



Wesco **ELECTRODE**

Global Ace Partner
in Electrolysis Technology



Name	WESCO ELECTRODE CO., LTD.
Establishment	1993.03.22
CEO	Sangwook, Kim
Business	Manufacturing of Electrode, Electrolysis System, Hypochlorite Generator, Construction of Hypochlorite Generator System
Manpower	47
Capital Stock	460,000 USD
Total Sales	10 million USD



Name	R&D Center
Establishment	2002.09.16
Manpower	7
No. of Patent	19

- **Head Office & Factory #1**
30, Gongdan-ro 21 beongil, Sungsan-gu, Changwon-si, Gyeongsangnam-do, Korea
- **Factory #2**
121, Beopjeong-ro, Beopsumyeon, Haman-gun, Gyeongsangnam-do, Korea
- **Factory #3**
79, Gangdongsandan-ro 1-gil, Gangdong-myeon, Gyeongju-si, Gyeongsangbuk-do, Korea
- **Factory #4**
8, Paryong-ro 346 beon-gil, Uichang-gu, Changwon-si, Gyeongsangnam-do, Korea
- **Seoul- Gyeonggi Sales Office**
- **Gwangyang Sales Office**

GREETING

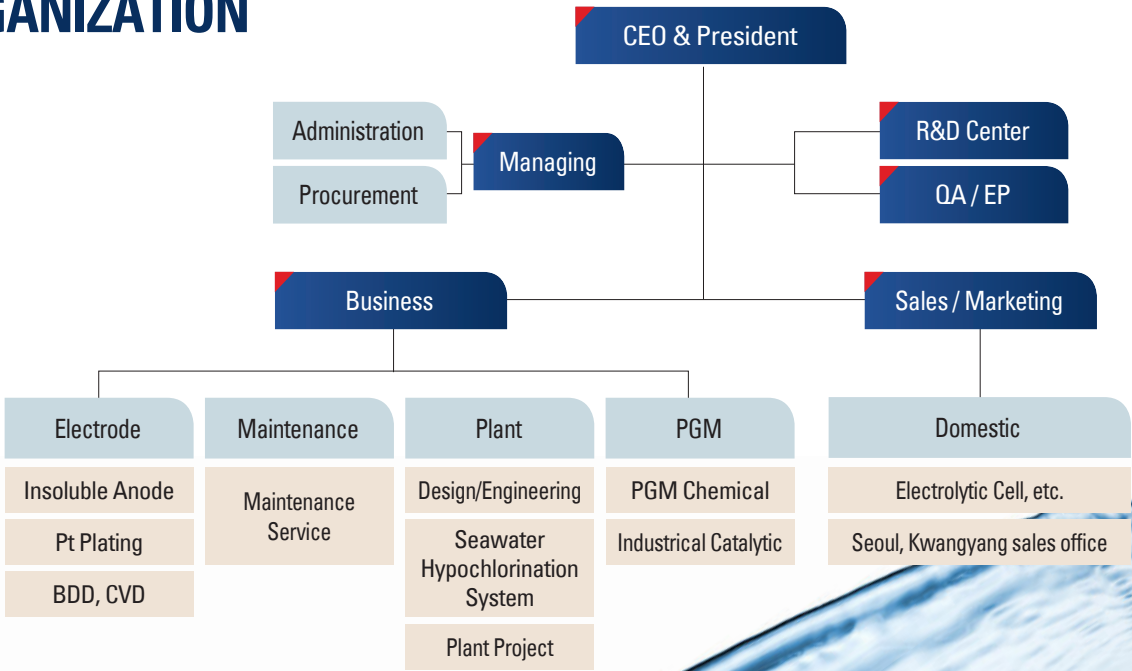
Becoming a Total Solution Specialist at the core of technology development of Insoluble Anode... However, WESCO ELECTRODE will challenge the 3rd Growth.



WESCO ELECTRODE CO., LTD. has improved production process, focusing technology development, to satisfy needs in various industry fields since it's foundation in 1993 to produce and supply Insoluble Anodes. As a result, we achieved first in domestic production in Korea, which was a barren land of anode market and recognition as a trustworthy technology partner not only by public utility companies, such as KEPCO (Korean Electric Power Corporation), KHNP(Korea Hydro & Nuclear Power Co., LTD) and KOGAS (Korea Gas Corporation) but also by big EPC businesses. Also, we prepared the foundation of the 2nd technology innovation by establishing a technology development R&D center in 2002 and successfully expanded our business field. We became a total solution specialist in the related industry, such as seawater electrochlorination system for a plant, escaping simple production and constructing engineering resource infrastructure. Furthermore, WESCO ELECTRODE CO., LTD. is challenging itself to become an influential specialist in overseas market. Please keep watching our 3rd growth as a global company with attention.

Kim, Sang-wook
CEO of WESCO

ORGANIZATION



HISTORY

WESCO ELECTRODE is able to provide significant and dependable value.

ESTABLISHMENT

1993~1999

- 1993 "Hankook Electrolysis Co.", Initial company name, was founded for manufacturing industrial Insoluble Anodes.
Developed Electrodes Platinum plated
- 1994 Developed Electrodes for Chlorine Evolving
- 1997 Renamed to "Wookyoung Electrolysis System Co., Ltd.(WESCO)"
- 1998 Developed Electrodes for EGL, Electric Galvanizing Line, and designated by POSCO as a domestic supplier.
- 1999 Patent issued on "High efficiency insoluble anode for Seawater Electrolysis"



ISO 9001 : 2008 form ICR



ISO 14001 : 2004 form ICR



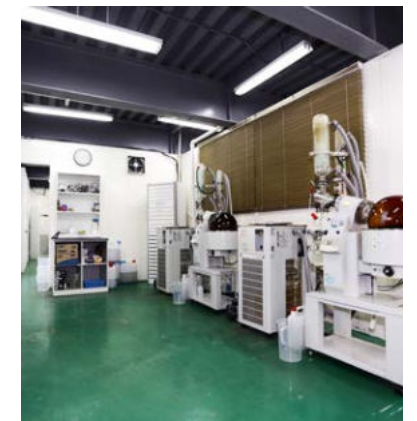
OHSAS 18001:2007



ADVANCEMENT

2000~ing

- 2000 Patent issued on "Insoluble anodes Platinum Group Material Plated for Plating Industry"
Patent issued on "Method for Tantalum layers on the substrate by Sputtering"
- 2002 Research & Development Center was founded.
- 2003 Designated as a "Superior Exporting Firm" by Gyeongnam Export Assistance Center in Korea
Head office moved from Haman to Changwon city.
- 2004 Awarded ISO 9001 : 2000 form ICR
Patent issued on "Multi-tube Cell for Seawater Electrolysis"
- 2005 Extended a Special plating treatment factory
- 2006 Designated as a "New Excellent Product, NEP" by Ministry of Commerce, Industry & Energy
- 2009 Awarded ISO 9001 : 2008 form ICR
Awarded ISO 14001 : 2004 form ICR
Patent issued on "Monopolar Type Electrolyser for Seawater Electrolysis"
- 2011 Awarded OHSAS 18001 : 2007 form Bureau Veritas
- 2012 Developed a technology for interlayer of Insoluble Anode
- 2013 Designated as a "New Excellent Technology, NET" by Ministry of Commerce, Industry & Energy
Patent issued on "High concentration hypochlorite generation electrolyser"
- 2016 Renamed to "WESCO ELECTRODE"
- 2017 Completed construction and operation of Gyeongju factory
Korea Energy Technology Evaluation & Consulting Task "3rd generation insoluble anode based power reduction rate 30% performance level development of electrolytic smelting device."



BUSINESS 01

INSOLUBLE ANODE

The Best Quality of Electrodes,
WESCO ELECTRODE is a Reliable Solution.

Main
Product

01

Cl₂ evolving
electrode

02

Electroplating
electrode

03

Special
electrode
(PbO₂, BDD)01 Cl₂ evolving electrode

Introduction

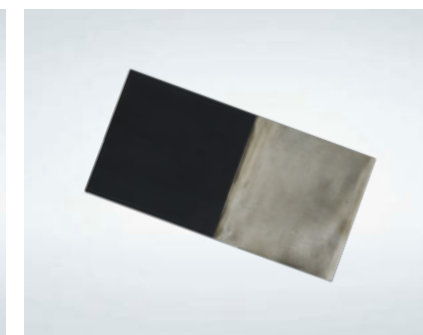
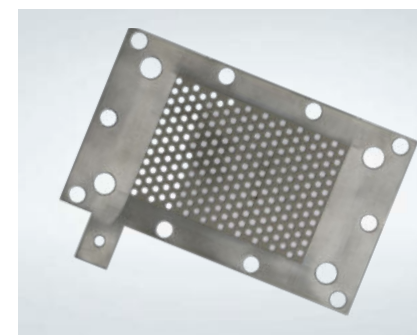
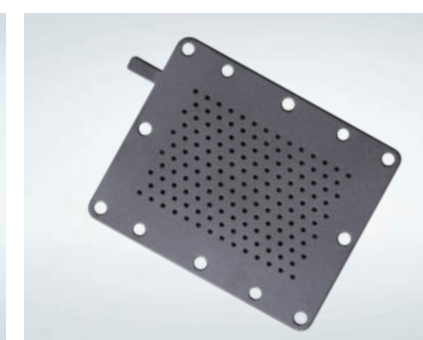
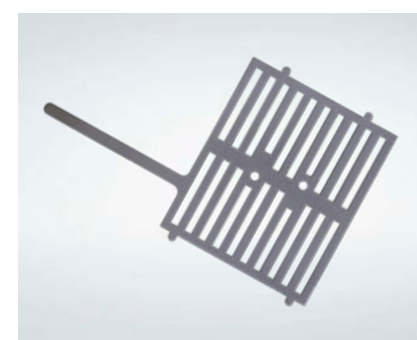
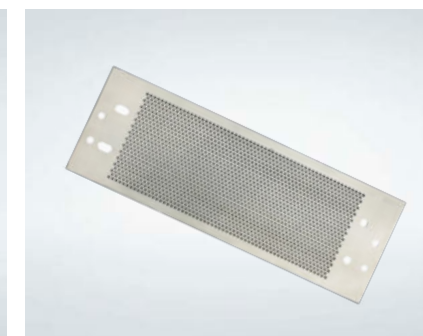
- Cl₂ evolved during electrolysis for seawater and NaOCl using special anodes.
- To generate chlorine, desinged the special anodes which can be evolved even lower voltage during electrolysis
- Main composition for electrode : Titanium with Ruthenium mixed Metal Oxide / Platinum

Advantage

- High efficiency, saving energy in low voltage
- Long life time and safety
- Saving maintenance cost

Applied as

- Ionizer
- Brine Electrolysis
- Metal-Recovery/winning
- Sodium Hypochlorite Production
- Dilution of Brine/Seawater
- Electrolysis
- BWMS & MGPS
- Environment Protection



BUSINESS 01

INSOLUBLE ANODE

The Best Quality of Electrodes,
WESCO ELECTRODE is a Reliable Solution.

02 Electroplating electrode

Introduction

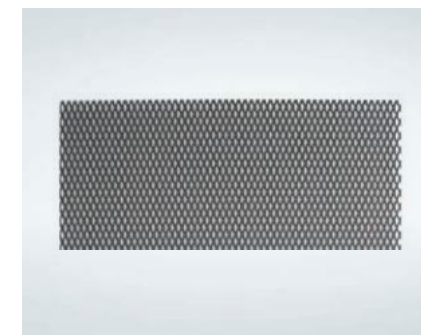
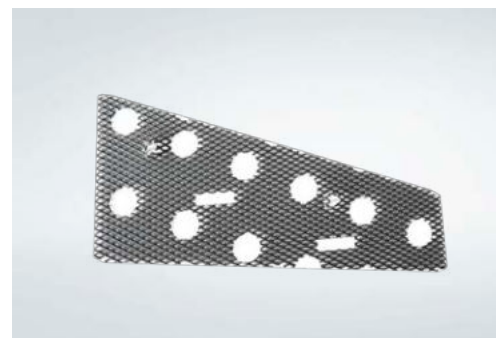
- O₂ evolved during electrolysis for an aqueous solution which includes a mineral, an inorganic, acid and organic acid such as sulfuric acid and acetate etc.
- Main composition for electrode : Titanium with a Iridium mixed Metal Oxide

Advantage

- Remove a risk of undesirable side effect
- Possible to operate in low Bath Voltage for a long time
- Reduce consumption of energy and long time life electrode

Applied as

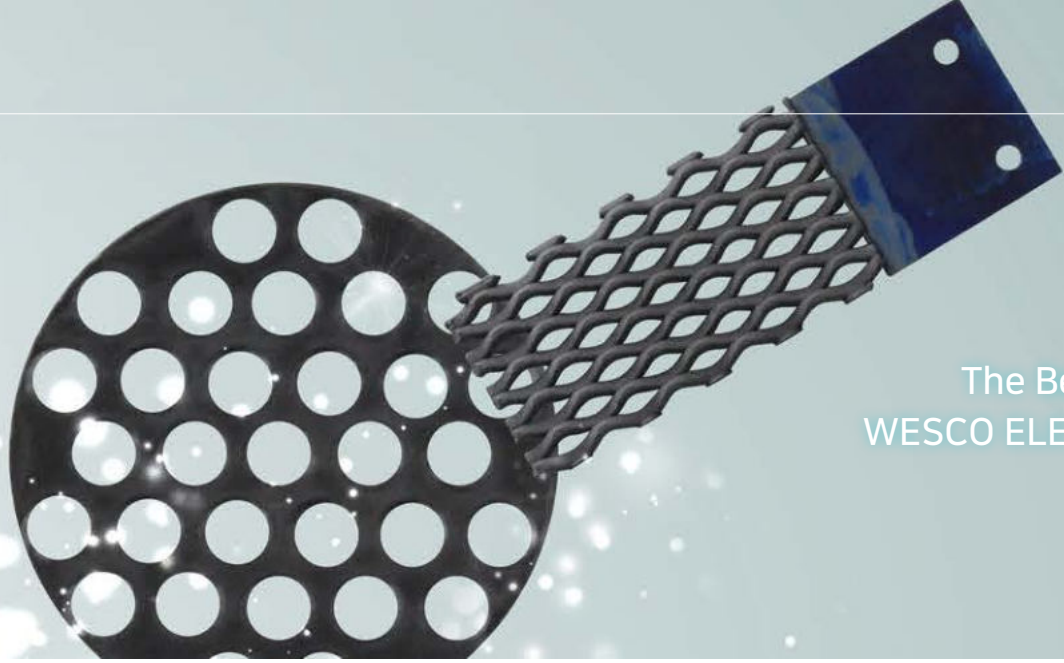
- Electrolytic Copper Foil Manufacturing
- Steel Plate Plating (EGL, ETL, etc.)
- Electrolytic Pickling of Steel Plates
- Chemical Treatment by Liquid Contact process
- Alkalines and Salts Organic Electrolysis
- Electrolytic Protection metal Plating (Cu, Ni, Au, etc.)
- Environment Protection
- Metal recovery
- Wastewater treatment



BUSINESS 01

INSOLUBLE ANODE

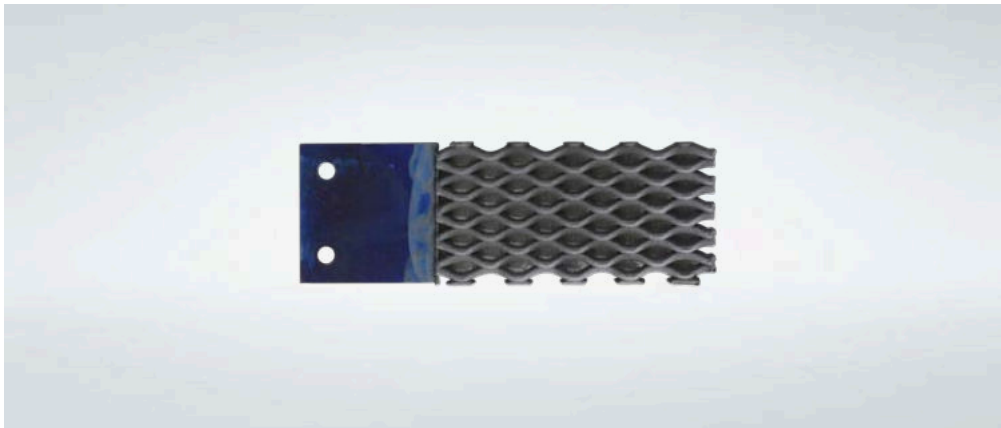
The Best Quality of Electrodes,
WESCO ELECTRODE is a Reliable Solution.



03 Special electrode (PbO₂, BDD)

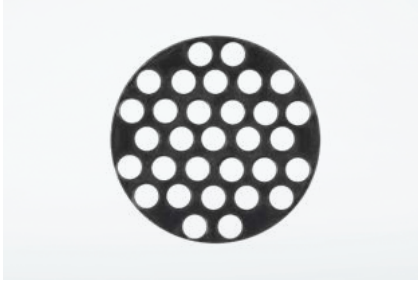
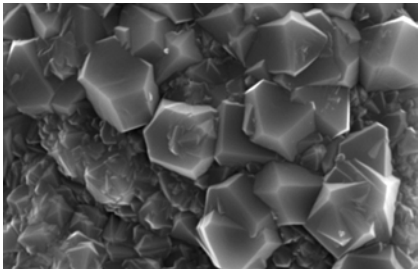
› PbO₂ Evolution

- Introduction**
 - Manufacture an electrode to be coated on a substrate of Titanium, "a" type and "β" type lead dioxide.
- Advantage**
 - Mainly use for Waste water treatment in high oxygen generating over voltage.
 - Efficiently dissolved organics by an anode axidation
 - Generate high concentration of Ozone, if apply a water electrolysis
 - Possible to use for sterillization system
- Applied as**
 - Waste Water Treatment
 - Chrome Plating
 - Ozone Generation



› BDD(Boron-doped Diamond) Electrode

- Introduction**
 - Even though Diamond has very safety and excellent characteristic, it is not used for an electrodes, because of conductivity. But boron doped diamond can be roled as an electrode after metalizing with Silicon, Niobium etc. using CVD.
- Advantage**
 - Operate in safe and a wide scope of electric potential
 - Existing electrode can not be achived to high electric potential. (Unstable)
 - Apply to variety Industry
 - The best efficiency using BDD electrodes
- Applied as**
 - PbO₂ Electrode
 - BDD Electrode
 - Electrode for variety industry, etc.



Substance	Current Efficiency of Anode Materials (%)			
	Pt/Ti	IrO ₂ /Ti	PbO ₂ /Ti	BBD
Ozone	0.2	0.05	5	2 to 3
Hydrogen Peroxide	0.005	0.001	0.001	0.05 to 0.15

• Specially Devised BDD Anode for Functional Water Comparison of Ozone and Hydrogen Peroxide Generating Efficiency

BUSINESS 02

SEAWATER ELECTRO-CHLORINATION SYSTEM

The Best Quality of Electrodes,
WESCO ELECTRODE is a Reliable Solution.

What is the Seawater Electro-Chlorination System

It refers to a facility to generate NaOCl by electrolyzing seawater through a hypochlorite generator. It is also called a Hypo-chlorite Generation System.

How to arrange the Seawater Electro-Chlorination System

It restrains Bio-Fouling i.e., fouling phenomenon due to marine organism's attachment, which occurs in using seawater as cooling water.

There are different Anti-Fouling methods. However, seawater electro-chlorination system has various advantages. One, as it is installed on-site, the treatment is easy. Two, it can be automatically operated. Lastly, NaOCl can be more safely handled as it is generated on-site.

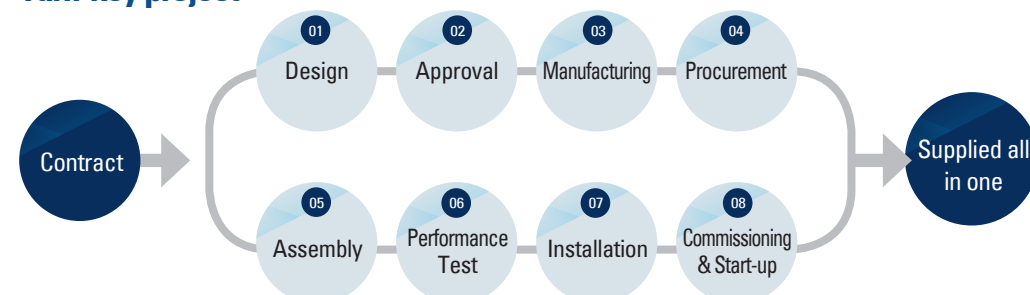


▲ Eroded water pipe due to the propagation of marine organisms

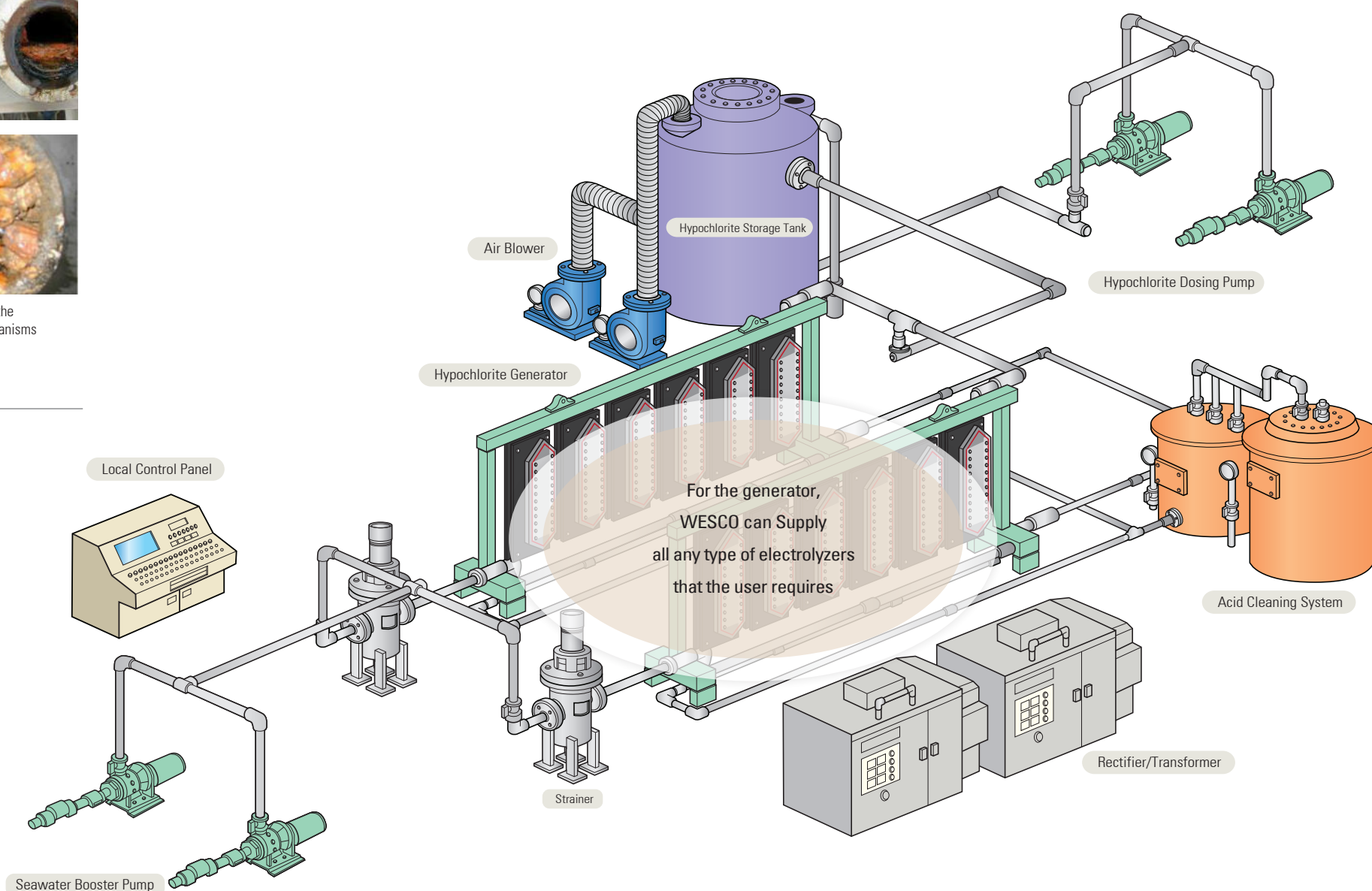
WESCO carries out Turn-key project providing design, manufacturing, procurement, performance test, installation, commissioning & start-up and supervision service all in one.

Anode, the core part directly links to life of a hypochlorite generator and the efficiency of seawater electro-chlorination system. WESCO has developed it with Know-how established over 20 years and is proud of its optimized quality to seawater electro-chlorination system.

Turn-key project



► Design Figure of The Seawater Electro-Chlorination System



BUSINESS 03

HYPOCHLORITE
GENERATOR

The Best Quality of Electrodes,
WESCO ELECTRODE is a Reliable Solution.

WESCO's core device of seawater electro-chlorination system, Hypochlorite Generator (NaOCl generator) is convergence of anode technologies of accumulated know-how over 20 years and WESCO can produce it regardless of its type or capacity.

Also, WESCO can produce an alternative anode and supply an electrolytic bath of electrochlorination systems produced by any production companies in the world. We can repair existing electrolytic baths and provide re-coating and even new production.



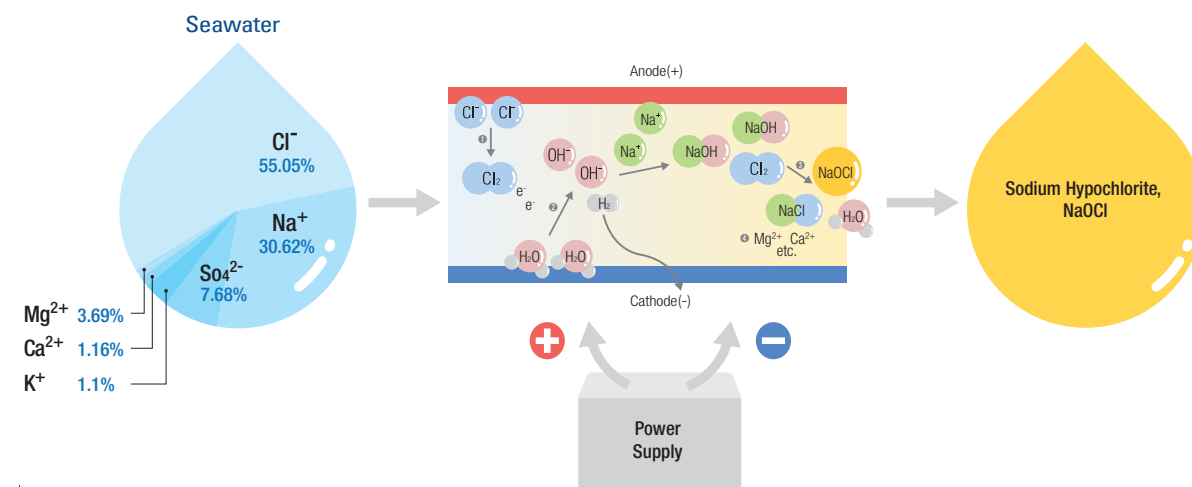
※ When life of an anode of hypochlorite generator reaches the limit, the generator can be re-operated by replacing the anode or the electrolytic bath.

Types of
Hypochlorite
Generator

	Mono-Polar Type	Bi-Polar Type
Construction	<ul style="list-style-type: none"> An electrolytic bath consisting of single cell Anode made of plate with titanium material Each plate of an anode has a single polar (the positive or the negative) 	<ul style="list-style-type: none"> An electrolytic bath consisting of multiple cells Anode made of plate with titanium material Each plate of anode has a double polar (the positive and the negative)
Space	<ul style="list-style-type: none"> It is required relatively wide skid area 	<ul style="list-style-type: none"> Installation space can be minimized to utilize the space
DC current/voltage	<ul style="list-style-type: none"> High current low voltage 	<ul style="list-style-type: none"> Low current high voltage
Repair and Maintenance	<ul style="list-style-type: none"> As a standard, acid cleaning is required once a or two months (in general condition) It is lighter than a bi-polar type. However, it is still not suitable to handle by one person. 	<ul style="list-style-type: none"> As a standard, acid cleaning is required once a or two months (in general condition) It is not easy to handle due to the weight of housing.
Application	<ul style="list-style-type: none"> In general, it is applied when small capacity and installation are required. Less than 40kg Cl₂/UNIT 	<ul style="list-style-type: none"> It is applied when medium or large capacity and installation are required. 20~90kg Cl₂/UNIT
Experience	<ul style="list-style-type: none"> Samcheok base of Korea Gas Corporation Tongyeong base of Korea Gas Corporation Indonesia PT Muara Karang Power Plant The 1st ~ 4th units of Dangjin, Hyundai Green Power And many more 	<ul style="list-style-type: none"> The 1st and 2nd units of Sinboryeong, Korea Midland Power Co., Ltd. CCPP, Indonesia Zahrani Power Plant in Lebanon, KEPCO Tanjung Jati Power Plant in Indonesia, KEPCO And many more

The principle of
Hypochlorite
Generator

- 1 Oxidation response of Cl⁻ at the positive polar
- 2 Reduction response of H₂O at the negative polar
- 3 The final response:
- 4 By-reaction : Mg²⁺, Ca²⁺ and ionic bonds create suspended solids at the negative polar
-> regular acid cleaning required (removal of current efficiency declining factor)



MAJOR EXPERIENCE LIST

For Electrochlorination System

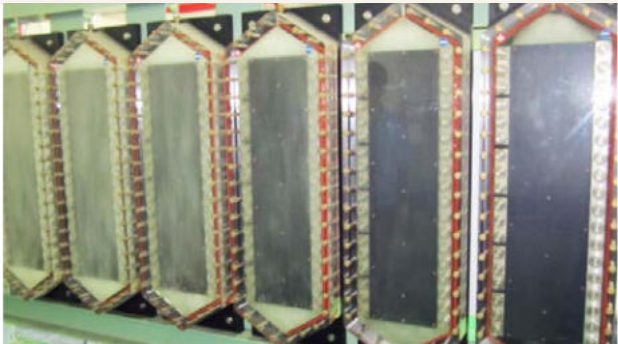
PROJECT	END USER / PURCHASER	LOCATION / COUNTRY	ITEM	GENERATOR TYPE / CAPA.	YEAR	REMARKS
SinBoryung#5,6	POSCO Engineering Co., Ltd.	Boryung, Choongnam Province	Hypochlorite Generator, T/R etc.	Total : 336 Kg Cl ₂ /hr (48 Kg Cl ₂ /hr x 7 units) Bi-polar Type	2015 April (Expected)	Sub-supplier
Tongyoung Receiving Terminal	Korea Gas Corporation(KOGAS)	Tongyoung, Gyungnam Province	Hypochlorite Generator, T/R etc.	Total : 40 Kg Cl ₂ /hr (40 Kg Cl ₂ /hr x 1 unit) Mono-polar Plate Type	2014 October	Extension
Samcheok Receiving Terminal	Korea Gas Corporation(KOGAS)	Samcheok, South of Korea	Electrochlorination System	Total : 180 Kg Cl ₂ /hr (60 Kg Cl ₂ /hr x 3 units)Mono-polar Plate Type	2014 September	Turn-key Project
Pohang CCPP	POSCO Energy Co., Ltd.	Pohang, South of Korea	Electrochlorination System	Total : 42 Kg Cl ₂ /hr (21 Kg Cl ₂ /hr x 2 units)Multi-tubular (Bi-polar Type)WESCO NEW developed	2013 November	Turn-key Project
Hyundai Green Power Plant	Hyundai Engineering & Construction	Dangjin, Choongnam Province	Hypochlorite Generator, T/R etc.	Total : 30 Kg Cl ₂ /hr (30 Kg Cl ₂ /hr x 1 unit)Mono-polar Plate Type	2013 July	Extension for #5-8
Indonesia CCPP	POSCO Engineering Co., Ltd.	Chilegon, Indonesia	Electrochlorination System	Total : 66 Kg Cl ₂ /hr (22 Kg Cl ₂ /hr x 3 units)Bi-polar Plate Type	2012 November	Turn-key Project
Hyundai Green Power Plant	Daelim Industrial Company	Dangjin, Choongnam Province	Electrochlorination System	Total : 60 Kg Cl ₂ /hr (30 Kg Cl ₂ /hr x 2 units)Mono-polar Plate Type	2009 March	Turn-key Project for #1-4
POSCO FINEX CCPP & LNG Power Plant	POSCO CO.	Pohang, Gyungbuk Province	Hypochlorite Generator, T/R etc.	Total : 120 Kg Cl ₂ /hr (45 Kg Cl ₂ /hr x 2 units, 15 Kg Cl ₂ /hr x 2 units) Mono & Bi-polar Plate Type	2008 June	Replacement
POSCO FINEX CCPP in LNG Power Plant	Daewoo Eng.	Pohang, Gyungbuk Province	Hypochlorite Generator, T/R etc.	Total : 15 Kg Cl ₂ /hr (15 Kg Cl ₂ /hr x 1 unit)Bi-polar Plate Type	2005 December	Turn-key Project

Samcheok Receiving Terminal(2014)
Korea Gas Corporation(KOGAS)



Type	Mono-Polar Plate Type
Capacity	180 Kg Cl ₂ /hr

Hyundai Green Power Plant (2013)
Hyundai Engineering & Construction



Type	Mono-Polar Plate Type
Capacity	30 Kg Cl ₂ /hr

Pohang CCPP (2013)
POSCO Energy Co., Ltd.



Type	Multi Tubular(Bi-Polar) Type
Capacity	42 Kg Cl ₂ /hr

Indonesia CCPP(2012)
POSCO Engineering Co., Ltd.



Type	Bi-Polar Plate Type
Capacity	66 Kg Cl ₂ /hr

For Hypochlorite Generator & Etc.

Project	Purchaser	Location	Item	Generator Type / Capacity	Year	Remarks
Overseas						
QEWC RAF Station	Cumberland Electro chemical LTD	Doha / Qatar	Sanilec Type Electrolytic Cell	5.6 kgCl ₂ /hr x 1 units	2012	Replace of existing units
Dewa D-Station	Babcock Borsig Service GmbH	Dubai / U.A.E	Anodes supplied by Kyosan Electric Manufacturing Co.	Anode Plate 48pcs	2014	Replace of existing units
PT Muara Karang Power Plant	PT PJB INDONESIA	Indonesia	Daiki Type (15WL) Electrolytic Module	5.4 kgCl ₂ /hr x 24 Cells Mono-polar Type	2010	Replace of existing units
Deir Amar Power Plant	KELECO / KEPCO Lebanon S.A.R.L	Lebanon	Chloropac Type Electrochlorination System	40 kgCl ₂ /hr x 1 units Bi-polar (Tubular) Type	2009	Replace of existing units
Al Taweela Power Plant	CMS Power Company	Abu Dhabi / U.A.E	PEPCON Type Electrolytic Cell	4.2 kgCl ₂ /hr x 10 sets Bi-polar Type	2007	Replace of existing units
Al Taweela Power Plant	CMS Power Company	Abu Dhabi / U.A.E	PEPCON Type Electrolytic Cell	4.2 kgCl ₂ /hr x 10 sets Bi-polar Type	2007	Replace of existing units
Umm Al Nar Power Plant	ITM O&M Co. Limited	Abu Dhabi / U.A.E	PEPCON Type Electrolytic Cell	4.2 kgCl ₂ /hr x 36 sets Bi-polar Type	2004	Replace of existing units
-	PREMABERGO ITALIANA stl	ITALY	Tubular Type Electrolytic Cell	13 kgCl ₂ /hr x 1 units Bi-polar (Tubular Pipe) Type	2010	Replace of existing units
-	ACG - Italia	Genovese / ITALIA	Titanium Anode & Electrolytic Cell Unit	5 kgCl ₂ /hr x 2 sets Bi-polar Shell Type	2009	New unit Manufacturing
Domestic						
Hadong Thermal Power Plant	KOSPO (KOREA SOUTHERN POWER Co.,Ltd.)	Hadong	NEP acquired Module skid	12 Cells Mono-polar (WESCO Developed)	2019	Replace of existing units
Hanbit Nuclear Power Plant	KHNP (Korea Hydro-Nuclear Power Co., Ltd.)	Younggwang	NEP acquired Module skid	108 Cells Mono-polar (WESCO Developed)	2019	Replace of existing units
Boryung Thermal Power Plant	KOMIPO (Korea Midland Power Co., Ltd.)	Boryung	NEP acquired Module skid	21 Cells Mono-polar (WESCO Developed)	2018	Replace of existing units
Ulsan CCPP	EWP (KOREA EAST-WEST POWER Co.,Ltd.)	Ulsan	NEP acquired Module skid	6 Cells Mono-polar (WESCO Developed)	2017	Installation, Commissioning
LNG Combined Cycle Power Plant	GS EPS	Dangjin	NEP acquired Module skid	10 Cells Mono-polar (WESCO Developed)	2017	Replace of existing units
Boryung Thermal Power Plant	KOMIPO (Korea Midland Power Co., Ltd.)	Boryung	NEP acquired Module skid	7 Cells Mono-polar (WESCO Developed)	2017	Replace of existing units
Hadong Thermal Power Plant	KOSPO (KOREA SOUTHERN POWER Co.,Ltd.)	Hadong	NEP acquired Module skid	12 Cells Mono-polar (WESCO Developed)	2017	Replace of existing units
Boryung Thermal Power Plant	KOMIPO (Korea Midland Power Co., Ltd.)	Boryung	NEP acquired Module skid	21 Cells Mono-polar (WESCO Developed)	2016	Replace of existing units
LNG Combined Cycle Power Plant	GS EPS	Dangjin	NEP acquired Module skid	16 Cells Mono-polar (WESCO Developed)	2015	Installation, Commissioning
KORI Nuclear Power Plant	KHNP (Korea Hydro-Nuclear Power Co., Ltd.)	Busan	NEP acquired Module skid	8 Cells Mono-polar (WESCO Developed)	2015	Replace of existing units
Hanbit Nuclear Power Plant	KHNP (Korea Hydro-Nuclear Power Co., Ltd.)	Younggwang	NEP acquired Module skid	56 Cells Mono-polar (WESCO Developed)	2015	Replace of existing units
Boryung Thermal Power Plant	KOMIPO (Korea Midland Power Co., Ltd.)	Boryung	NEP acquired Module skid	14 Cells Mono-polar (WESCO Developed)	2015	Replace of existing units
Younggwang Nuclear Power Plant	KHNP (Korea Hydro-Nuclear Power Co., Ltd.)	Younggwang	NEP acquired Module skid	61 Cells Mono-polar (WESCO Developed)	2014	Replace of existing units
Boryung Thermal Power Plant	KOMIPO (Korea Midland Power Co., Ltd.)	Boryung	NEP acquired Module skid	21 Cells Mono-polar (WESCO Developed)	2013	Installation, Commissioning
Hadong Thermal Power Plant	KOSPO (KOREA SOUTHERN POWER Co.,Ltd.)	Hadong	NEP acquired Module skid	12 Cells Mono-polar (WESCO Developed)	2013	For # 1&2 units
Dangjin Thermal Power Plant	EWP (KOREA EAST-WEST POWER Co.,Ltd.)	Dangjin	NEP acquired Module skid	8 Cells Mono-polar (WESCO Developed)	2012	Replace of existing units
KORI Nuclear Power Plant	KHNP (Korea Hydro-Nuclear Power Co., Ltd.)	Busan	NEP acquired Module skid	6 Cells Mono-polar (WESCO Developed)	2011	Replace of existing units
Seochon Thermal Power Plant	KOMIPO (Korea Midland Power Co., Ltd.)	Seochon	Mitsubishi - MGPS Electrolysers	6 Cells Mono-polar (WESCO Developed)	2009	New units manufacture
West Incheon Thermal Power Plant	KWP (Korea Western Power Co., Ltd.)	Incheon	NEP acquired Module skid	12 Cells Mono-polar (WESCO Developed)	2009	New units manufacture
Wooljin Nuclear Power Plant	KHNP (Korea Hydro-Nuclear Power Co., Ltd.)	Wooljin	NEP acquired Module skid	2 Cells Mono-polar (WESCO Developed)	2008	Replace of existing units
Incheon Receiving Terminal	KOGAS (Korea Gas Corporation)	Incheon	NEP acquired Module skid	8 Cells Mono-polar (WESCO Developed)	2008	LNG Gas Receiving Terminal
Taeon Thermal Power Plant	KOWEPO (Korea Western Power Co.,Ltd.)	Taeon	NEP acquired Module skid	7 Cells Mono-polar (WESCO Developed)	2008	Replace of existing units
Tongyoung Receiving Terminal	KOGAS (Korea Gas Corporation)	Tongyoung	NEP acquired Module skid	4 Cells Mono-polar (WESCO Developed)	2007	LNG Gas Receiving Terminal
Busan Combined Cycle Power Plant	KOEWP (Korea East & West Power Co.,Ltd.)	Busan	NEP acquired Module skid	14 Cells Mono-polar (WESCO Developed)	2006	
Youngnam Thermal Power Plant	EWP (KOREA EAST-WEST POWER Co.,Ltd.)	Ulsan	Mitsubishi - MGPS Electrolysers	35 kgCl ₂ /hr x 3 Cells Mono-polar	2004	New units manufacture
Seosan Petroleum Complex	Hyundai Oil Bank	Seosan	Mitsubishi - MGPS Electrolysers	12 kgCl ₂ /hr x 2 Cells Mono-polar Type	2003	Refurnishment
Ulsan CCPP	EWP (KOREA EAST-WEST POWER Co.,Ltd.)	Ulsan	Mitsubishi - MGPS Electrolysers	12 kgCl ₂ /hr x 3 Cells Mono-polar	2002	Replace of existing units
Gwangyang Thermal Power Plant	POSCO	Gwangyang	Mitsubishi Type L - type(MGPS)	12 kgCl ₂ /hr x 6 Cells Mono-polar Type	2001	Refurnishment
Samchonpo Thermal Power Plant	KOSEP (Korea South East Power Co., Ltd.)	Samchonpo	Chloropac Cell -ELECTROCATALYTIC	Cell Outer Full Sets 6 cets Bi-polar (Tubular Pipe) Type	2000	Refurnishment

BUSINESS 04

PGM (Platinum Group Metal)
CHEMICAL COMPOUNDS



	ITEM	Formula	Metal Contents	Supplied as	Usage
<div><div>46</div><div>Pd</div><div>106.42</div></div>	Diammine palladium(II) chloride	Pd(NH ₃) ₂ Cl ₂	up to 50%	Solid	Plating additive
	Tetraammine palladium(II) chloride	Pd(NH ₃) ₄ Cl ₂	100g/ℓ	Solution	Plating additive bonding wire manufacturing Precious metal plating
	Palladium(II) chloride	PdCl ₂	up to 59% up to 200g/ℓ(HCl)	Solid Solution	Electric gilding Carbon monoxide detectors
	Palladium(II) sulfate	PdSO ₄	100g/ℓ(H ₂ SO ₄)	Solution	Insoluble anode manufacturing
<div><div>78</div><div>Pt</div><div>195.084</div></div>	Hexachloroplatinate(IV) acid	H ₂ PtCl ₆ ·6H ₂ O	up to 37% up to 200g/ℓ(HCl)	Solid Solution	Pt plating Catalyst manufacturing
	Diammine platinum(II) nitrite	Pt(NH ₃) ₂ (NO ₂) ₂	up to 59% up to 50g/ℓ(HNO ₃)	Solid Solution	Catalyst manufacturing
<div><div>45</div><div>Rh</div><div>102.90550</div></div>	Rhodium(III) chloride	RhCl ₃ ·3H ₂ O	up to 38%	Solid	Catalyst manufacturing
	Rhodium(III) sulfate	Rh ₂ (SO ₄) ₃	100g/ℓ(H ₂ SO ₄)	Solution	Decorative plating
<div><div>44</div><div>Ru</div><div>101.07</div></div>	Ruthenium(III) chloride	RuCl ₃ ·3H ₂ O	up to 38%	Solid	Catalyst manufacturing
<div><div>77</div><div>Ir</div><div>192.217</div></div>	Iridium(III) chloride	IrCl ₃ ·3H ₂ O	up to 50%	Solid	Manufacturing Insoluble Anodes Catalyst manufacturing
	Hexachloroiridate(IV) acid	H ₂ IrCl ₆ ·6H ₂ O	up to 37%	Solid	
<div><div>79</div><div>Au</div><div>196.96659</div></div>	Tetrachloroaurate(III) acid	HAuCl ₄ ·4H ₂ O	up to 47%	Solid	Gold plating Photographic toning
	Sodium gold(III) chloride	NaAuCl ₄ ·2H ₂ O	up to 48%	Solid	Gold plating
	Sodium gold(I) sulfite	Na ₂ Au(SO ₃) ₂	100g/ℓ	Solution	Gold plating
	Potassium gold(III) chloride	KAuCl ₄	up to 50%	Solid	Gold plating
	Potassium gold(I) cyanide	KAu(CN) ₂	up to 68%	Solid	Gold plating
	Potassium gold(III) cyanide	KAu(CN) ₄	up to 57%	Solid	Gold plating



Diammine platinum(II) nitrite



Diammine palladium(II) chloride



Ruthenium(III) chloride



Palladium(III) chloride

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Cl₂ evolving electrode
Electroplating Electrode
Special Electrode (PbO₂, BDD)
- 02 Seawater Electro-chlorination System
- 03 Hypochlorite Generator
- 04 PGM (Platinum Group Metal) Chemical Compounds

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