



重金属污染防治技术

Heavy metal pollution prevention technology

-多用途重金属乳化剂分段过滤处理设备

Multi-purpose heavy metal blending agent staged filtering processing equipment

-含重金属六价铬废液及污泥之处理

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

-酸洗废液分段处理

Staged treatment of pickling waste liquid



前言

Foreword

- 六价铬废液的产生

Production of hexavalent chromium waste liquid

- 电镀、染料、碱氯、化肥、石化、制革、纺织、造纸等各业之废料

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

- 六价铬的危害

Harm of hexavalent chromium

- 对人体及动物具致癌或诱发突变的危害

Carcinogenic or mutagenic harm to humans and animals



前言

Foreword

操作简单 easy to use

尽量利用已有设备 Make best use of existing equipment

效果稳定 Stable effect

污泥符合一般事业废弃物管制标准

Sludge meets general business waste control standards

废液符合排放水标准

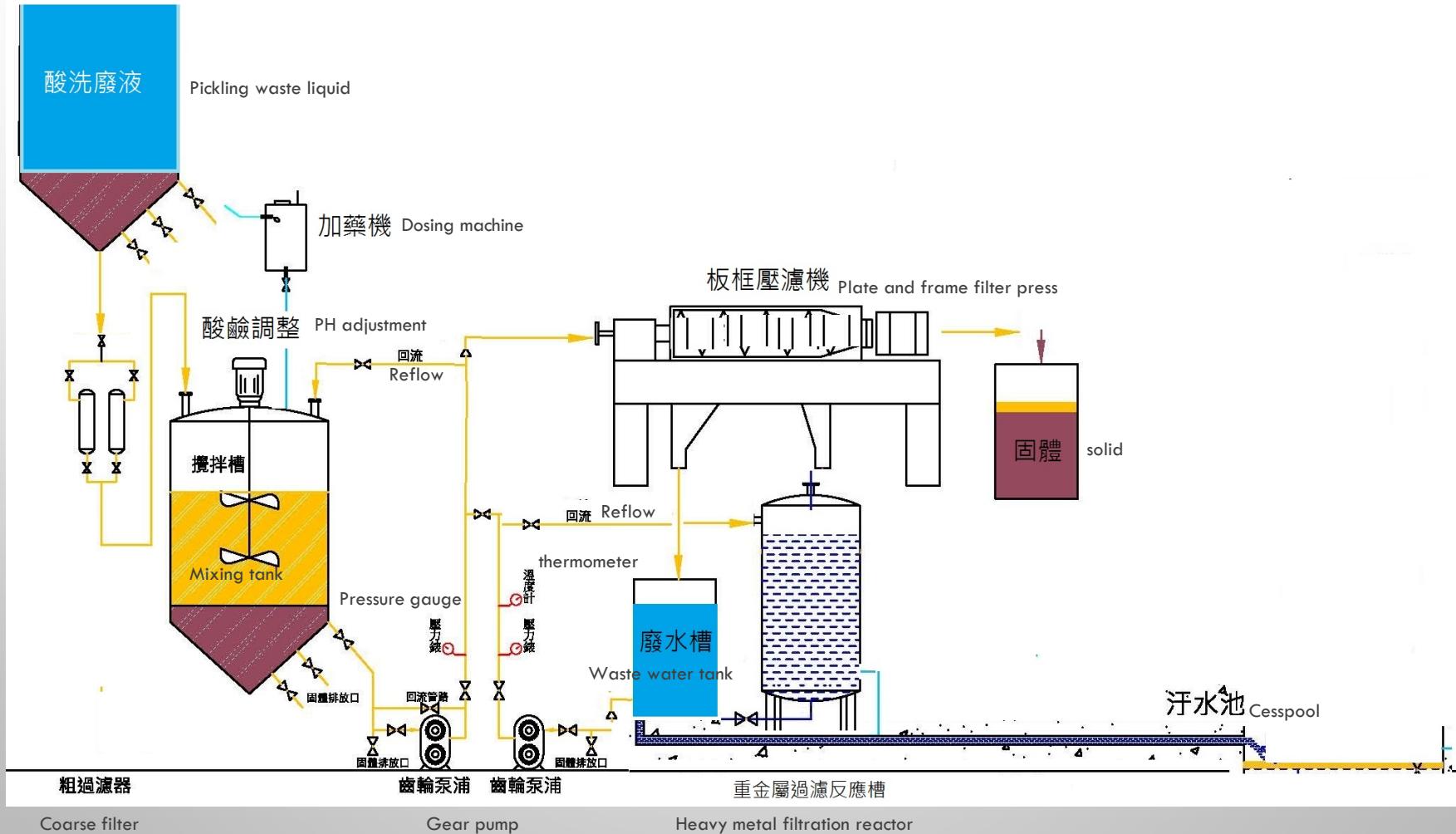
Waste liquid meets discharge water standards

作业场所无臭味

No odor in the workplace

多用途重金属乳化剂分段過濾處理設備

Multi-purpose heavy metal blending agent staged filtering processing equipment





多用途重金属乳化剂分段过滤处理设备

Multi-purpose heavy metal blending agent staged filtering processing equipment

优劣比较如下：

The advantages and disadvantages are as follows

| | 传统 Traditional | 重金属调和剂 Heavy metal blender |
|--|--|---|
| 1.设备投资 Equipment investment | 3条处理线 3 processing lines 3套监控设备 3 sets of monitoring equipment | 仅需2条处理线 Only 2 processing lines required 2套监控设备 2 sets of monitoring equipment |
| 2.所需处理材料 Required processing materials | 药剂繁多，容易犯错误，且使用量大。 <i>Many medicines, easy to make mistakes, and large quantities.</i> | 重金属调和剂单一材料使用简单，且无需其他原料，重金属种类可去除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.产生之废污泥 Waste sludge produced | 污泥量大，约需处理剂产生污泥量之3~5倍，且有害废弃物之污泥处理费用高。 <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，仅为传统污泥量之1/3~1/5。 <i>Low sludge volume, only 1/3 ~ 1/5 of traditional sludge volume.</i> |
| 4.废水处理速度(量) Wastewater treatment speed (quantity) | 由于操作过程繁杂，且使用之药剂多，故处理速度较慢，废水处理量较少。 <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> | 因为单一药剂，使用仅2条处理线，故处理速度较快，且废水处理量较大。 <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> |

多用途重金属乳化剂分段过滤处理设备

Multi-purpose heavy metal sedimentation agent staged filtering processing equipment

| | | |
|--|---|--|
| 5.电力费用 Electricity cost | 由于处理线较多条，且冗长，故电力费用较高。 Higher processing costs due to more processing lines and length. | 处理方式简单，处理线较短，所需电力仅传统方式之60%。 The processing method is simple, the processing line is short, and the power required is only 60% of the traditional method. |
| 6.人力费用 Labor costs | 因为使用3套设备与3条处理线，故至少需2人以上监控处理。 Because 3 sets of equipment and 3 processing lines are used, at least 2 people need to monitor and process. | 仅需1人即可。 Only one person is required. |
| 7.厂房用地 Workshop land | 厂房使用面积大。 Large plant area. | 厂房使用面积仅约传统作法之60%。 Plant use area is only about 60% of traditional practices. |
| 8.环境卫生 (健康危害) Environmental hygiene (Health hazard) | 反应当中产生硫化氢，危害人体健康及恶臭影响环境卫生。 Hydrogen sulfide is generated during the reaction, which harms human health and malodor and affects environmental hygiene. | 无恶臭及其他有害物质产生，为最环保之反应过程。 No foul odor and other harmful substances are generated, which is the most environmentally friendly reaction process. |

- 六价铬废液的处理 Treatment of hexavalent chromium waste liquid
 - 化学性与其它有毒重金属不同，处理比较困难，是环境保护的痛处
Chemically different from other toxic heavy metals, it is more difficult to handle and is a sore point of environmental protection
- 现行处理方法 Current treatment
 - CR $^{6+}$ $\xrightarrow{\hspace{1cm}}$ CR $^{3+}$ (沉淀) precipitation
 - 缺点 Disadvantage
 - 作业现场恶臭 Stench at the job site
 - 加药量多 Dosing more
 - 污泥产量高 High sludge production
 - 效果不稳定 Unstable effect



技术能量与应用

Technology Energy and Application

- 以「现场诊断」、「对症下药」方式提供处理方法、制程设计、软硬件建造、作业辅导

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

- 六价铬处理剂 Hexavalent chromium treatment agent

- 浆状 Pasty
- 较低水溶性 Low water solubility
- 可直接处理高浓度(远高于其他已知者) Can handle high concentrations directly (much higher than others known)
- 大幅降低COD Significantly reduce COD
- 前处理去除干扰节省用量 Pre-treatment removes interference to save usage



技术能量与应用

Technology Energy and Application

- 六价铬处理剂 Hexavalent chromium treatment agent
 - 液体、固体或复方浆体 Liquid, solid or compound slurry
 - 只要单一药剂 Just a single potion
 - 操作时间短 Short operating time
 - 干扰问题较少 Less interference issues

· 六价铬乳化剂

Hexavalent chromium blender



乳化剂0.45%



Blending agent 0.45%



含Cr⁶⁺原溶液

Cr⁶⁺original solution

体积 1000 mL

1000ml volume

浓度 1000 ppm

1000ppm concentration

脱除后Cr⁶⁺溶液

Cr⁶⁺solution after removal

体积 1000 mL

1000ml volume

浓度 <0.5 ppm

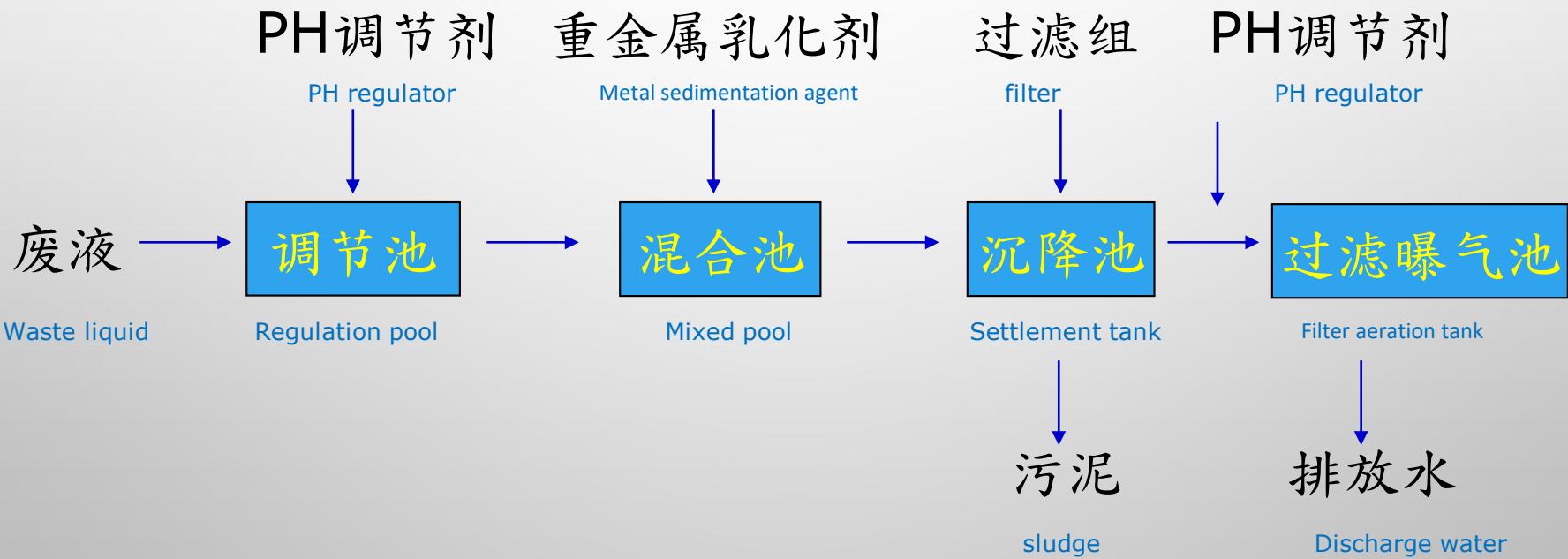
Concentration <0.5ppm

- 废液的脱六价铬处理

Dehexavalent chromium treatment of waste liquid

- 六价铬废液

Hexavalent chromium waste liquid



- 污泥性质 Sludge properties

- TCLP程序测试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%





污泥的处理

Treatment of sludge

前言：

Foreword:

会损害人体中枢神经的剧毒重金属离子【六价铬】污泥处理 ·

国内相关产业如石化、不锈钢、造纸、电镀、制革、纺织等工业都会
随伴产生含六价铬的废料 · 但相关处理技术麻烦不彻底，无法完全符合排放
标准，而且处理成本昂贵 · 过去国内若不是储存起来固化处理，就是被偷偷
排放掉或偷偷掩埋，大幅影响大自然环境生态，更直接挑战环保意识 ·

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.

无机含废液与铬污泥处理剂，经处理后废液的铬浓度降为0.5PPM · 完全符合
环保署规定的排放标准 ·

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.



污泥的处理

Treatment of sludge

- 处理基本原理 Processing rationale

- 针对个案之污泥条件，综合处理剂，以化学吸附固着与安定化的作用，使总铬形成安定而不溶出的化合物固着于污泥中，发挥安定化与无毒化之效果，污泥不必再固化，处理前后体积几乎相同，处理后可达到TCLP测试之要求标准，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.



污泥的处理

Treatment of sludge

◆ 优点 advantage

- ◆ 可确保TCLP测试符合标准，不必再固化。
- ◆ 处理前后体积几乎相同，可节省运费与掩埋费。
- ◆ 处理迅速，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.



污泥的处理

Treatment of sludge

◆ 铬重金属污泥综合处理剂

Comprehensive treatment agent for chromium heavy metal sludge

- ◆ 复方水体 Compound water body
- ◆ 无味、无臭 Tasteless, odorless
- ◆ 适用于含铬(III)与铬(VI) 重金属污泥之处理

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



污泥的处理

Treatment of sludge

◆ 铬重金属污泥处理实例

Example of chromium heavy metal sludge treatment

◆ 处理方法A Processing method A

- ◆ 步骤1：先将污泥置入搅拌容器中。
- ◆ 步骤2：再加入综合处理剂与适量之水(以使易于搅拌混合为度)。
- ◆ 步骤3：启动搅拌马达使污泥与综合处理剂混合均匀后下料即可。

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.

铬污泥处理实例 Examples of chromium sludge treatment

污泥来源

T公司

由电解废液与酸洗废液之处理
所产生

待处理污泥特性

含水率63.2%

含铬(III)与铬(VI)

TCLP测试(使用萃取液B)之总铬
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



- 处理结果

process result

- TCLP 测试CR溶出 2.7 PPM
- 符合 非有害事业废弃物标准

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





污泥的处理

Treatment of sludge

已处理

Processed

未处理

Unprocessed





污泥的处理

Treatment of sludge

◆ 铬污泥处理设备 Chrome sludge treatment equipment

- ◆ 混合搅拌器(连续式或批次式)：1式。
- ◆ 污泥定量进料器(连续式或批次式)：1式。
- ◆ 综合处理剂定量进料器(连续式或批次式)：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



污泥的处理

Treatment of sludge

与水泥固化之比较 Comparison with cement curing

| 比较项目 Compare items | 其他方法 Other methods | 无毒化处理 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 |
| 螯合剂使用 Chelating agent use | 需要 need | 不需要 No need |
| TCLP铬溶出 TCLP chromium dissolution | 难过关 Difficult | 可确保合格 Can ensure compliance |
| 处理后体积 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 |
| 运费 Freight | 高(30%以上) High (above 30%) | 低 low |



污泥的处理

Treatment of sludge

外观：无色或淡紫蓝色浆体

比重： 1.20 ± 0.03

组成：复方组成之铬污泥安定化与无毒化处理剂

包装：

①桶装:5G1.100L.150L

②槽车：运送至用户处，并负责抽送进入储存槽·每次送货至少20吨.

Appearance: colorless or lilac blue slurry

Specific gravity: 1.20 ± 0.03

Composition: Compound sludge stabilization and non-toxic treatment

Packaging:

①Bucket: 5G1.100L.150L

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



污泥的处理

Treatment of sludge

使用方法：

- ①. 潮湿污泥：将适用量之铬污泥处理剂与污泥搅拌混合均匀，如过湿应再行脱水·
- ②. 干固污泥：将适用量之铬污泥处理剂与污泥加入适量水搅拌，混合均匀即可·

以上操作，本公司将派人至现场指导操作·

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.

使用剂量：

随污泥之性质而定·须依本公司预先测定建议之剂量使用，以免发生不合格处理结果·

- △ 铬污泥处理现场须增设机器设备混合搅拌器组·
- △ 铬污泥处理专设人员约2-3人，预估每天可处理100~150吨.
- △ 因已经安定与无毒化处理，后即可清运掩埋·减少总成本花费.

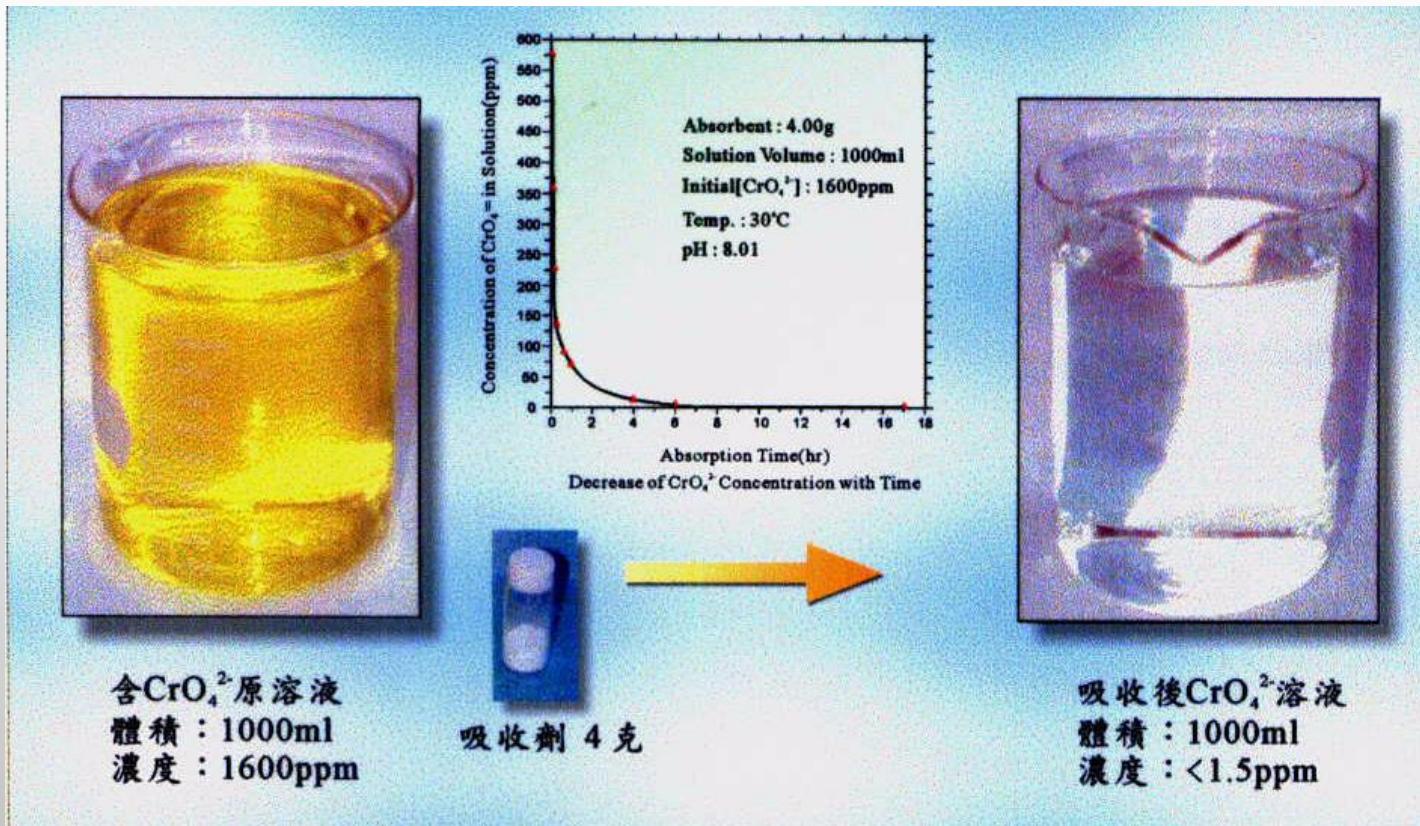
Dosage used:

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.

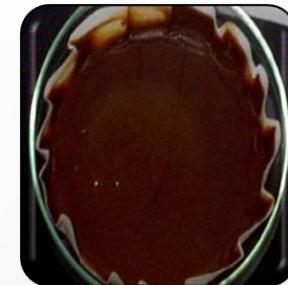
污泥的處理

Treatment of sludge



处理流程

Process flow



8. 处理流程图

Processing flowchart



图片说明:专利处理流程示意图

Caption: Schematic diagram of patent processing



废液的处理

Waste liquid treatment

- 废液组成 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 废液 <small>Pickling waste liquid</small> | 86 | 691 | 5620 | 16.6 | 4.7 | 337 | 956 | 5.0 | 951 |
| 电解 废液 <small>Electrolytic waste</small> | 83 | 28.6 | <0.1 | <0.1 | <0.1 | 206 | 35.8 | 31.4 | 4.4 |



废液的处理

Waste liquid treatment

- 电解废液 Electrolytic waste

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



废液的处理

Waste liquid treatment

- 电解废液 Electrolytic waste

- 处理方法 Approach

- 加金属乳化剂搅拌后，污泥沉降并分离

After stirring with metal emulsifier, the sludge settles and separates

废液的处理

Waste liquid treatment

- 电解废液 Electrolytic waste



处理前
Before processing

金属乳化剂

Metal emulsifier



处理后
After processing



废液的处理

Waste liquid treatment

- 电解废液 Electrolytic waste

- 处理效果 Processing effect

- 污泥2.6公斤(干重1.7公斤)/吨废液

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

- 污泥TCLP测试CR溶出 1.87 PPM

Cr dissolution from sludge TCLP test 1.87 ppm

- 处理后废液符合排放标准

Waste liquid after treatment meets discharge standards

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



废液的处理

Waste liquid treatment

- 酸洗废液 Pickling waste liquid

| 元素 element | Ni | Fe | Zn | tCr | Cr ⁶⁺ | Cr ³⁺ | pH |
|---------------------|-----|------|-----|-----|------------------|------------------|-----|
| 浓度 concentration | 691 | 5620 | 4.7 | 956 | 5.0 | 951 | 1.5 |

废液的处理

Waste liquid treatment

- 酸洗废液 Pickling waste liquid



处理前
Before processing

金属乳化剂
Metal emulsifier



处理后
After processing



废液的处理

Waste liquid treatment

- 酸洗废液 Pickling waste liquid

- 处理效果 Processing effect

- 污泥21.6公斤(干重14.4公斤)/吨废液

21.6 kg of sludge (14.4 kg dry weight) / ton of waste liquid

- 污泥TCLP测试CR溶出 2.37 PPM

Cr dissolution from sludge TCLP test 2.37 ppm

- 处理后废液符合排放标准

Waste liquid after treatment meets discharge standards

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



废液的处理

Waste liquid treatment

电解废液（浓）

Electrolytic waste liquid (concentrated)



混合废液

Mixed waste liquid





废液的处理

Waste liquid treatment

• 混合废液（酸洗废液与电解液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+} |
|---------------------|----|-----|------|----|-----|-----|-----|------------------|------------------|
| 浓度 concentration | 85 | 470 | 3747 | 11 | 3.1 | 293 | 650 | 14 | 636 |

废液的处理

Waste liquid treatment

- 混合废液 Mixed waste liquid



加
金
属
乳
化
剂

Metal emulsifier



分
离

Separate





废液的处理

Waste liquid treatment

◆ 混合废液

Mixed waste liquid

◆ 处理效果 Processing effect

- ◆ 污泥22.4公斤(干重14.5公斤)/吨废液
Sludge 22.4 kg (dry weight 14.5 kg) / ton waste liquid
- ◆ 污泥TCLP测试CR溶出 2.07 PPM
Sludge TCLP test Cr dissolution 2.07 ppm
- ◆ 处理后废液符合排放标准

Waste liquid after treatment meets discharge standards

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



废液的处理

Waste liquid treatment

◆ 化学镍处理 Chemical nickel treatment



处理前
Before processing

金属乳化剂

Metal emulsifier



处理后
After processing

| 元素 element | Ni | Fe | Cu | Zn | Mn | Cr |
|---------------------------------------|---------|----|----|----|----|----|
| 处理后浓度 Post-treatment concentration | <0.2ppm | ND | ND | ND | ND | ND |

废液的处理

Waste liquid treatment

◆ 硝酸镍处理 Nickel nitrate treatment



| 元素 element | Ni(L) | Ni(S) | Cu | Cr |
|---------------------------------------|---------|------------|----|----|
| 处理后浓度 Post-treatment concentration | <0.2ppm | >500000ppm | ND | ND |



废液的处理

Waste liquid treatment

处理后污泥检测分析

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



废酸处理前

Before waste acid treatment

SGS

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：環署環檢字第 105 號
水質樣品檢驗報告

| 委託單位： | 有限公司 | 檢驗項目 | 檢驗值 (單位) | 檢驗方法 | 備註 |
|--|-----------|------|---------------|---------------|-------|
| * 畫別： | * | pH | <1.0(22.2°C) | NIEA W424.52A | 備註 6. |
| 樣品基質： | 廢水原液 | 鐵 | 128000 (mg/L) | NIEA W311.53C | |
| 樣品編號： | AW8042401 | 以下空白 | | | |
| 採樣單位： | 委託單位自行送樣 | | | | |
| 採樣地點： | * | | | | |
| 備註：1. 本報告已由檢核報告簽署人審核無誤，並簽署於內部報告文件，簽署人如下： 無檢核說明；高孔理(IGI-01)林新芳(IGI-03)張弘澤(IGI-09)。 2. 本報告共 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. 係於方法檢測極限之測定值以“ND”表示，並註明其方法檢測極限(MDL)；若高於 MDL 但低於檢量線底度濃度時，以“*”始接報告並依執業單位值”表示，並註明其實測值。 5. 本樣品為委託單位自行送樣，本報各項對該樣品的分析，不得隨意複製及作為宣傳廣告之用。 6. 分析結果為實驗室之分析值非現場分析，檢測數據僅供參考。 7. 上述樣品不日合保存，本報告不得作為法規用逕僅供參考。 8. 採樣時間由委託單位提供。 | | | | | |
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| 公司名稱：台灣檢驗科技股份有限公司高雄分公司 負責人：楊麗山 檢驗室主管：劉士華 檢驗室：實驗室 主任劉士華 印文(1/1) | | | | | |
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处理成果

Processing results

废酸处理后

After waste acid treatment

SGS

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|--|-----------|------|--------------|---------------|-------|
| * 畫別： | * | pH | 10.0(22.0°C) | NIEA W424.52A | 備註 6. |
| 樣品基質： | 廢水#2 | 鐵 | 2.20 (mg/L) | NIEA W311.53C | |
| 樣品編號： | AW8042403 | 以下空白 | | | |
| 採樣單位： | 委託單位自行送樣 | | | | |
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处理实例

Processing example

• 案例一：桃园Y厂表面化成废液处理

Case 1: Wastewater treatment on surface of Taoyuan Y Plant

图一

| 废液组成 (图一) Waste liquid composition (Figure 1) | 外观 Exterior | Cr ⁶⁺ (ppm) | SO ₄ ²⁻ (ppm) | 电导度 μmho/cm Electrical conductivity | |
|---|--|---------------------------|--|---|--|
| | 淡黄色 Light yellow | 13.4 | 580 | 890 | |
| 待解问题 Open question | 原废液处理其电导度高达2000 μmho/cm，不符合电导度<750 μmho/cm 要求 The conductivity of the original waste liquid is as high as 2000 μmho / cm, which does not meet the requirements of conductivity <750 μmho / cm | | | | |
| 处理要求 Processing requirements | 符合农业灌溉用水水质：tCr<0.1ppm；电导度<750；钠吸着率<6等 In line with agricultural irrigation water quality: tCr <0.1ppm; electrical conductivity <750; sodium adsorption rate <6, etc. | | | | |
| 处理方法 Approach | 1.加调理剂移除干扰离子并降低废液之电解质 2.降低溶液中钠离子比例并调整合适pH 3.加入金属调和剂搅拌脱除铬 4.污泥沉降并移除 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 | | | | |
| 处理结果 (图二) process result (Figure II) | 外观 Exterior | tCr (ppm) | SO ₄ ²⁻ (ppm) | 电导度 μmho/cm Electrical conductivity | |
| | 无色 colorless | 0.05 | 350 | 680 | |
| 处理效益 Processing benefits | 1.放流水符合农业灌溉用水水质标准 2. 解决电导度<750 μmho/cm 要求 1. Drained water meets water quality standards for agricultural irrigation 2. Solve the requirement of conductivity <750 μmho / cm | | | | |



图二



处理实例

Processing example

• 案例二：彰化J厂表面化成废液处理

Case 2: Changhua J Plant Surface Chemical Treatment

| 废液组成 (图三) Waste liquid composition (Figure III) | 外观 Exterior | Cr^{6+} (ppm) | SO_4^{2-} (ppm) | PO_4^{3-} (ppm) | pH |
|--|---|---------------------------|-----------------------------|-----------------------------|-----|
| | 蓝黑色 Blue black | >7000 | >500 | >2000 | <1 |
| 待解问题 Open question | 无法处理 Cannot handle | | | | |
| 处理要求 Processing requirements | 符合放流水水质 : $t\text{Cr} < 2\text{ppm}$; $\text{Zn} < 5\text{ppm}$; $\text{Pb} < 1\text{ppm}$ Meet the quality of the release water: $t\text{Cr} < 2\text{ppm}$; $\text{Zn} < 5\text{ppm}$; $\text{Pb} < 1\text{ppm}$ | | | | |
| 处理方法 Approach | 1. 先加入调理剂移除干扰离子 2. 加入脱除剂搅拌并调整合适pH 3. 污泥沉降并移除 1. Add conditioner first to remove interfering ions 2. Add remover and stir and adjust the appropriate pH 3. Settlement and removal of sludge | | | | |
| 处理结果 (图四) process result (Figure 4) | 外观 Exterior | $t\text{Cr}$ (ppm) | Zn (ppm) | Pb (ppm) | pH |
| | 无色 colorless | 0.54 | 0.8 | 0.2 | 8.5 |
| 处理效益 Processing benefits | 1. 放流水符合水质标准 2. 解决贮存问题 1. Drained water meets water quality standards 2. Solving storage problems | | | | |

图三
(原液稀释7倍)



图四





处理实例

Processing example

案例三：彰化G厂表面化成废液处理

Case 3: Changhua G Plant Surface Chemical Treatment

- 铬皮膜化成废液 Chromium film forming waste liquid
- 六价铬浓度 Hexavalent chromium concentration
- 含硫酸、盐酸 Contains sulfuric acid and hydrochloric acid
- PH : 8.5
- 处理方法与成本 Processing method and cost

调节剂 + 金属乳化剂 : **/T

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

污泥 : 4.5kg(dry)/T

Sludge: 4.5kg (dry) / T



处理实例

Processing example

案例三：彰化G厂表面化成废液处理

Case 3: Changhua G Plant Surface Chemical Treatment



六价铬溶液

Hexavalent chromium solution



处理失败之铬溶液

Failed Chrome Solution



处理后之废液

Waste liquid after treatment



处理实例

Processing example

案例三：彰化G厂表面化成废液处理

Case 3: Changhua G Plant Surface Chemical Treatment

• 处理效益 Processing benefits

处理程序简单 Simple procedure

设备简化：加药机少用60% Simplified equipment: 60% less dosing machine

污泥产量少 Less sludge production

无臭味 Odorless

效果稳定 Stable effect



处理实例

Processing example

• 案例四：高雄C厂表面化成铬(VI)废液处理

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

资源化处理

Resource processing

废液无害化处理结果比较(单位：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 |
|----------------------------------|-------------------------------|-------------------------------|------|---------|------|-------|------|------|------------------|------------------|-----------------|
| 原始废液 Original waste | 1890 | 8.4 | 26.8 | 333 | 0.95 | --- | 0.38 | 492 | 327 | 165 | 2.3 - 2.4 |
| 处理后溶液 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



废水池清淤泥作业属于局限空间作业场所，事前都要进行通风换气及测定措施，有硫化氢的场域不能作业，必须经过通风、测定后，浓度低于10ppm才可以作业，而废水处理池抽干后，污泥会产生硫化氢气体，一般只要10ppm就有中毒危险，因现场浓度很高，仍无法测定，宜兰某电子厂已造成4人死亡，案发时的浓度一定很高，「浓度至少超过10倍以上」。此外，业者将依「刑法」业务过失致死罪嫌送办，违反「职安法」，则处于最高30万元罚款。于距离事发地点约15公尺处，就闻到空气中弥漫浓厚的化学药剂味道及如臭鸡蛋「阿摩尼亚」的味道，显示现场浓度相当高。某电子宜兰厂未依SOP标准作业流程进行，才会造成不幸事件发生。

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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结语

Conclusion

六价铬废液的产源十分多元，组成也变化多端，处理方法如无法对症下药，处理效果很难把握，污染受罚的可能性很高，唯具有灵活应用技术的能力，以及坚强的技术辅导，才可能以低成本解决问题。

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「对症下药」方式处理六价铬废液之效果比还原法稳定，无臭味，且污泥产量也较少。

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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