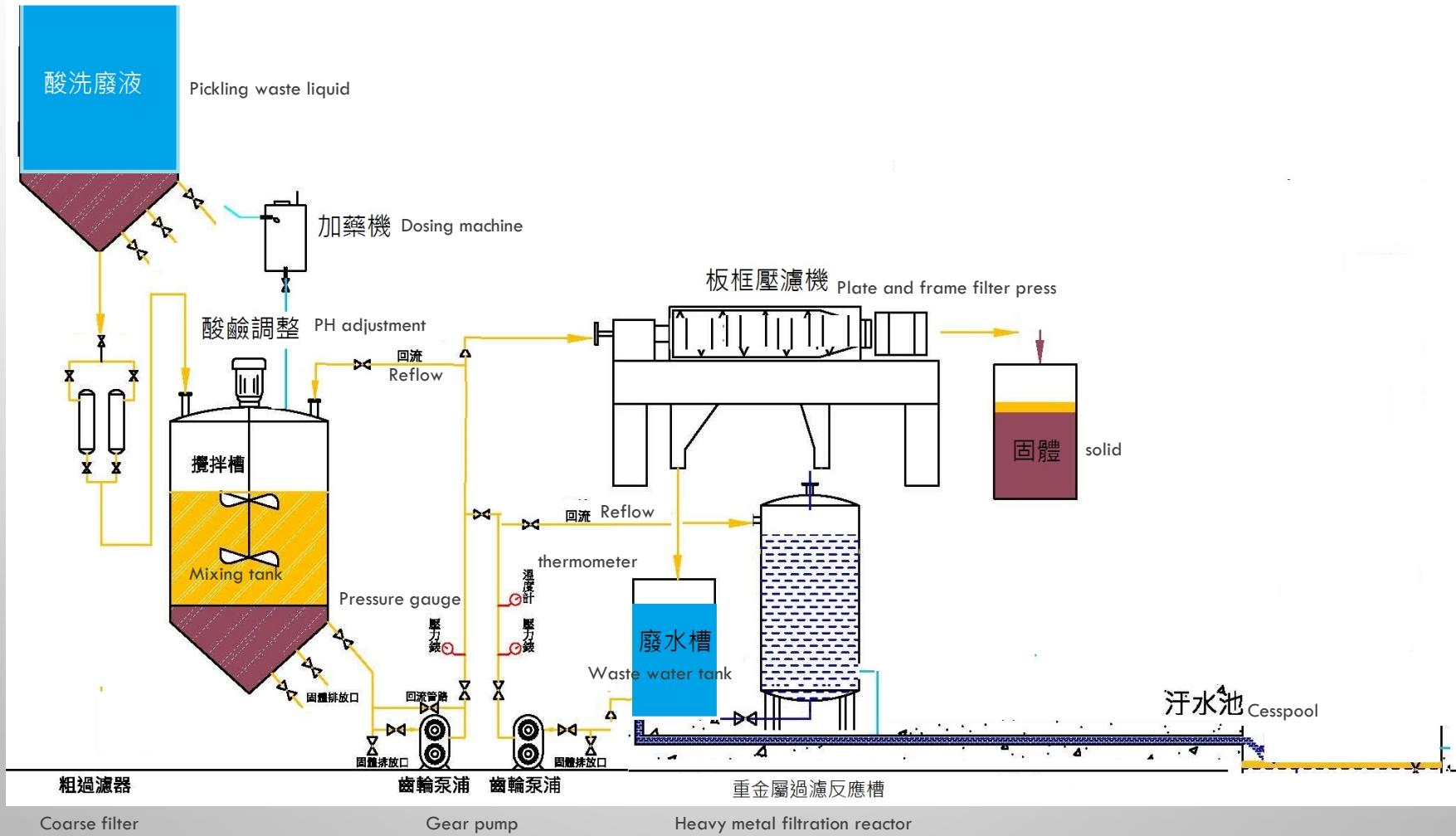
Waste liquid meets discharge water standards

作業場所無臭味

No odor in the workplace

多用途重金屬乳化劑分段過濾處理設備

Multi-purpose heavy metal blending agent staged filtering processing equipment



多用途重金屬乳化劑分段過濾處理設備

Multi-purpose heavy metal blending agent staged filtering processing equipment

優劣比較如下：

The advantages and disadvantages are as follows

	傳 統 Traditional	重金屬調和劑 Heavy metal blender
1.設備投資 Equipment investment	3條處理線 3 processing lines 3套監控設備 3 sets of monitoring equipment	僅需2條處理線 Only 2 processing lines required 2套監控設備 2 sets of monitoring equipment
2.所需處理材料 Required processing materials	藥劑繁多，容易犯錯誤，且使用量大。 <i>Many medicines, easy to make mistakes, and large quantities.</i>	重金屬調和劑單一材料使用簡單，且無需其他原料，重金屬種類可去除95%以上。 <i>The single material of heavy metal blending agent is simple to use and does not require other raw materials. The heavy metal species can be removed by more than 95%.</i>
3.產生之廢污泥 Waste sludge produced	污泥量大，約需處理劑產生污泥量之3~5倍，且有害廢棄物之污泥處理費用高。 <i>Large amount of sludge, about 3 to 5 times the amount of sludge required by the treatment agent, and high sludge treatment costs for hazardous waste.</i>	污泥量少，僅為傳統污泥量之1/3~1/5。 <i>Low sludge volume, only 1/3 ~ 1/5 of traditional sludge volume.</i>
4.廢水處理速度(量) Wastewater treatment speed (quantity)	由於操作過程繁雜，且使用之藥劑多，故處理速度較慢，廢水處理量較少。 <i>Due to the complicated operation process and the use of many chemicals, the treatment speed is slow and the amount of wastewater treatment is small.</i>	因為單一藥劑，使用僅2條處理線，故處理速度較快，且廢水處理量較大。 <i>Because only two treatment lines are used for a single agent, the treatment speed is fast and the amount of wastewater treatment is large.</i>

多用途重金屬乳化劑分段過濾處理設備

Multi-purpose heavy metal sedimentation agent staged filtering processing equipment

5.電力費用 Electricity cost	由於處理線較多條，且冗長，故電力費用較高。 Higher processing costs due to more processing lines and length.	處理方式簡單，處理線較短，所需電力僅傳統方式之60%。 The processing method is simple, the processing line is short, and the power required is only 60% of the traditional method.
6.人力費用 Labor costs	因為使用3套設備與3條處理線，故至少需2人以上監控處理。 Because 3 sets of equipment and 3 processing lines are used, at least 2 people need to monitor and process.	僅需1人即可。 Only one person is required.
7.廠房用地 Workshop land	廠房使用面積大。 Large plant area.	廠房使用面積僅約傳統作法之60%。 Plant use area is only about 60% of traditional practices.
8.環境衛生 (健康危害) Environmental hygiene (Health hazard)	反應當中產生硫化氫，危害人體健康及惡臭影響環境衛生。 Hydrogen sulfide is generated during the reaction, which harms human health and malodor and affects environmental hygiene.	無惡臭及其他有害物質產生，為最環保之反應過程。 No foul odor and other harmful substances are generated, which is the most environmentally friendly reaction process.

- 六價鉻廢液的處理 Treatment of hexavalent chromium waste liquid
 - 化學性與其它有毒重金屬不同，處理比較困難，是環境保護的痛處
Chemically different from other toxic heavy metals, it is more difficult to handle and is a sore point of environmental protection
 - 現行處理方法 Current treatment
 - CR $^{6+}$ $\xrightarrow{\hspace{1cm}}$ CR $^{3+}$ (沉澱) precipitation
 - 缺點 Disadvantage
 - 作業現場惡臭 Stench at the job site
 - 加藥量多 Dosing more
 - 污泥產量高 High sludge production
 - 效果不穩定 Unstable effect



技術能量與應用

Technology Energy and Application

- 以「現場診斷」、「對症下藥」方式提供處理方法、製程設計、軟硬體建造、作業輔導

Provide treatment methods, process design, software and hardware construction, and operation guidance by means of "on-site diagnosis" and "medical treatment"

- 六價鉻處理劑 Hexavalent chromium treatment agent

- 漿狀 Pasty
- 較低水溶性 Low water solubility
- 可直接處理高濃度(遠高於其他已知者) Can handle high concentrations directly (much higher than others known)
- 大幅降低COD Significantly reduce COD
- 前處理去除干擾節省用量 Pre-treatment removes interference to save usage



技術能量與應用

Technology Energy and Application

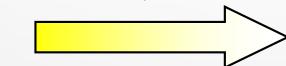
- 六價鉻處理劑 Hexavalent chromium treatment agent
 - 液體、固體或複方漿體 Liquid, solid or compound slurry
 - 只要單一藥劑 Just a single potion
 - 操作時間短 Short operating time
 - 干擾問題較少 Less interference issues

六價鉻乳化劑

Hexavalent chromium blender



乳化劑0.45%



Blending agent 0.45%



含Cr⁶⁺原溶液

Cr⁶⁺original solution

體積 1000 mL

1000ml volume

濃度 1000 ppm

1000ppm concentration

脫除後Cr⁶⁺溶液

Cr⁶⁺solution after removal

體積 1000 mL

1000ml volume

濃度 <0.5 ppm

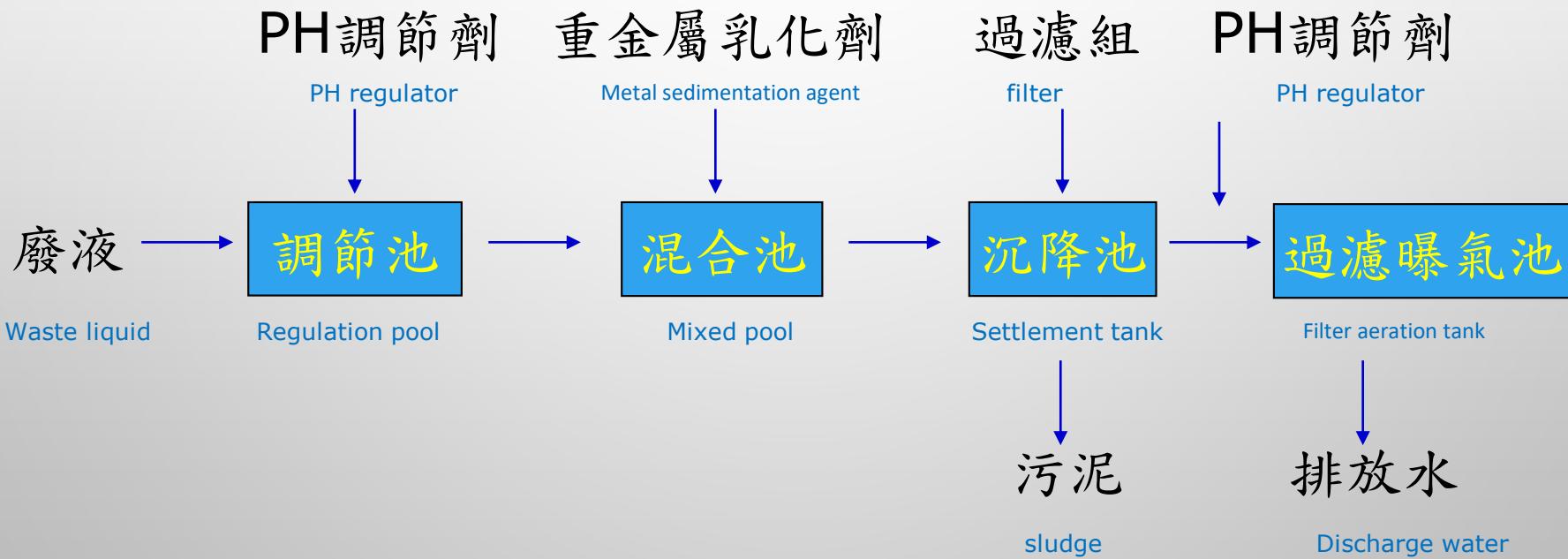
Concentration <0.5ppm

- 廢液的脫六價鉻處理

Dehexavalent chromium treatment of waste liquid

- 六價鉻廢液

Hexavalent chromium waste liquid



- 污泥性質 Sludge properties

- TCLP程序測試CR溶出： 11.9 PPM
TCLP program tests Cr dissolution: 11.9 ppm
- (使用萃取液B)
(Using extract B)
- 含水率：63.2 %
Water content: 63.2%





污泥的處理

Treatment of sludge

前言：

Foreword:

會損害人體中樞神經的劇毒重金屬離子【六價鉻】污泥處理・

國內相關產業如石化、不鏽鋼、造紙、電鍍、製革、紡織等工業都會隨伴產生含六價鉻的廢料・但相關處理技術麻煩不徹底，無法完全符合排放標準，而且處理成本昂貴・過去國內若不是儲存起來固化處理，就是被偷偷排放掉或偷偷掩埋，大幅影響大自然環境生態，更直接挑戰環保意識・

Treatment of highly toxic heavy metal ions [hexavalent chromium] that will damage the central nervous system of the human body. Relevant domestic industries such as petrochemicals, stainless , papermaking, electroplating, tanning, textiles and other industries will accompany wastes containing hexavalent chromium. However, the related treatment technology is incomplete and cannot fully meet the emission standards, and the treatment cost is expensive. In the past, if it was stored in the country for solidification, or it was secretly discharged or buried, it would greatly affect the natural environment and ecology, and directly challenge environmental awareness.

無機含廢液與鉻污泥處理劑，經處理後廢液的鉻濃度降為0.5PPM・完全符合環保署規定的排放標準・

The inorganic waste liquid and chromium sludge treatment agent, after treatment, the chromium concentration of the waste liquid was reduced to 0.5PPM. It fully meets the emission standards stipulated by the Environmental Protection Agency.



污泥的處理

Treatment of sludge

- 處理基本原理 Processing rationale

- 針對個案之污泥條件，綜合處理劑，以化學吸附固著與安定化的作用，使總鉻形成安定而不溶出的化合物固著於污泥中，發揮安定化與無毒化之效果，污泥不必再固化，處理前後體積幾乎相同，處理後可達到TCLP測試之要求標準，可直接掩埋。

According to the sludge conditions of the individual case, the comprehensive treatment agent uses chemical adsorption to fix and stabilize, so that the total chromium forms a stable but insoluble compound to be fixed in the sludge, and exerts the effects of stabilization and non-toxicity. There is no need to solidify, the volume is almost the same before and after treatment. After treatment, it can meet the TCLP test standard and can be buried directly.



污泥的處理

Treatment of sludge

◆ 優點 advantage

- ❖ 可確保TCLP測試符合標準，不必再固化。
- ❖ 處理前後體積幾乎相同，可節省運費與掩埋費。
- ❖ 處理迅速，人工成本低。

This ensures that the TCLP test complies with the standard and does not require curing.

The volume is almost the same before and after processing, which saves freight and landfill costs.

Quick processing and low labor costs.



污泥的處理

Treatment of sludge

◆ 鉻重金屬污泥綜合處理劑

Comprehensive treatment agent for chromium heavy metal sludge

- ◆ 複方水體 Compound water body
- ◆ 無味、無臭 Tasteless, odorless
- ◆ 適用於含鉻(III)與鉻(VI) 重金屬污泥之處理

Suitable for treatment of chromium (III) and chromium (VI) heavy metal sludge



污泥的處理

Treatment of sludge

◆ 鉻重金屬污泥處理實例

Example of chromium heavy metal sludge treatment

◆ 處理方法A Processing method A

- ◆ 步驟1：先將污泥置入攪拌容器中。
- ◆ 步驟2：再加入綜合處理劑與適量之水(以使易於攪拌混合為度)。
- ◆ 步驟3：啟動攪拌馬達使污泥與綜合處理劑混合均勻後下料即可。

Step 1: Put the sludge into the mixing container first.

Step 2: Then add the comprehensive treatment agent and an appropriate amount of water (to make it easy to stir and mix to the degree).

Step 3: Start the stirring motor to make the sludge mixed with the comprehensive treatment agent uniform and then discharge.

鉻污泥處理實例 Examples of chromium sludge treatment

污泥來源

T公司

由電解廢液與酸洗廢液之處理
所產生

待處理污泥特性

含水率63.2%

含鉻(III)與鉻(VI)

TCLP測試(使用萃取液B)之總鉻
溶出11.9ppm

Source of sludge

Company T

Produced by the treatment of electrolytic waste liquid
and pickling waste liquid

Characteristics of sludge to be treated

Water content 63.2%

Contains chromium (III) and chromium (VI)

TCLP test (using extract B) total chromium
dissolution 11.9ppm



• 處理結果

process result

- TCLP 測試CR溶出 2.7 PPM
- 符合 非有害事業廢棄物標準

TCLP test Cr dissolution 2.7 ppm
Meets non-hazardous business waste standards





污泥的處理

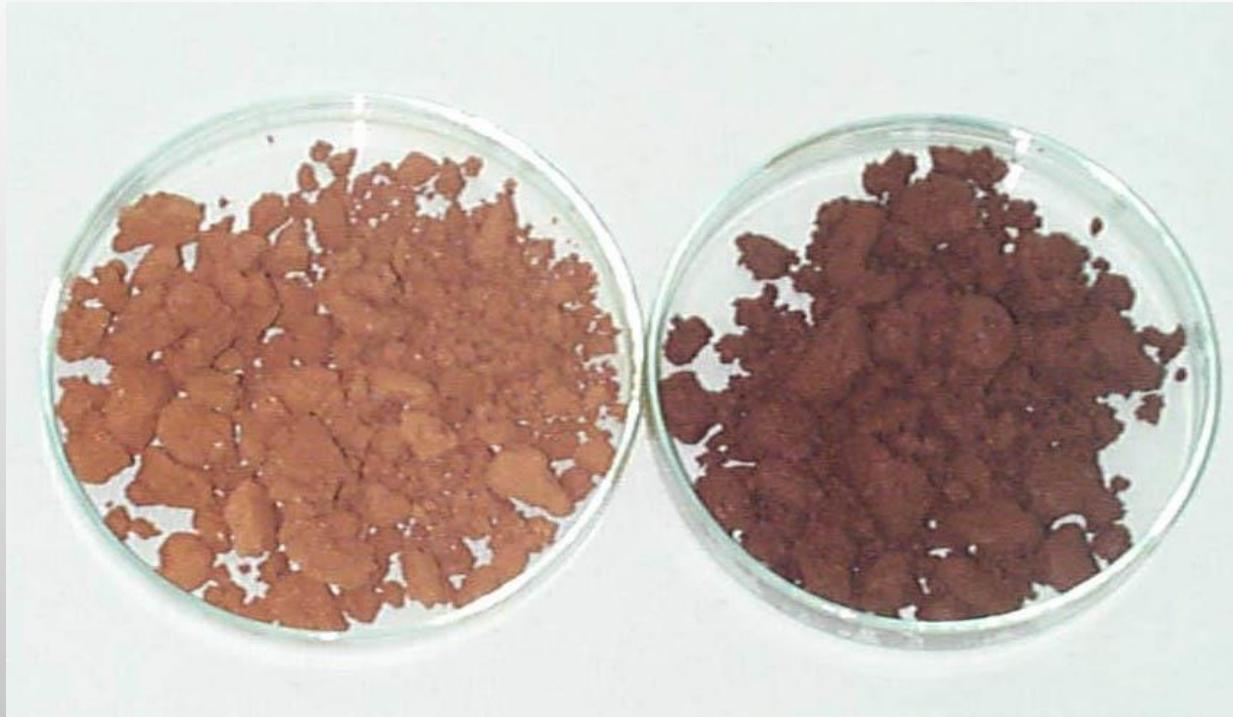
Treatment of sludge

已處理

Processed

未處理

Unprocessed





污泥的處理

Treatment of sludge

◆ 鉻污泥處理處理設備 Chrome sludge treatment equipment

- ◆ 混合攪拌器(連續式或批次式)：1式。
- ◆ 污泥定量進料器(連續式或批次式)：1式。
- ◆ 綜合處理劑定量進料器(連續式或批次式)：1式。
- ◆ 水定量泵：1式

Mixer (continuous or batch type): 1 type.

Sludge dosing feeder (continuous or batch type): 1 type.

Comprehensive treatment agent quantitative feeder (continuous or batch type): 1 type.

Water fixed pump: 1 type



污泥的處理

Treatment of sludge

與水泥固化之比較 Comparison with cement curing

比較項目 Compare items	其他方法 Other methods	無毒化處理 Non-toxic treatment
固化需要性 Need for curing	需要固化 Need curing	不需要固化 No curing required
螯合劑使用 Chelating agent use	需要 need	不需要 No need
TCLP鉻溶出 TCLP chromium dissolution	難過關 Difficult	可確保合格 Can ensure compliance
處理後體積 Volume after treatment	增加30%以上 Increase by more than 30%	不增加 No increase
掩埋成本 Landfill cost	高(30%以上) High (above 30%)	低 low
運費 Freight	高(30%以上) High (above 30%)	低 low



污泥的處理

Treatment of sludge

外觀：無色或淡紫藍色漿體

比重： 1.20 ± 0.03

組成：複方組成之鉻污泥安定化與無毒化處理劑

包裝：

① 桶裝：5GI. 100L. 150L

② 槽車：運送至用戶處，並負責抽送進入儲存槽。每次送貨至少20噸。

Appearance: colorless or lilac blue slurry

Specific gravity: 1.20 ± 0.03

Composition: Compound sludge stabilization and non-toxic treatment

Packaging:

① Bucket: 5GI.100L.150L

② Tank truck: transported to the user, and responsible for pumping into the storage tank. At least 20 tons per delivery.



污泥的處理

Treatment of sludge

使用方法：

- ①. 潮濕污泥：將適用量之鉻污泥處理劑與污泥攪拌混合均勻，如過濕應再行脫水。
- ②. 乾固污泥：將適用量之鉻污泥處理劑與污泥加入適量水攪拌，混合均勻即可。

以上操作，本公司將派人至現場指導操作。

Instructions:

- ①. Wet sludge: Mix the appropriate amount of chromium sludge treatment agent with the sludge, and dehydrate it if it is too wet.
- ②. Dry solid sludge: add an appropriate amount of chromium sludge treatment agent and sludge to an appropriate amount of water, stir and mix well.

For the above operations, the company will send someone to the site to guide the operation.

使用劑量：

隨污泥之性質而定。須依本公司預先測定建議之劑量使用，以免發生不合格處理結果。

△ 鉻污泥處理現場須增設機器設備混合攪拌器組。

△ 鉻污泥處理專設人員約2-3人，預估每天可處理100~150噸。

△ 因已經安定與無毒化處理，後即可清運掩埋。減少總成本花費。

Dosage used:

Depending on the nature of the sludge. It must be used in accordance with the company's pre-determined recommended dosage to avoid unqualified treatment results.

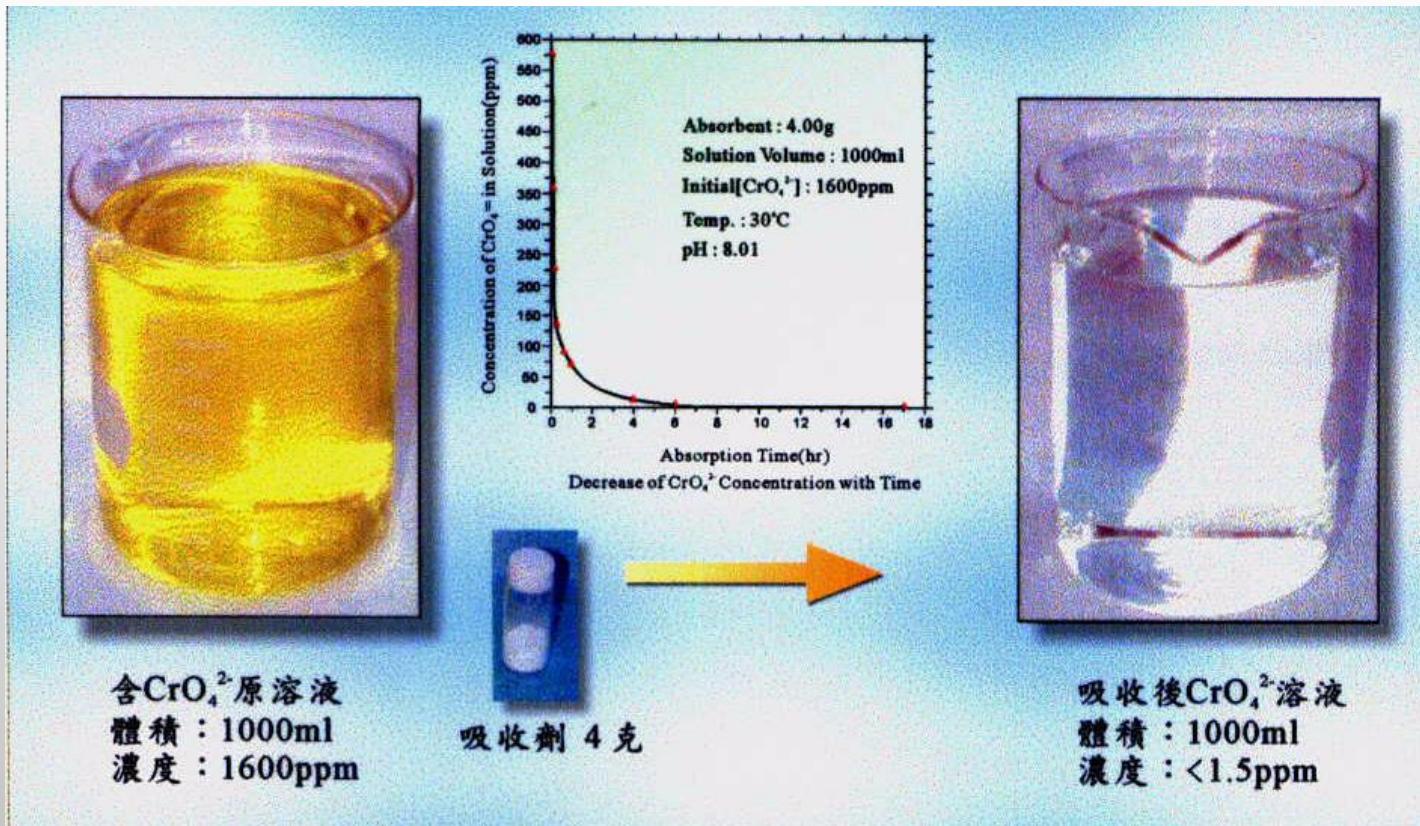
△ The chrome sludge treatment site must be added with a machine and equipment mixing mixer group.

△ The dedicated staff for chromium sludge treatment is about 2-3, and it is estimated that it can handle 100 ~ 150 tons per day.

△ Because it has been stabilized and detoxified, it can be cleared and buried. Reduce total costs.

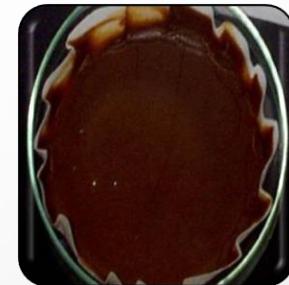
污泥的處理

Treatment of sludge



處理流程

Process flow



8. 處理流程圖

Processing flowchart



圖片說明:專利處理流程示意圖

Caption: Schematic diagram of patent processing



廢液的處理

Waste liquid treatment

- 廢液組成 Waste liquid composition

- 主要成分 NA、NI、FE、CR

Main ingredients Na、Ni、Fe、Cr

	Ca	Ni	Fe	Cu	Zn	Na	tCr	Cr ⁶⁺	Cr ³⁺
酸洗 廢液 <small>Pickling waste liquid</small>	86	691	5620	16.6	4.7	337	956	5.0	951
電解 廢液 <small>Electrolytic waste</small>	83	28.6	<0.1	<0.1	<0.1	206	35.8	31.4	4.4

廢液的處理

Waste liquid treatment

- 電解廢液 Electrolytic waste

元素 element	Ni	Fe	Cu	Zn	tCr	Cr ⁶⁺	Cr ³⁺
濃度 concentration	28.6	--	<0.1	<0.1	35.8	31.4	4.4



廢液的處理

Waste liquid treatment

- 電解廢液 Electrolytic waste

- 處理方法 Approach

- 加金屬乳化劑攪拌後，污泥沉降並分離

After stirring with metal emulsifier, the sludge settles and separates

廢液的處理

Waste liquid treatment

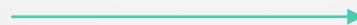
- 電解廢液 Electrolytic waste



處理前
Before processing

金屬乳化劑

Metal emulsifier



處理後
After processing



廢液的處理

Waste liquid treatment

- 電解廢液 Electrolytic waste

- 處理效果 Processing effect

- 污泥2.6公斤(乾重1.7公斤)/噸廢液

Sludge 2.6 kg (dry weight 1.7 kg) / ton waste liquid

- 污泥TCLP測試CR溶出 1.87 PPM

Cr dissolution from sludge TCLP test 1.87 ppm

- 處理後廢液符合排放標準

Waste liquid after treatment meets discharge standards

元素 element	Ni	Fe	Cu	Zn	tCr	Cr ⁶⁺	Cr ³⁺
濃度 concentration	<0.1	<0.1	<0.1	<0.1	0.26	0.16	0.10



廢液的處理

Waste liquid treatment

- 酸洗廢液 Pickling waste liquid

元素 element	Ni	Fe	Zn	tCr	Cr^{6+}	Cr^{3+}	pH
濃度 concentration	691	5620	4.7	956	5.0	951	1.5

廢液的處理

Waste liquid treatment

- 酸洗廢液

Pickling waste liquid



處理前
Before processing

金屬乳化劑

Metal emulsifier



處理後
After processing



廢液的處理

Waste liquid treatment

- 酸洗廢液 Pickling waste liquid
 - 處理效果 Processing effect
 - 污泥21.6公斤(乾重14.4公斤)/噸廢液
21.6 kg of sludge (14.4 kg dry weight) / ton of waste liquid
 - 污泥TCLP測試CR溶出 2.37 PPM
Cr dissolution from sludge TCLP test 2.37 ppm
 - 處理後廢液符合排放標準
Waste liquid after treatment meets discharge standards

元素 element	Ni	Fe	Zn	tCr	Cr ⁶⁺	Cr ³⁺	pH
濃度 concentration	<0.1	0.03	0.04	0.41	0.26	0.15	8.5



廢液的處理

Waste liquid treatment

電解廢液（濃）

Electrolytic waste liquid (concentrated)



混合廢液

Mixed waste liquid





廢液的處理

Waste liquid treatment

• 混合廢液（酸洗廢液與電解液2：1）

Mixed waste liquid

(Pickling waste liquid and electrolyte 2: 1)

元素 element	Ca	Ni	Fe	Cu	Zn	Na	tCr	Cr^{6+}	Cr^{3+}
濃度 concentration	85	470	3747	11	3.1	293	650	14	636

廢液的處理

Waste liquid treatment

- 混合廢液 Mixed waste liquid



加
金
屬
乳
化
劑

Metal emulsifier



分
離

Separate





廢液的處理

Waste liquid treatment

◆ 混合廢液 Mixed waste liquid

◆ 處理效果 Processing effect

- ◆ 污泥22.4公斤(乾重14.5公斤)/噸廢液
Sludge 22.4 kg (dry weight 14.5 kg) / ton waste liquid
- ◆ 污泥TCLP測試CR溶出 2.07 PPM
Sludge TCLP test Cr dissolution 2.07 ppm
- ◆ 處理後廢液符合排放標準
Waste liquid after treatment meets discharge standards

元素 element	Ni	Fe	Cu	Zn	Pb	Mn	Cr
濃度 concentration	0.11	0.03	0.06	<0.01	0.09	<0.01	0.13



廢液的處理

Waste liquid treatment

◆化學鎳處理 Chemical nickel treatment



處理前
Before processing

金屬乳化劑
Metal emulsifier



處理後
After processing

元素 element	Ni	Fe	Cu	Zn	Mn	Cr
處理後濃度 Post-treatment concentration	<0.2ppm	ND	ND	ND	ND	ND

廢液的處理

Waste liquid treatment

◆ 硝酸鎳處理 Nickel nitrate treatment



元素 element	Ni(L)	Ni(S)	Cu	Cr
處理後濃度 Post-treatment concentration	<0.2ppm	>500000ppm	ND	ND

廢液的處理

Waste liquid treatment

處理後污泥檢測分析

Analysis of sludge after treatment



鎳D

	鎳D	鐵C
XRF	%	%
Mg	0.377	0.102
Al	0.317	0.078
Si	0.046	0.209
P	0.537	-
S	0.025	0.057
Cl	1.540	0.024
Ca	9.810	13.330
Fe	0.150	23.133
Ni	41.730	4.703
Zn	0.120	-
Na	9.940	3.350
Ba	14.300	-
Nd	15.900	-
Cr	-	3.827
Mn	-	0.432
Co	-	0.166
Cu	-	0.804



鐵C



廢酸處理前

Before waste acid treatment

處理成果

Processing results

廢酸處理後 After waste acid treatment

台灣檢驗科技股份有限公司高雄分公司

行政院環保署許可證號字號：環署檢字第 105 號

水質樣品檢驗報告

委託單位：有限公司

業別：*

樣品基質：廢水#2

樣品編號：AW8042403

採樣單位：委託單位自行送樣

採樣地點：*

10.0(22.0°C)

2.20 (mg/L)

11時 00 分

16時 42 分

是否 認可	檢驗項目	檢驗值 (單位)	檢驗方法	備註
* pH	10.0(22.0°C)	NIEA W42452A	備註 6.	
* 鐵	2.20 (mg/L)	NIEA W311.53C		
以下空白				

備註：1. 本報告已由核可報告簽署人，審核無誤，並簽署於內附報告文件，簽署人如下：

施測辦測：高孔雅 (IGI-01) / 林新宏 (IGI-03) / 張泓澤 (IGI-09)

2. 本報告具 1 頁。

3. 檢測項目有標示“*”者，係指該檢測項目經環保署許可，並依公告檢測方法分析。

4. 依於方法檢測極限之測定值以“ND”表示，並說明其方法檢測極限(MDL)；若高於 MDL，但低於檢量級最低點濃度時，以“—”檢測報告為最低檢量級單位值”表示，並接註說明其實測值。

5. 本樣品由委託單位自行送樣，本報告僅對樣品真實性，不得隨意複製及作為宣傳廣告之用。

6. 本檢測結果為實驗室之檢驗值，不得隨意複製及作為宣傳廣告之用。

7. 上述樣品不另保存方法，本報告不得作為法規明定僅供參考。

8. 本報告由委託單位發出。

聲明書

(一) 葉得證本公司檢驗室所提供之樣品，自本檢驗室收樣至報告發出之過程，係在委託人／申報人指示下，以本公司人員從性質上專業知識，完全依循行政院環境保護署及有關機關之標準方法及品樣品管等相關規定，秉公正誠，誠實進行採樣、檢測，絕無偽不實，如有違反，就政府機關所受損失願負賠償責任之外，並接受主管機關依法令所為之行政處分及刑事處罰。

(二) 各人聲明如自身知悉委託單位有違法情事，亦苟於刑法之公務員，並瞭解刑法上圖利罪、公務員登貪不實偽大欺及貪污治罪條例之適用，對其所為行為，願負上列各款之法律責任。

公司名稱：台灣檢驗科技股份有限公司高雄分公司

負責人：楊國山

檢驗室主管：董士萍

檢驗室
主任
董士萍

處理實例

Processing example

• 案例一：桃園Y廠表面化成廢液處理

Case 1: Wastewater treatment on surface of Taoyuan Y Plant

圖一

廢液組成 (圖一) Waste liquid composition (Figure 1)	外觀 Exterior	Cr^{6+} (ppm)	SO_4^{2-} (ppm)	電導度 $\mu\text{mho}/\text{cm}$ Electrical conductivity	
	淡黃色 Light yellow	13.4	580	890	
待解問題 Open question	原廢液處理其電導度高達2000 $\mu\text{mho}/\text{cm}$ ，不符合電導度<750 $\mu\text{mho}/\text{cm}$ 要求 The conductivity of the original waste liquid is as high as 2000 $\mu\text{mho}/\text{cm}$, which does not meet the requirements of conductivity <750 $\mu\text{mho}/\text{cm}$				
處理要求 Processing requirements	符合農業灌溉用水水質： $t\text{Cr}<0.1\text{ppm}$ ；電導度<750；鈉吸著率<6等 In line with agricultural irrigation water quality: $t\text{Cr} < 0.1\text{ppm}$; electrical conductivity <750; sodium adsorption rate <6, etc.				
處理方法 Approach	1. 加調理劑移除干擾離子並降低廢液之電解質 2. 降低溶液中鈉離子比例並調整合適pH 3. 加入金屬調和劑攪拌脫除鉻 4. 污泥沉降並移除 1. Add conditioner to remove interfering ions and reduce electrolyte of waste liquid 2. Reduce the proportion of sodium ions in the solution and adjust the appropriate pH 3. Add metal blending agent and stir to remove chromium 4. Sludge sedimentation and removal				
處理結果 (圖二) process result (Figure II)	外觀 Exterior	$t\text{Cr}$ (ppm)	SO_4^{2-} (ppm)	電導度 $\mu\text{mho}/\text{cm}$ Electrical conductivity	
	無色 colorless	0.05	350	680	
處理效益 Processing benefits	1. 放流水符合農業灌溉用水水質標準 2. 解決電導度<750 $\mu\text{mho}/\text{cm}$ 要求 1. Drained water meets water quality standards for agricultural irrigation 2. Solve the requirement of conductivity <750 $\mu\text{mho}/\text{cm}$				



圖二



處理實例

Processing example

• 案例二：彰化J廠表面化成廢液處理

Case 2: Changhua J Plant Surface Chemical Treatment

圖三

(原液稀釋7倍)

廢液組成 (圖三) Waste liquid composition (Figure III)	外觀 Exterior	Cr^{6+} (ppm)	SO_4^{2-} (ppm)	PO_4^{3-} (ppm)	pH
	藍黑色 Blue black	>7000	>500	>2000	<1
待解問題 Open question	無法處理 Cannot handle				
處理要求 Processing requirements	符合放流水水質： $t\text{Cr} < 2\text{ppm}$; $\text{Zn} < 5\text{ppm}$; $\text{Pb} < 1\text{ppm}$ Meet the quality of the release water: $t\text{Cr} < 2\text{ppm}$; $\text{Zn} < 5\text{ppm}$; $\text{Pb} < 1\text{ppm}$				
處理方法 Approach	1. 先加入調理劑移除干擾離子 2. 加入脫除劑攪拌並調整合適pH 3. 汚泥沉降並移除 1. Add conditioner first to remove interfering ions 2. Add remover and stir and adjust the appropriate pH 3. Settlement and removal of sludge				
處理結果 (圖四) process result (Figure 4)	外觀 Exterior	$t\text{Cr}$ (ppm)	Zn (ppm)	Pb (ppm)	pH
	無色 colorless	0.54	0.8	0.2	8.5
處理效益 Processing benefits	1. 放流水符合水質標準 2. 解決貯存問題 1. Drained water meets water quality standards 2. Solving storage problems				



圖四





處理實例

Processing example

案例三：彰化G廠表面化成廢液處理

Case 3: Changhua G Plant Surface Chemical Treatment

- 鉻皮膜化成廢液 Chromium film forming waste liquid
- 六價鉻濃度 Hexavalent chromium concentration
- 含硫酸、鹽酸 Contains sulfuric acid and hydrochloric acid
- PH : 8.5
- 處理方法與成本 Processing method and cost

調節劑 + 金屬乳化劑 : **/T

Regulator + metal emulsifier: \$ *** / T

污泥 : 4.5kg(dry)/T

Sludge: 4.5kg (dry) / T



處理實例

Processing example

案例三：彰化G廠表面化成廢液處理

Case 3: Changhua G Plant Surface Chemical Treatment



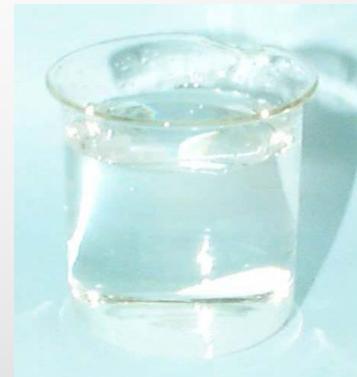
六價鉻溶液

Hexavalent chromium solution



處理失敗之鉻溶液

Failed Chrome Solution



處理後之廢液

Waste liquid after treatment



處理實例

Processing example

案例三：彰化G廠表面化成廢液處理

Case 3: Changhua G Plant Surface Chemical Treatment

• 處理效益 Processing benefits

處理程序簡單 Simple procedure

設備簡化：加藥機少用60% Simplified equipment: 60% less dosing machine

污泥產量少 Less sludge production

無臭味 Odorless

效果穩定 Stable effect



處理實例

Processing example

• 案例四：高雄C廠表面化成鉻(VI)廢液處理

Case 4: Treatment of Chromium (VI) Waste Liquid on Surface of Kaohsiung C Plant

資源化處理

Resource processing

廢液無害化處理結果比較(單位：ppm)

Comparison of the results of harmless treatment of waste liquid (unit: ppm)

	PO ₄ ³⁻	SO ₄ ²⁻	Ni	Al	Fe	Pb	Zn	tCr	Cr ⁶⁺	Cr ³⁺	pH
原始廢液 Original waste	1890	8.4	26.8	333	0.95	---	0.38	492	327	165	2.3 - 2.4
處理後溶液 Post-treatment solution	0.55	5.0	<0.2	-- -	0.03	<0.01	0.05	<0.2	<0.2	ND	



工安中毒事件

Work safety poisoning incident



廢水池清淤泥作業屬於侷限空間作業場所，事前都要進行通風換氣及測定措施，有硫化氫的場域不能作業，必須經過通風、測定後，濃度低於10ppm才可以作業，而廢水處理池抽乾後，污泥會產生硫化氫氣體，一般只要10ppm就有中毒危險，因現場濃度很高，仍無法測定，宜蘭某電子廠已造成4人死亡，案發時的濃度一定很高，「濃度至少超過10倍以上」。此外，業者將依「刑法」業務過失致死罪嫌送辦，違反「職安法」，則處予最高30萬元罰款。於距離事發地點約15公尺處，就聞到空氣中瀰漫濃厚的化學藥劑味道及如臭雞蛋「阿摩尼亞」的味道，顯示現場濃度相當高。某電子宜蘭廠未依SOP標準作業流程進行，才會造成不幸事件發生。

Wastewater pool stasis removal is a limited space operation site. Ventilation and measurement measures must be performed beforehand. Fields with hydrogen sulfide cannot be operated. After ventilation and measurement, the concentration can be lower than 10ppm before operation. Wastewater treatment tank After draining, the sludge will generate hydrogen sulfide gas. Generally, as long as 10ppm, there is a danger of poisoning. Due to the high concentration at the site, it is still impossible to measure. An electronics factory in Yilan has killed 4 people. The concentration at the time of the incident must be high. The concentration is at least 10 times higher. " In addition, the industry will send suspects of death due to business negligence in accordance with the "criminal law" and violate the "Occupational Safety Law" with a fine of up to 300,000 yuan. At a distance of about 15 meters from the incident, the smell of strong chemical agents in the air and the smell of rotten eggs "Amonia" showed that the concentration at the scene was quite high. An electronic Yilan factory did not follow the SOP standard operating procedures, which would cause unfortunate incidents.

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結 語

Conclusion

六價鉻廢液的產源十分多元，組成也變化多端，處理方法如無法對症下藥，處理效果很難把握，污染受罰的可能性很高，唯具有靈活應用技術的能力，以及堅強的技術輔導，才可能以低成本解決問題。

The source of hexavalent chromium waste liquid is very diverse, and the composition is also varied. If the treatment method is not the right medicine, the treatment effect is difficult to grasp, the possibility of pollution is very high, only the ability to apply technology flexibly and strong technical guidance Is it possible to solve the problem at low cost.

以「對症下藥」方式處理六價鉻廢液之效果比還原法穩定，無臭味，且污泥產量也較少。

The effect of treating the hexavalent chromium waste liquid by the method of "the right medicine" is more stable than the reduction method, no odor, and less sludge production.



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