RARP ENGINEERING & RECYCLING (OPC) PRIVATE LIMITED

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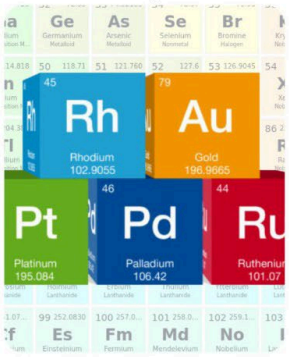
Precious Metal Recovery & Refinery Services

Precious Metal Chemicals

Precious Metal Catalysts



RHODIUM
RUTHENIUM
PLATINUM
PALLADIUM
SILVER
GOLD

Precious Metal Engineering-products

Precious Metal & Alloys

Mirror Industry

1. Silver Nitrate AR
2. Palladium Chloride
3. Ruthenium Trichloride

1) SPECIFICATION

Product:	Spec.#:
Silver Nitrate Crystals	**Formula: AgNO3**
Grade: AR	
Test	**Limits**
Molecular Weight	169.87
Description	Colorless crystals that darken if exposed to light
Minimum Assay [ex. Ag]	99.9%
Minimum Ag content	63.45%
Maximum Limits of Impurities	
Water-insoluble matter	0.003%
Alcohol-insoluble matter	Passes Test
Solution: 10%w/v in water	Clear & colorless
Free Acid	Passes Test
Chloride [Cl]	0.0005%
Sulfate [SO4]	0.002%
Alkalis and other metals [as sulfates]	0.05%
Calcium [Ca]	0.001%
Bismuth [Bi]	0.0005%
Lead [Pb]	0.0005%
Copper [Cu]	0.0002%
Magnesium [Mg]	0.001%
Potassium [K]	0.01%
Sodium [Na]	0.002%
Iron [Fe]	0.0002%
Substances not precipitated by HCl	0.01%

2) SPECIFICATION

Product:	Spec.#:
Palladium [II] Chloride	**Formula: PdCl2**
Grade: AR	
Test	**Limits**
Molecular Weight	177.31
Colour	Rust color
Form	Solid
Melting point	500ºC
Stability	Hygroscopic
Moisture content	0.15% max
Assay	99.95% min.
Typical Analysis	% Pd 59.5 - 60
Maximum Limits of Impurities in ppm	
Silver (Ag)	50
Aluminium	50
Gold	50
Bismuth	10
Calcium	50
Copper (Cu)	50
Iron (Fe)	50
Magnesium (Mg)	50
Manganese (Mn)	10
Nickel (Ni)	50
Lead (Pb)	10
Platinum (Pt)	50
Palladium (Pd)	50
Rhodium (Rh)	30
Silicon	50
Titanium	10
Zirconium	5
Antimony	20
Total Impurities	500 ppm Max.

3) SPECIFICATION

Product:	Spec.#:
Ruthenium Trichloride Trihydrate	**Formula: $RuCl_3 .3H_2O$**
Grade: AR	
Test	**Limits**
Molecular Weight	261.4
Description	Black Powder/Crystal
Minimum Assay	99.97%
Ruthenium Content	38.8-42%
Maximum Limits of Impurities	
Silver (Ag)	0.03%
Gold (Au)	0.03%
Palladium (Pd)	0.05%
Platinum (Pt)	0.03%
Rhodium (Rh)	0.03%
Copper (Cu)	0.03%
Nickel (Ni)	0.03%
Iron (Fe)	0.03%
Zinc (Zn)	0.03%
Magnesium (Mg)	0.03%
Lead (Pb)	0.03%
Calcium (Ca)	0.03%
Sodium (Na)	0.03%

API Pharma Industry

RARP offers Precious Metals (Platinum, Palladium, Gold, Silver, Rhodium, and Ruthenium) in various forms i.e., **Powder, Sponge, wires, Bars Ingots** etc. with purity 99.9%-99.99%

Supported Catalyst:

RARP Provides a number of supported Platinum, Palladium Metal Catalysts for **Hydrogenation, Dehydrogenation, Oxidation, Reduction, Debenzylation, C-N and C-O Clevage, Aromatic Nitro group Hydrogenation, Pyridine Ring Hydrogenation, Aromatic Ring Hydrogenation**.

1. Platinum on Carbon (Metal loading 1%, 2%, 5%, 10%), Make to order in **Dry & Wet** basis

2. Palladium on Carbon (Metal loading 1%, 2.5%, 5%, 10%) Make to order in **Dry & Wet** basis

3. Rhodium on Carbon (Metal loading 5%, 10%) Make to order in **Dry & Wet** basis

Precious Metal Chemicals:

Silver, Palladium, Platinum, Gold, Rhodium, Ruthenium

Some of the products are as follow:

1. Silver Nitrate AR,

2. Silver Sulphate,

3. Silver Chloride,

4. Palladium Chloride,

5. Palladium Acetate,

6. Chloroplatinic acid,

7. Potassium TeTrachloroplatinate,

8. Potassium Hexachloroplatinate,

9. Ruthenium Trichloride,

1.1) SPECIFICATION

Product:	Spec.#:
1% Platinum on Carbon	Formula : 1% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	0.98% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75%- 78% > 74 µm : 10% - 15%

1.2) SPECIFICATION

Product:	Spec.#:
2% Platinum on Carbon	Formula : 2% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	1.95% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75%- 78% > 74 µm : 10% - 15%

1.3) SPECIFICATION

Product:	Spec.#:
5% Platinum on Carbon	Formula : 5% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	4.90% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75%- 78% > 74 µm : 10% - 15%

1.4) SPECIFICATION

Product:	Spec.#:
10% Platinum on Carbon	Formula : 10% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	9.90% Min.
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75% - 78% > 74 µm : 10% - 15%

2.1) SPECIFICATION

Product:	Spec.#:
1% Palladium on Carbon	Formula : 1%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	0.98% Min.
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

2.2) SPECIFICATION

Product:	Spec.#:
2.5% Palladium on Carbon	Formula : 2.5%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	2.49% Min.
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

2.3) SPECIFICATION

Product:	Spec.#:
5% Palladium on Carbon	Formula : 5%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	4.9% -5.05%
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

2.4) SPECIFICATION

Product:	Spec.#:
10% Palladium on Carbon	Formula : 10%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	9.9%Min
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

3.1) SPECIFICATION

Product:	Spec.#:
5% Rhodium on Carbon	Formula : 5% Rh/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Rhodium Content [On dry basis]	4.9% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 µm : 70%- 75% > 74 µm : 10% - 15%

3.2) SPECIFICATION

Product:	Spec.#:
10% Rhodium on Carbon	Formula : 10% Rh/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Rhodium Content [On dry basis]	9.5% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 µm : 70%- 75% > 74 µm : 10% - 15%

1) SPECIFICATION

Product:	Spec.#:
Silver Nitrate Crystals	**Formula: AgNO3**
Grade: AR	
Test	**Limits**
Molecular Weight	169.87
Description	Colorless crystals that darken if exposed to light
Minimum Assay [ex. Ag]	99.9%
Minimum Ag content	63.45%
Maximum Limits of Impurities	
Water-insoluble matter	0.003%
Alcohol-insoluble matter	Passes Test
Solution: 10%w/v in water	Clear & colorless
Free Acid	Passes Test
Chloride [Cl]	0.0005%
Sulfate [SO4]	0.002%
Alkalis and other metals [as sulfates]	0.05%
Calcium [Ca]	0.001%
Bismuth [Bi]	0.0005%
Lead [Pb]	0.0005%
Copper [Cu]	0.0002%
Magnesium [Mg]	0.001%
Potassium [K]	0.01%
Sodium [Na]	0.002%
Iron [Fe]	0.0002%
Substances not precipitated by HCl	0.01%

2) SPECIFICATION

Product:	Spec.#:
Silver Sulfate	**Formula: Ag2SO4**
Grade: AR	
Test	**Limits**
Molecular Weight	311.8
Minimum Assay [ex. Ag]	98.5%
Minimum Ag content	68.15%
Description	Colorless Crystalline Powder
pH of the 0.5% solution in H2O	Not less than 5.0
Maximum Limits of Impurities	
Insoluble matter	0.01%
Chloride [Cl]	0.001%
Nitrate [NO3]	0.003%
Alkalis [Sulfated]	0.40%
Bismuth and Lead [Pb]	0.001%
Copper [Cu]	0.0002%
Iron [Fe]	0.003%

3) SPECIFICATION

Product:	Spec.#:
Silver Chloride	**Formula: AgCl**
Grade: AR	
Test	**Limits**
Molecular Weight	143.32
Minimum Assay [ex. Ag]	99%
Minimum Ag content	74.5%
Description	White powder (Darkens on exposure to light)
Solubility in Water	Insoluble
Nitrate [NO3]	Not more than 0.05%

4) SPECIFICATION

Product:	Spec.#:
Palladium [II] Chloride	**Formula: PdCl2**
Grade: AR	
Test	**Limits**
Molecular Weight	177.31
Colour	Rust color
Form	Solid
Melting point	500ºC
Stability	Hygroscopic
Moisture content	0.15% max
Assay	99.95% min.
Typical Analysis	% Pd 59.5 - 60
Maximum Limits of Impurities in ppm	
Silver (Ag)	50
Aluminium	50
Gold	50
Bismuth	10
Calcium	50
Copper (Cu)	50
Iron (Fe)	50
Magnesium (Mg)	50
Manganese (Mn)	10
Nickel (Ni)	50
Lead (Pb)	10
Platinum (Pt)	50
Palladium (Pd)	50
Rhodium (Rh)	30
Silicon	50
Titanium	10
Zirconium	5
Antimony	20
Total Impurities	500 ppm Max.

5) SPECIFICATION

Product:	Spec.#:
Palladium Acetate	**Formula: Pd(CH3COO)2**
Grade: AR	
Test	**Limits**
Molecular Weight	224.1
Description	Brownish Black Colored Powder
Stability	Air Stable
Typical Purity	98.0%
Assay (Pd Contentd)	46.5 % Minimum
Solubility in Water	Soluble
Maximum Limits of Impurities in ppm	1000 PPM

6) SPECIFICATION

Product:	Spec.#:
Chloroplatinic Acid	**Formula: H_2PtCl_6. XH_2O**
Grade: AR	
Test	**Limits**
Minimum Assay	99.5%
Platinum Content	38 - 40%
Maximum Limits of Impurities in ppm	
Silver (Ag)	2
Aluminium	7
Gold	1
Bismuth	0.4
Calcium	10
Copper (Cu)	0.7
Iron (Fe)	20
Magnesium (Mg)	4
Manganese (Mn)	0.1
Nickel (Ni)	0.3
Lead (Pb)	1
Palladium (Pd)	5
Rhodium (Rh)	3
Silicon	14
Titanium	0.3
Zirconium	0.7

7) SPECIFICATION

Product:	Spec.#:
Potassium TeTrachloroplatinate	**Formula: K2PtCl4**
Grade: AR	
Test	**Limits**
Molecular Weight	415.2
Description	Dark Ruby Red Crystals
Moisture content	0.05% Max.
Solubility	Soluble in Water
Assay	99.95% Min.
Typical Analysis	% Pt 46.3 - 47.0
Maximum Limits of Impurities	
Metals	<500 ppm

8) SPECIFICATION

Product:	Spec.#:
Potassium Hexachloroplatinate	**Formula: K2PtCl6**
Grade: AR	
Test	**Limits**
Molecular Weight	486.03
Description	Orange - Yellow Crystal
Moisture content	0.05% Max.
Solubility	Slightly Soluble in Cold Water Soluble in Hot water
Assay	99.6% Min.
Typical Analysis	% Pt 40 Min
Maximum Limits of Impurities	
Metals	<2000 ppm

9) SPECIFICATION

Product:	Spec.#:
Ruthenium Trichloride Trihydrate	**Formula: $RuCl_3 .3H_2O$**
Grade: AR	
Test	**Limits**
Molecular Weight	261.4
Description	Black Powder/Crystal
Minimum Assay	99.97%
Ruthenium Content	38.8-42%
Maximum Limits of Impurities	
Silver (Ag)	0.03%
Gold (Au)	0.03%
Palladium (Pd)	0.05%
Platinum (Pt)	0.03%
Rhodium (Rh)	0.03%
Copper (Cu)	0.03%
Nickel (Ni)	0.03%
Iron (Fe)	0.03%
Zinc (Zn)	0.03%
Magnesium (Mg)	0.03%
Lead (Pb)	0.03%
Calcium (Ca)	0.03%
Sodium (Na)	0.03%

AGRO Chemical Industry

Supported Catalyst:

RARP Provides a number of supported Platinum, Palladium Metal Catalysts for Hydrogenation, Dehydrogenation, Oxidation, Reduction, Debenzylation, C-N and C-O Clevage, Aromatic Nitro group Hydrogenation, Pyridine Ring Hydrogenation, Aromatic Ring Hydrogenation.

1. Platinum on Carbon (Metal loading 1%, 2%, 5%, 10%), Make to order in **Dry & Wet** basis

2. Palladium on Carbon (Metal loading 1%, 2.5%, 5%, 10%) Make to order in **Dry & Wet** basis

3. Rhodium on Carbon (Metal loading 5%, 10%) Make to order in **Dry & Wet** basis

Precious Metal Chemicals:

Ruthenium, Palladium
Some of the products are as follow:

1. Ruthenium Trichloride

2. Ruthenium Oxide

3. Palladium Chloride

1.1) SPECIFICATION

Product:	Spec.#:
1% Platinum on Carbon	Formula : 1% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	0.98% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75%- 78% > 74 µm : 10% - 15%

1.2) SPECIFICATION

Product:	Spec.#:
2% Platinum on Carbon	Formula : 2% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	1.95% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75%- 78% > 74 µm : 10% - 15%

1.3) SPECIFICATION

Product:	Spec.#:
5% Platinum on Carbon	Formula : 5% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	4.90% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75%- 78% > 74 µm : 10% - 15%

1.4) SPECIFICATION

Product:	Spec.#:
10% Platinum on Carbon	Formula : 10% Pt/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Platinum Content [On dry basis]	9.90% Min.
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g]	>900 m^2/g
Total Pore Volume [cm^3/g]	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 15 µm : 75% - 78% > 74 µm : 10% - 15%

2.1) SPECIFICATION

Product:	Spec.#:
1% Palladium on Carbon	Formula : 1%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	0.98% Min.
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3]	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

2.2) SPECIFICATION

Product:	Spec.#:
2.5% Palladium on Carbon	Formula : 2.5%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	2.49% Min.
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

2.3) SPECIFICATION

Product:	Spec.#:
5% Palladium on Carbon	Formula : 5%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	4.9% -5.05%
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

2.4) SPECIFICATION

Product:	Spec.#:
10% Palladium on Carbon	Formula : 10%Pd/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Palladium Content [On dry basis]	9.9%Min
Carrier Material	Activated Carbon Powder up to 125 μm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 μm : 70% - 75% > 74 μm : 10 %- 15%

3.1) SPECIFICATION

Product:	Spec.#:
5% Rhodium on Carbon	Formula : 5% Rh/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Rhodium Content [On dry basis]	4.9% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 µm : 70%- 75% > 74 µm : 10% - 15%

3.2) SPECIFICATION

Product:	Spec.#:
10% Rhodium on Carbon	Formula : 10% Rh/C(Dry Basis)
Grade: AR	

Test	**Limits**
Supply form	Dry Powder
TECHNICAL DATA	
Moisture content	1.0% Max.
Rhodium Content [On dry basis]	9.5% Min
Carrier Material	Activated Carbon Powder up to 125 µm
Total Surface Area [m^2/g] (According to BET)	>950 m^2/g
Total Pore Volume [cm^3/g] (Mercury Porosimeter Method)	1.0 cm^3/g
Bulk density [kg/m^3] (Loose Bulk)	250 kg/m^3 [15.6 lbs/ft^3]
Particle Size Distribution [Wt %]	> 10 µm : 70%- 75% > 74 µm : 10% - 15%

1) SPECIFICATION

Product:	Spec.#:
Ruthenium Trichloride Trihydrate	**Formula: $RuCl_3 .3H_2O$**
Grade: AR	
Test	**Limits**
Molecular Weight	261.4
Description	Black Powder/Crystal
Minimum Assay	99.97%
Ruthenium Content	38.8-42%
Maximum Limits of Impurities	
Silver (Ag)	0.03%
Gold (Au)	0.03%
Palladium (Pd)	0.05%
Platinum (Pt)	0.03%
Rhodium (Rh)	0.03%
Copper (Cu)	0.03%
Nickel (Ni)	0.03%
Iron (Fe)	0.03%
Zinc (Zn)	0.03%
Magnesium (Mg)	0.03%
Lead (Pb)	0.03%
Calcium (Ca)	0.03%
Sodium (Na)	0.03%

2) SPECIFICATION

Product:	Spec.#:
Ruthenium Oxide Trihydrate	**Formula: $RuO_2.3H_2O$**
Grade: AR	
Test	**Limits**
Molecular Weight	187.1
Description	Black Powder
Minimum Assay	98.50%
Ruthenium Content	54-55%
Maximum Limits of Impurities	Max.1000 ppm

3) SPECIFICATION

Product:	Spec.#:
Palladium [II] Chloride	**Formula: PdCl2**
Grade: AR	
Test	**Limits**
Molecular Weight	177.31
Colour	Rust color
Form	Solid
Melting point	500ºC
Stability	Hygroscopic
Moisture content	0.15% max
Assay	99.95% min.
Typical Analysis	% Pd 59.5 - 60
Maximum Limits of Impurities in ppm	
Silver (Ag)	50
Aluminium	50
Gold	50
Bismuth	10
Calcium	50
Copper (Cu)	50
Iron (Fe)	50
Magnesium (Mg)	50
Manganese (Mn)	10
Nickel (Ni)	50
Lead (Pb)	10
Platinum (Pt)	50
Palladium (Pd)	50
Rhodium (Rh)	30
Silicon	50
Titanium	10
Zirconium	5
Antimony	20
Total Impurities	500 ppm Max.

Semiconductor Industry / Electroplating Industry

RARP offers Precious Metal Chemicals of Silver, Palladium, Gold, and Rhodium.

Some of the products are as follow:

For Silver Plating

1. Silver Potassium Cyanide

2. Silver Cyanide

For Gold Plating

1. Gold Potassium Cyanide

For ABS Plating

1. Palladium Chloride

For Rhodium Plating

1. Rhodium Sulphate Solution (2gm in 100ml bottle)

1) SPECIFICATION

Product:	Spec.#:
Silver Potassium Cyanide	**Formula: $KAg(CN)_2$**
Grade: AR	
Test	**Limits**
Molecular Weight	199.01
Minimum Assay	99.6%
Minimum Ag content	54%
Description	White Crystals
Water-insoluble matter	0.01%
Copper [Cu] Max	0.05%
Chloride [Cl] Max	0.02%

2) SPECIFICATION

Product:	Spec.#:
Silver Cyanide	**Formula: AgCN**
Grade: AR	
Test	**Limits**
Molecular Weight	133.89
Minimum Ag content	80.5%
Description	White to Yellowish Powder
Copper [Cu] Max	0.05%
Chloride [Cl] Max	0.02%
Other Metal Impurities	<500ppm

1) SPECIFICATION

Product:	Spec.#:
Gold Potassium Cyanide/ Potassium Dicyano Aurate	**Formula: $KAu(CN)_2$**
Grade: AR	
Test	**Limits**
Molecular Weight	288.12
Form & Appearance	White Crystalline Powder
Metal Content	68.1% as Gold Min
Moisture Content	0.2%max
PH	7.0 - 7.2 as 1% in distilled water
Impurities	
Copper	0.01%max
Silver	Traces
Other metals [Fi, Hi]	Traces
Chloride [Cl]	0.1%max
Sulphate	0.01%max
Free KCN	0.05%
Residue after dissolution	Nil
Clarity of Solution	Clear

1) SPECIFICATION

Product:	Spec.#:
Palladium [II] Chloride	**Formula: PdCl2**
Grade: AR	
Test	**Limits**
Molecular Weight	177.31
Colour	Rust color
Form	Solid
Melting point	500ºC
Stability	Hygroscopic
Moisture content	0.15% max
Assay	99.95% min.
Typical Analysis	% Pd 59.5 - 60
Maximum Limits of Impurities in ppm	
Silver (Ag)	50
Aluminium	50
Gold	50
Bismuth	10
Calcium	50
Copper (Cu)	50
Iron (Fe)	50
Magnesium (Mg)	50
Manganese (Mn)	10
Nickel (Ni)	50
Lead (Pb)	10
Platinum (Pt)	50
Palladium (Pd)	50
Rhodium (Rh)	30
Silicon	50
Titanium	10
Zirconium	5
Antimony	20
Total Impurities	500 ppm Max.

1) SPECIFICATION

Product:	Spec.#:
Rhodium Sulphate Solution	**Formula: RhSO4 Solution**
Grade: AR	
Test	**Limits**
Supply form	Solution
Description	Reddish Yellow
Solubility in water	Soluble in water
Minimum Assay	99.99%
Minimum Rh Content	2%
Maximum Limits of Impurities	100 PPM

Engineering Products

for the heavy Industry's like Steel & Iron Industry, Glass & Ceramic Industry, Metal Processing Industry & Furnaces Users

RARP offers **Platinum/Rhodium (R,S,B type) Thermocouple wires**

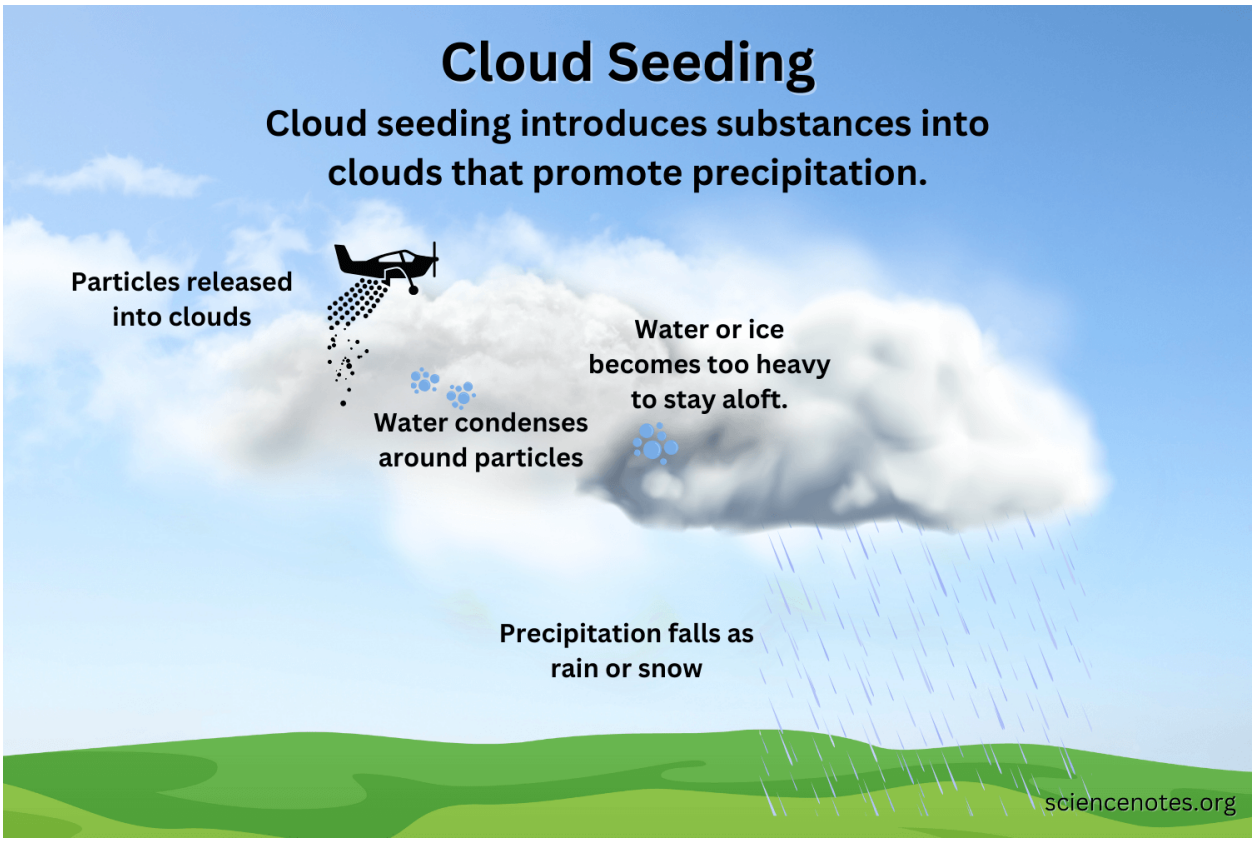
For measuring high temperatures up to 1700°C, Thermocouple wires made of High-purity Platinum/Rhodium alloys are required.
The thermocouples made of these wires are used for measuring exact temperatures. They are of made up of high Purity & provide long-term stability.

RARP offers Highly Pure **Platinum, Platinum/Gold Lab wares like Crucibles, Dish, Platinum Tipped SS Tong.**
Platinum Crucibles are used due to its inalterability to air, both at room temperature and at high temperatures, as well as its resistance to most chemical agents (excluding direct water)
in the chemical industry, Glass Industry, Steel & Iron Industry, Testing Laboratories etc

Chemical analysis frequently involves operations, which cannot be performed using conventional laboratory apparatus (Glass, Teflon, Porcelain, Silica etc.) because of high temperatures

Platinum group metals are ideal materials and possess all the required properties like ductility, alleability, high melting point, low heat capacity and high resistance to chemical attack, which make them one of the most suitable materials for the manufacture of laboratory wares.

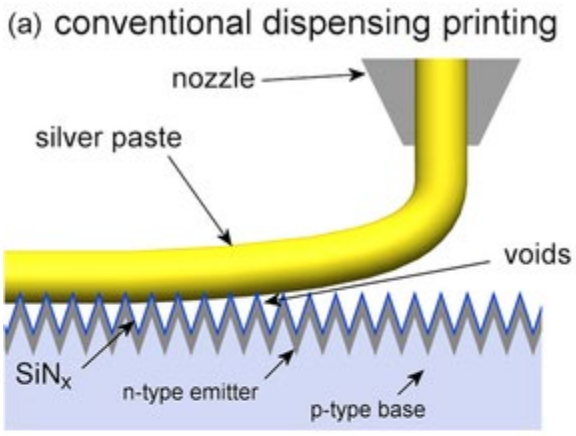
CLOUD SEEDING Industry

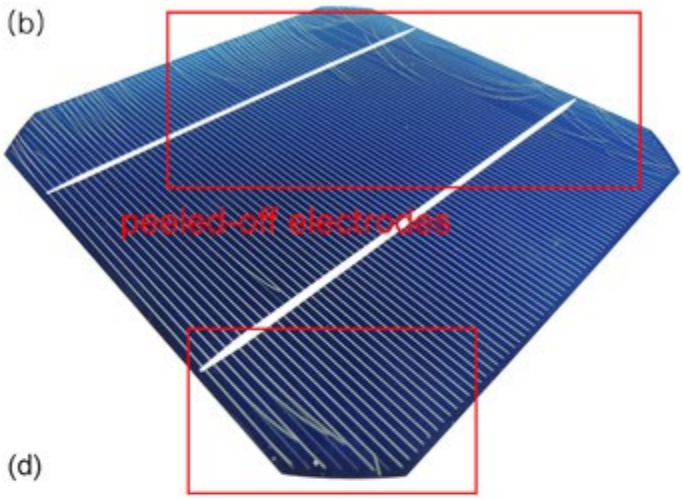


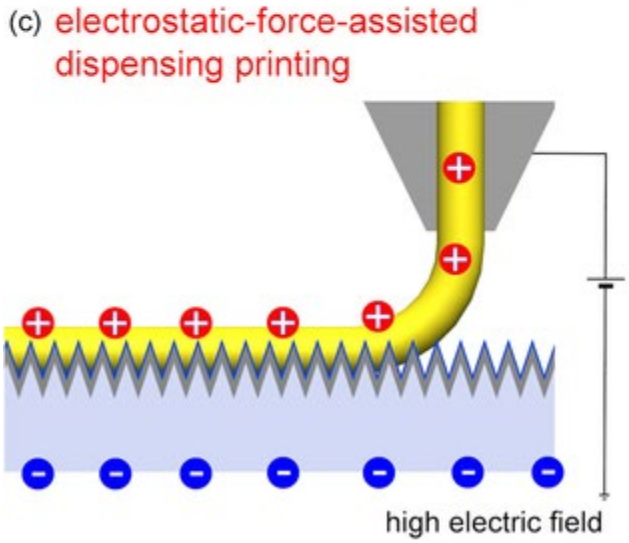
RARP offers highly pure **Silver Iodide** for this industry.

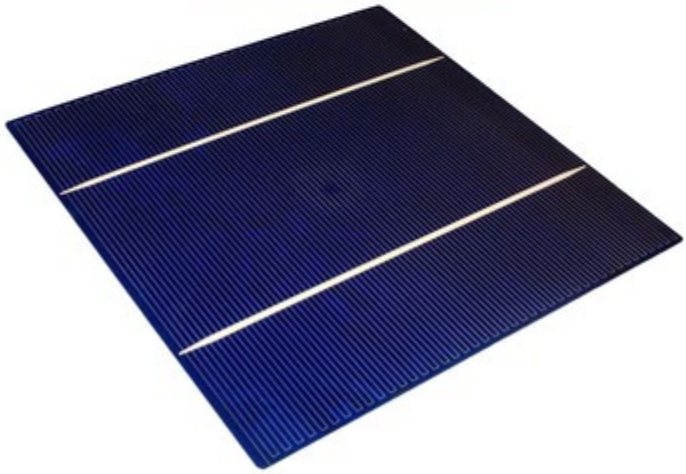
SOLAR CELL Industry

RARP offers superior quality **Silver Paste** for this industry.









Where are these chemicals frequently used :

Applications of Products:		
	Rhodium Chemicals	**USES**
1	Rhodium Trichloride hydrate	Used as a catalyst to prepare acetic acid. Also used as a catalyst for reduction, oxidation of alkenes, hydration of acetylene and isomerization of alkenes. It is involved in the hydrosilylation of alfa, beta-unsaturated esters to form dimethyl ketene trimethylsilyl acetals.
2	Rhodium Sulphate Solution	Used as plating reagents and additives for noble metal. It is also used for fancy plating rhodium in jewellery and horologe. Further, it is used for decorative applications
	Ruthenium chemicals	**USES**
1	Ruthenium Oxide Trihydrate	Used in the chemical industry to coat the anodes of electrochemical cells for chlorine production. Ruthenium is also used in catalysts for ammonia and acetic acid production. Ruthenium compounds can be used in solar cells, which turn light energy into electrical energy.
2	Ruthenium Trichloride Trihydrate	Used as a catalyst: In the synthesis of β-amino alcohols by nucleophilic opening of epoxides with anilines.
3	Ruthenium Acetyl Acetonate	Used as a catalyst in the hydrolysis of sodium borohydride at low concentrations and room temperature. It can also be used as a precursor to synthesize Ru-based nonmaterial which can be applied in the field of super capacitors and catalysis.
	Platinum Chemicals	**USES**
1	Platinum Black	Used as a thin film electrode, a fuel cell membrane catalyst, or as a catalytic ignition of flammable gases for "self-lighting' gas lamps, ovens, and stove burners.
2	Platinum Chloride PtCl4	Promote the conversion of organic substrates into higher-value products with controlled selectivity. Catalyst Development: Serve as a building block in the development of novel catalysts and catalytic processes.

3	Potassium TeTrachloroplatinate	Used as important reagent for the preparation of other coordination complexes of platinum. It is also used in the induction of apoptosis in human breast cancer cells. Also used in the preparation of camptothecin-linked platinum anticancer agents.
4	Potassium Hexachloroplatinate	Is commonly used as a platinum (Pt) precursor for the preparation of platinum-based compounds and as a precursor for Platinum based heterogeneous catalysts.
5	Chloroplatinic acid	Used for the determination of Potassium with Quantitative analysis of potassium. Chloroplatinic acid is widely used for this purpose as it holds advantages one Sodium Cobalt nitrite.
6	Platinum Nitrate Solution 10% W/V	Used to prepare palladium-containing compounds, heterogeneous catalysts and coatings of the material surface.
7	Tetra ammine Platinum Nitrate	Mainly used to prepare palladium-containing compounds, heterogeneous catalysts and coatings of the material surface. Used as a platinum (Pt) precursor to synthesize platinum-based catalysts such as Pt/cerium oxide catalysts [1] and Pt/mesoporous carbon catalysts.[2] It is also used in synthesizing lean NOx trap (LNT) catalysts.[3]
	Palladium Chemicals	**USES**
1	Palladium [II] Chloride	Producing hydrogenation catalysts, palladium-containing pastes; and palladation electrolyte powders. Also used in ABS plating
2	Palladium Acetate	Used as a catalyst of choice for a wide variety of reactions such as vinylation, Wacker process, Buchwald-Hartwig amination, carbonylation, oxidation, rearrangement of dienes (e.g., Cope rearrangement), C-C bond formation, reductive amination,
3	Palladium Oxide	useful catalysts for catalytic hydrogenation in organic synthesis.
4	Palladium Sulphate	Uses such as water treatment, unlike fluorides and oxides which tend to be insoluble. Organometallic forms are soluble in organic solutions and sometimes in both aqueous and organic solutions.
5	Tetrammine Palladium Sulphate	It is a new type of electroplating product used for palladium plating in the electronics industry. It is mainly used for coating computer motherboards and network plugs, and manufacturing automotive catalytic crackers.

6	Palladium Black	It has a strong affinity for hydrogen gas and can be used as catalysts in hydrogenation reactions and hydrogen getters. They are also used in the electronics industry for thick film pastes, especially in MLCC electrode and end termination pastes.
7	Palladium [II] Nitrate Solution 10% W/V	Main application is Plating of electronic parts & Catalysts
8	Sodium tetrachloropalladate	Used as a test salt for Pd allergy patch testing. It is used in chemical synthesis as a catalyst.
9	Tetramine Palladium (II) Chloride	Used in Producing hydrogenation catalysts, palladium-containing pastes; and palladation electrolyte powders, Used for Activation of printed-wiring board surfaces, Feed material for chemical compounds synthesis
	Silver Chemicals	**USES**
1	Silver Nitrate LR/AR	Used for making photographic films due to the property of forming precipitates of silver halides. It serves as anti-infective/antiseptic/antibacterial/cauterizing agent. It works as an anti-infective agent in the treatment of wounds/burns.
2	Silver Sulfate LR/AR	Used for medicinal purposes. Silver is a documented antibacterial agent. Bandages used to cover woulds ranging from basic skin wounds to serious lacerations and skin abrasions are impregnated with silver compounds including silver sulfate
3	Silver Oxide LR/AR	Used in silver oxide batteries. It is used in many reactions as a mild oxidizing agent such as in oxidation reactions of converting aldehydes to carboxylic acids. It is used in the synthesis of many compounds. It is used in the preparation of Tollen's reagent as well.
4	Silver Carbonate	Used as a catalyst and as a reagent in many chemical reactions. It is used as a reagent in Fetizon's reaction, where primary and secondary alcohols are oxidized to aldehydes and ketones. It is also used in the electronic industry.
5	Silver Chloride	Used in electroplating and polishing mirrors and in making alloys. Used as an antidote that reacts with the poison to produce a harmless chemical compound. Used in medicines and used in photographic films.

6	Silver Bromide	Main applications of silver bromide are in photography. Silver bromide is used in photographic films and plates. Silver bromide is also used for infrared applications, for light sensitive eyeglasses, and semiconductors.
7	Silver Iodide	is used in photography and as an antiseptic in medicine. With respect to cloud physics, used for weather modification applications such as cloud seeding or anti-hail systems.
8	Silver Acetate LR/AR	used as a pesticide. used in the medical field to manufacture anti-smoking medicines. Also used in chewing gums. It is used in the preparation of reflective, conductive silvered polymer films. AND used as a laboratory reagent.
9	Silver Lactate	It's application in the treatment of thermal burn has been reported, thus being made into cream. it can decrease superoxide anion formation and chemotaxis in human polymorph nuclear leucocytes.
10	Silver Powder	Used in Carbon Blocks & Brushes, Chemicals, Conductive coatings for electrical & electronic applications, contact materials, Diamond Tools, Glass, Medicines, Powder metallurgy parts, Printing, Silver plating, Soldering applications etc.
11	Silver Nitrite	used in the silver-plating process, hair dye, inks, permanent marker pens and determination of chloride ions in water and drilling fluids. It is used as Tollen's reagent and used in the formation of aniline and nitro compounds in victor Mayer reactions.
12	Silver Iodate	It is used to detect traces of chlorides in blood.
	Gold Chemicals	**USES**
1	Gold Chloride	Gold Chloride Solution is mainly used for microanalysis, alkaloid determination, gold electroplating and photography, gold powder production, porcelain coloring, red glass manufacturing, special inks and drugs for treating tuberculosis.
2	Choro Auric Acid	It is the precursor used in the purification of gold by electrolysis. Liquid–liquid extraction of chloroauric acid is used for the recovery, concentrating, purification, and analytical determinations of gold.

3	Potassium Tetrachloroaurate(III)	used as primary and secondary intermediates. A Key raw material for synthesis of new gold (III) dithionate complexes for luminescence studies or possible uses as photosensitizers or photo catalysts.
4	Sodium Tetrachloroaurate(III)	It is widely used in many organic transformations such as nucleophilic addition to multiple bonds, nonsymmetrical etherization, and nucleophilic substitution of propargylic alcohols.
5	Gold Potassium Cyanide	used in electrolytic gold plating. The primary application of gold potassium cyanide is in the electroplating of metals. In addition, gold potassium cyanide is also used in the decorative plating of jewelry.
6	Gold Powder	Resistances to corrosion and ease of forming and joining have made it a valuable metal widely used for making jewellery.