Hindustan Platinum

Pt Pd Au
Rh Ir
Ru Ag

Refiners & Catalysts Manufacturers

Established in 1961, Hindustan Platinum is India's leading manufacturer and refiner of precious metal products with wide and diverse industrial applications. With more than four decades of experience, Hindustan Platinum has fine-tuned to perfection various traditional and innovative high-yield technologies to produce high-purity precious metals.

Our proprietary indigenous technologies and processes, coupled with technical collaborations with global industry leaders has equipped us to deliver excellence in quality, quantity and customer-centric services.

Over the years we have established a large customer base, not only in India, but also in the USA, Europe, Uk and Asia. With the world as our market, Hindustan Platinum is truly a global player in the precious metal products, processes and services Industry.

tradition, & innovation experience

Strategic Location

Hindustan Platinum's first plant was set up in the heart of Mumbai (formerly Bombay), the commercial capital of India. This fully functional plant was followed by the commissioning of an ultra-modern plant in 1999 amidst the verdant hills of the Western Ghats in Navi Mumbai. This new plant designed specifically to meet the growing global demand for our products and services, employs the latest manufacturing and process technologies. Proximity to the Airports, both domestic and international, and Ports are a major advantage for bulk logistics to and from our plants.

Multi-level Quality Assurance

As a responsible manufacturer of critical components Hindustan Platinum employs various quality parameters to ensure stringent quality control at all levels of manufacturing. Beginning with the purity of raw materials. We also constantly validate our processes and monitor our final yields. With state-of-the-art facilities and continuously evolving technologies, we have an unbeaten track-record of delivering perfection and precision to our customers.

Clean Processes

A fully integrated effluent treatment plant, root zone system and stringent air-quality control reflects our commitment to maintain our environmental responsibilities. Although we meet strict environmental regulations our R&D team strives for continous improvent of all processes, in particular Energy and Water conservation. To state simply, we contribute to the world economy but not at the cost of the world's ecology!

Homogenizing & Sampling

Sampling is the crux for accurate determination of precious metal content in scrap material. This material needs to be homogenized to draw samples which represent the entire lot. Depending on the nature of the material, this can be achieved by a combination of incineration, sieving, grinding, blending & melting. Multiple representative samples are then drawn for evaluation of metal content by us, by the customer & if required by a reputed international laboratory.

Metal Analysis & Evaluation

Different analytical methods are employed to determine the concentration of precious metals in the homogenized sample which range from ppm level to 99.99% metal content. In addition to the traditional wet-chemical and fire assay methods, Hindustan Platinum uses advanced methods such as absorption and emission spectroscopy to reveal the exact content of precious metals. The choice of analytical methods is judiciously made depending on the type of material. Apart from this, the impurity profile is also determined for any purified metals for the manufacture of high quality finished products. Analytical reports determining precious metals content are presented to the customer for approval & final settlement.

Metal Recovery & Refining

The homogenized material goes through several physical and chemical processes for optimum recovery of the precious metals. These metals then undergo refining, the final purification process, which yields precious metals of purity above 99.95%, meeting international standards.

Manufactured Products

High purity precious metals are used to manufacture a wide array of sophisticated industrial products. All our supplies are accompanied by our Certificate of Analysis. The entire cycle of precious metal recovery is conducted through environment friendly processes which deliver high-yield, high-purity final products within the committed time.

Catalyst Manufacturing

Precious metal catalysts hold a unique position because of their high catalytic performance (activity, selectivity, filterability and recycleability). Hindustan Platinum has perfected the art and science of manufacturing homogenous and heterogenous catalysts for different chemical and pharmaceutical applications. For more than four decades, Hindustan Platinum has been serving the industry and has earned itself an enviable global reputation and stature in the field of precious metal catalysts. The manufacture of precious metal catalysts involves complex procedures and processes which require strict adherence to material and process quality parameters. Every ingredient used in the development of the catalyst is sourced from approved manufacturers / vendors and analysed for quality.

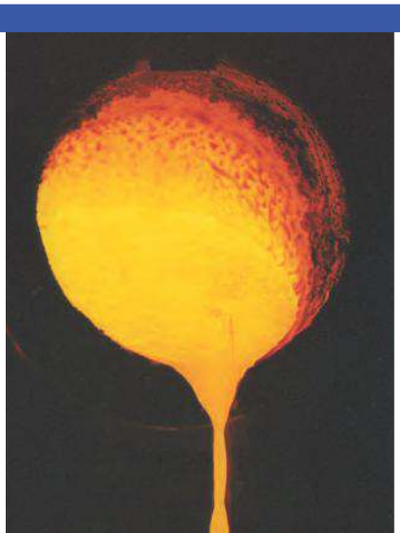
Catalyst Testing & Analysis

Hindustan Platinum covers every product with its Quality Commitment. All manufactured catalysts are subjected to analysis and quality control at every stage of production. Our state-of-the-art analytical laboratory is not only equipped with chemical assay systems but also equipments to measure surface area, pore size distribution, metal distribution and catalyst activity thus ensuring a consistent supply of superior quality products to our customers.

Research & Development

Catalysts are tailor-made to suit customer's needs as per their parameters. Our R&D team works closely with the customer's technical personnel to develop the most suitable catalyst for their application. Different catalysts with varying precious metal loadings from 1% to 20% are routinely developed. We also have an expert team which provides solutions to customer's production related problems.

the recovery cycle

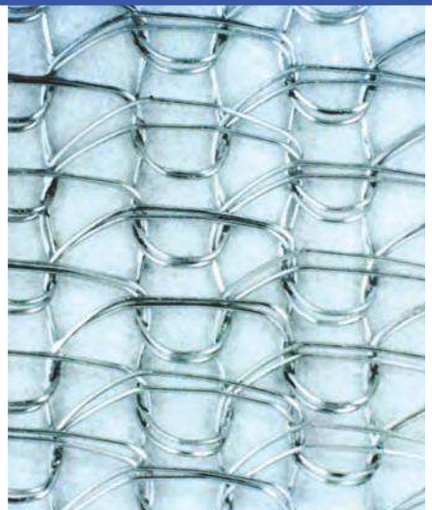


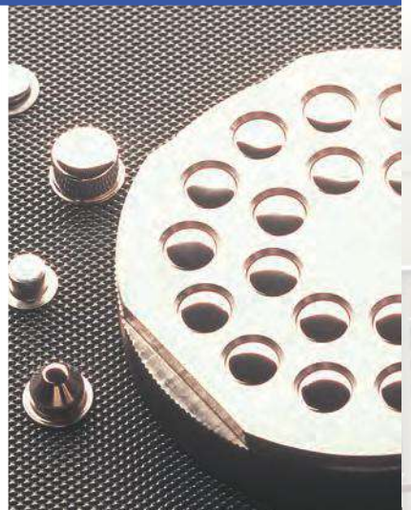
Industries we serve

Products we make

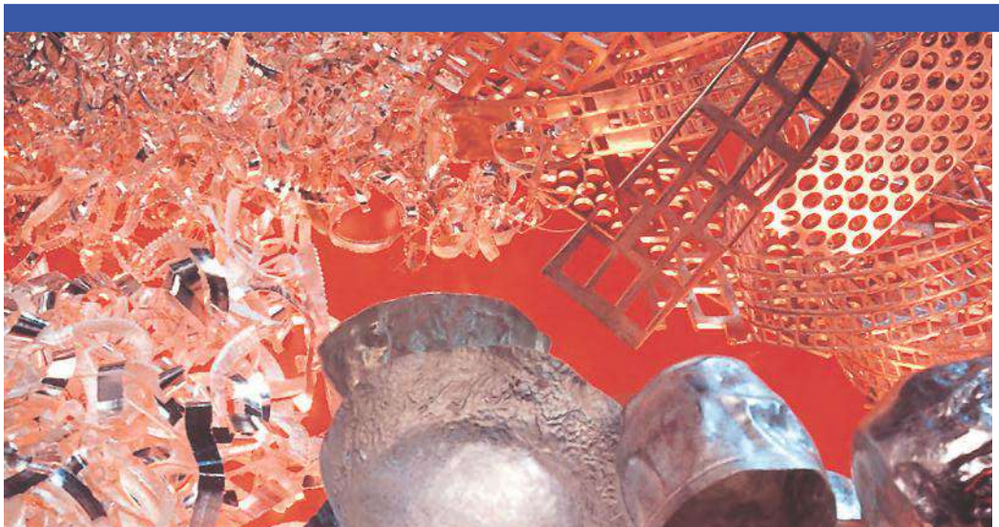
Industries we serve	Products we make
Electroplating & Coating	- Precious metal salts and solutions
Fertiliser, Industrial & Defense explosives, Caprolactam and Cyanide manufacturers	- Platinum / Rhodium catalyst gauzes - Platinum / Palladium / Rhodium catalyst gauzes - Palladium alloy catchment gauzes
Glass fiber and Glass wool	- Platinum / Rhodium alloy bushings - Spinner baskets
Glass and Optical glass	- Platinum / Rhodium alloy stirrers - Thimbles, orifice rings, liners, etc.
Man-made fiber	- Precious metal spinnerettes - Cluster spinnerettes - Tantalum filters - Stainless steel spinnerettes
Pharmaceutical and Chemical	- Precious metal compounds - Supported and unsupported hetrogenous catalysts - Homogenous catalysts
Research and Analytical laboratories	- Platinum laboratory apparatus
Steel and Glass	- Platinum and Platinum / Rhodium Thermocouple wires - Throwaway tips
Switchgear, Control gear, Automobile, Spacecraft, Elevator and Home Appliances	- Electrical contacts and profiles
Thin Film Coating	- Precious metal targets
Oil refineries, Petrochemical and all other industries	- Recovery and refining of precious metals

Labware **Gauzes** **Electrical Contacts** **Spinnerettes**

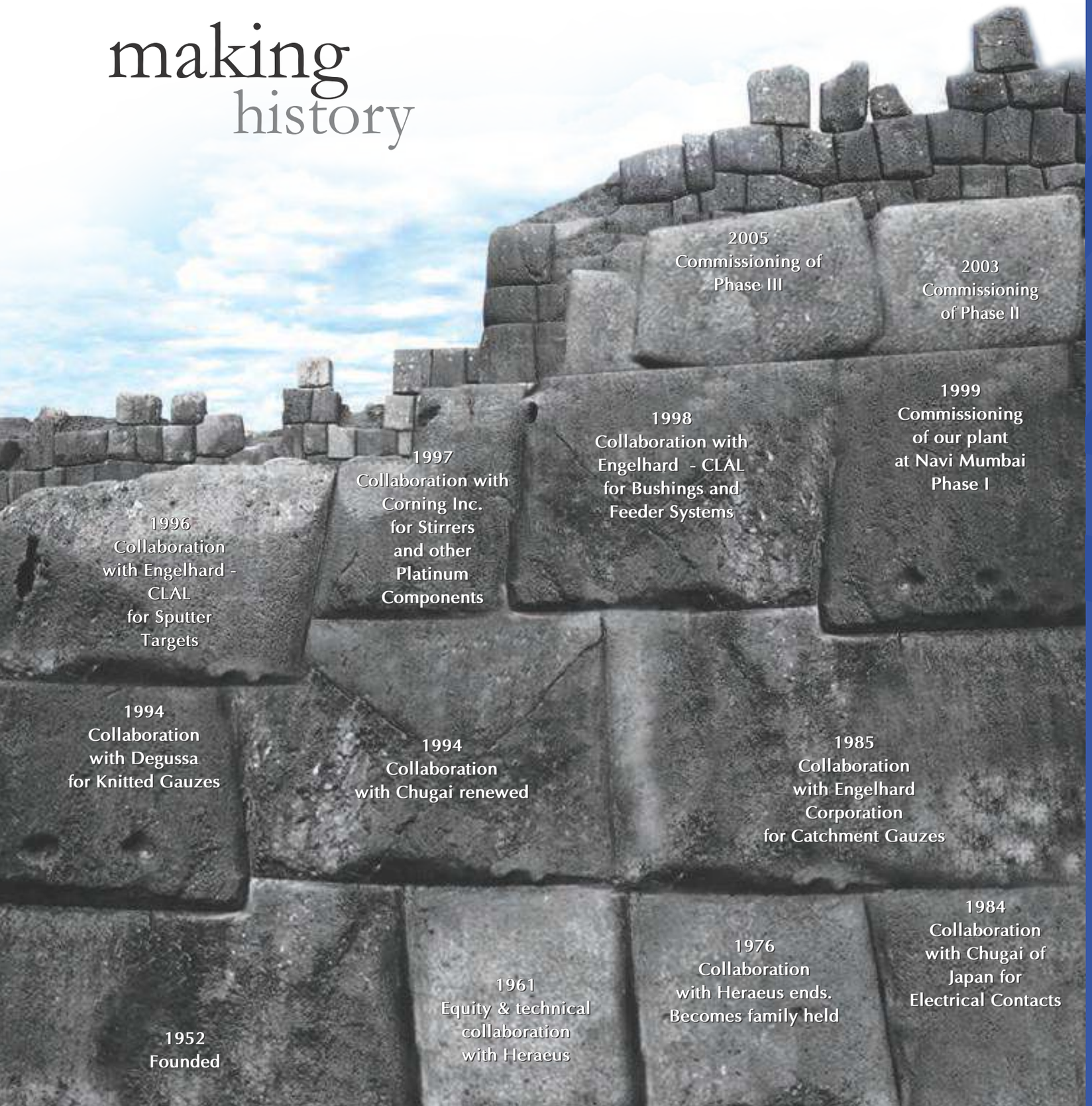




SOURCE INDUSTRY	TYPICAL REFINING INPUT	METALS REFINED				
		Platinum	Palladium	Rhodium	Gold	Silver
Automotive	Spent Autocatalyst	•	•	•		
Base Metal Refiners	PGM Residues and Sludge	•	•	•	•	•
Battery Manufacturers	Scrap Batteries					•
Catalyst Manufacturers	PGM Solutions and Residues	•	•	•		
Chemical Manufacturers	Spent Catalysts	•	•	•	•	•
Electroplaters	Scrap Components		•	•	•	
Financial Institutions	Bullion for Conversion				•	•
Glass	PGM Alloy & Refractory Scrap	•		•		
Jewellery Manufacturers	Metallic Scrap & Residues	•	•	•	•	•
Mining	PGM Dore and Concentrates	•	•	•	•	•
Oil Refineries & Petrochemical	Spent Catalysts	•	•			•
Pharmaceutical Manufacturers	Spent Catalysts & Ash	•	•	•	•	•
Photography	Process Residues					•
Precious Metal Refiners	Precious Metal Residues	•	•	•	•	•
Semi-Refiners and Collectors	Precious Metal Concentrates	•	•	•	•	•



making history



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Hindustan Platinum

PRECIOUS METAL CATALYSTS

precious metal catalysts

Platinum group supported metal catalysts are widely used in chemical industries because of their activity, selectivity and recycle capability. The catalytic processes are characterized by moderate reaction conditions, high yields, high throughputs, minimal by-products and process costs which make the industrial process highly cost effective.

These catalysts mainly find applications in liquid phase hydrogenation, dehydrogenation, and oxidation reactions usually in stirred tank reactors. This requires finely divided material which can be easily suspended within the reaction medium.

Finely divided platinum group metal salts are supported on a high surface area material, with various loading, under extremely controlled conditions. It involves careful selection of various parameters such as metal precursor, its concentration, pH, temperature, precipitating agent sequence and rate of addition, etc. to make efficient catalysts.

The powder precious metal catalysts find applications only under conditions when support itself is non-reactive. The surface area of the support determines metal loading and dispersion. The pore size distribution influences the diffusion rates and controls the course of the reaction. Surface chemistry, thermal & chemical stability of the support decides the performance of the catalyst. The metal location, it's crystallite size & oxidation state influences catalyst's selectivity. The support also facilitates improved metal recovery.

Activated carbon

It is a very common support. Mostly derived from natural sources, it is subjected to physical and chemical variations. The surface area can range up to 1200 m^2/g.

The carbon supported catalyst comes in two forms, dry powder and carbon paste with about 50% water wet. Both are free flowing powders. The former needs skillful handling as it is considered potentially more pyrophoric than the latter in presence of organic solvents. Further more handling losses are minimized by using wet catalyst. At times the catalyst can be regenerated by washing with solvents. The metal recovery is possible by burning the support.

Alumina

Activated alumina is well characterized support with surface area up to 300 m2/g. Alumina can be produced in pure state. Apart from surface area and porosity other performance related parameters can be adjusted to desired catalytic process. It has low absorptive capacity and is non combustible.

Other supports

Calcium carbonate, barium carbonate, barium sulphate are low surface area, low absorptive capacity supports.

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catalysts

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Catalysts	PALLADIUM																																
	RD-92	RD-124	RD-162	RD-169	RD-172	RD-189	RD-203	RD-206	RD-213	RD-245	RD-250	RD-298	RD-299	RD-306	RD-312	RD-343	RD-454	RD-484	RD-501	RD-506	RD-572	RD-609	RD-612	RD-619	RD-636	RD-672	RD-692	RD-718	RD-778	RD-841	RD-355	RD-355 L	RD-373
% of Metal loading	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5%, 10% Pd/C	5% Pd/CaCO3	5% Pd/CaCO3	5% Pd/Al2O3
Reaction profile																																	
C-C bonds hydrogenation Double bonds, Triple bonds	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
C-N bonds hydrogenation Nitriles,Imines,Hydrazones,Oximes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
C=O bond hydrogenation Aromatic aldehydes,Aromatic ketones	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
Reductive alkylation/Amination										•						•					•			•	•	•	•			•			
Nitro / Nitroso group hydrogenation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
Debenzylation/Hydrogenolysis O-Debenzylation,N-Debenzylation, Cbz-(Z)Deprotection,	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
Hetroaromatic hydrogenation	•			•	•	•			•			•												•		•	•			•			
Aromatic hydrogenation																																	
Halonitroaromatics hydrgenation																																	
Dehydrogenation				•	•	•						•	•					•	•				•	•									
Dehalogenation						•						•	•					•	•				•	•		•	•			•			
Selective reduction																															•	•	•

Catalysts	PLATINUM								RHODIUM		RUTHENIUM
	RD-236	RD-316	RD-381	RD-451	RD-537	RD-709	RD-714	RD-741	RD-8	RD-199	RD-800
% of Metal loading	3%, 5% Pt/C	5% Pt/C	3% Pt/C	1% Pt/C	5% Pt/C	3%, 5% Pt/C	5% Pt/C	3% Pt/C	5% Rh/Al	5% Rh/C	5% Ru/C
Reaction profile											
C-C bonds hydrogenation Double bonds, Triple bonds	•	•	•	•	•	•	•	•			
C-N bonds hydrogenation Nitriles,Imines,Hydrazones,Oximes											
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Reductive alkylation/Amination	•	•		•		•	•	•			
Nitro / Nitroso group hydrogenation	•	•	•	•	•	•	•	•			
Debenzylation/Hydrogenolysis O-Debenzylation,N-Debenzylation, Cbz-(Z)Deprotection,											
Hetroaromatic hydrogenation									•	•	•
Aromatic hydrogenation											
Halonitroaromatics hydrgenation	•	•	•	•	•						
Dehydrogenation											
Dehalogenation											
Selective reduction											

Supports : C - carbon; AL - alumina; BS - barium sulphate; CC - calcium carbonate

Catalyst Development Process

Hindustan Platinum works in close association with customers under strict confidentiality to bring products early to the market.

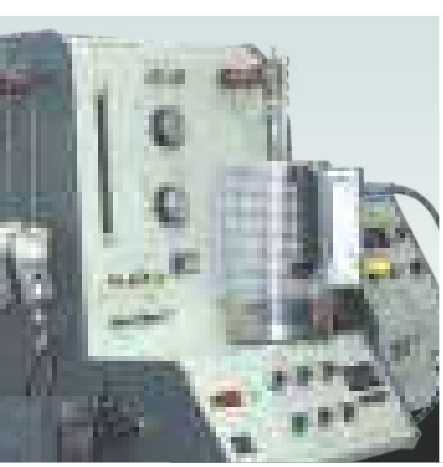
Customer's metal Catalyzed reactions

HP's Catalyst design & process parameter's suggestion

Lab Scale Catalyst testing at HP's / Customer's site

Pilot plant Catalyst testing at HP's / Customer's site

Process Commercialization



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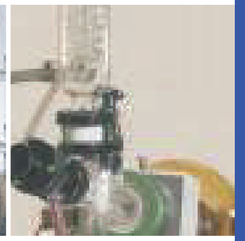

Hindustan Platinum

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Hindustan Platinum

PRECIOUS METAL CATALYSTS

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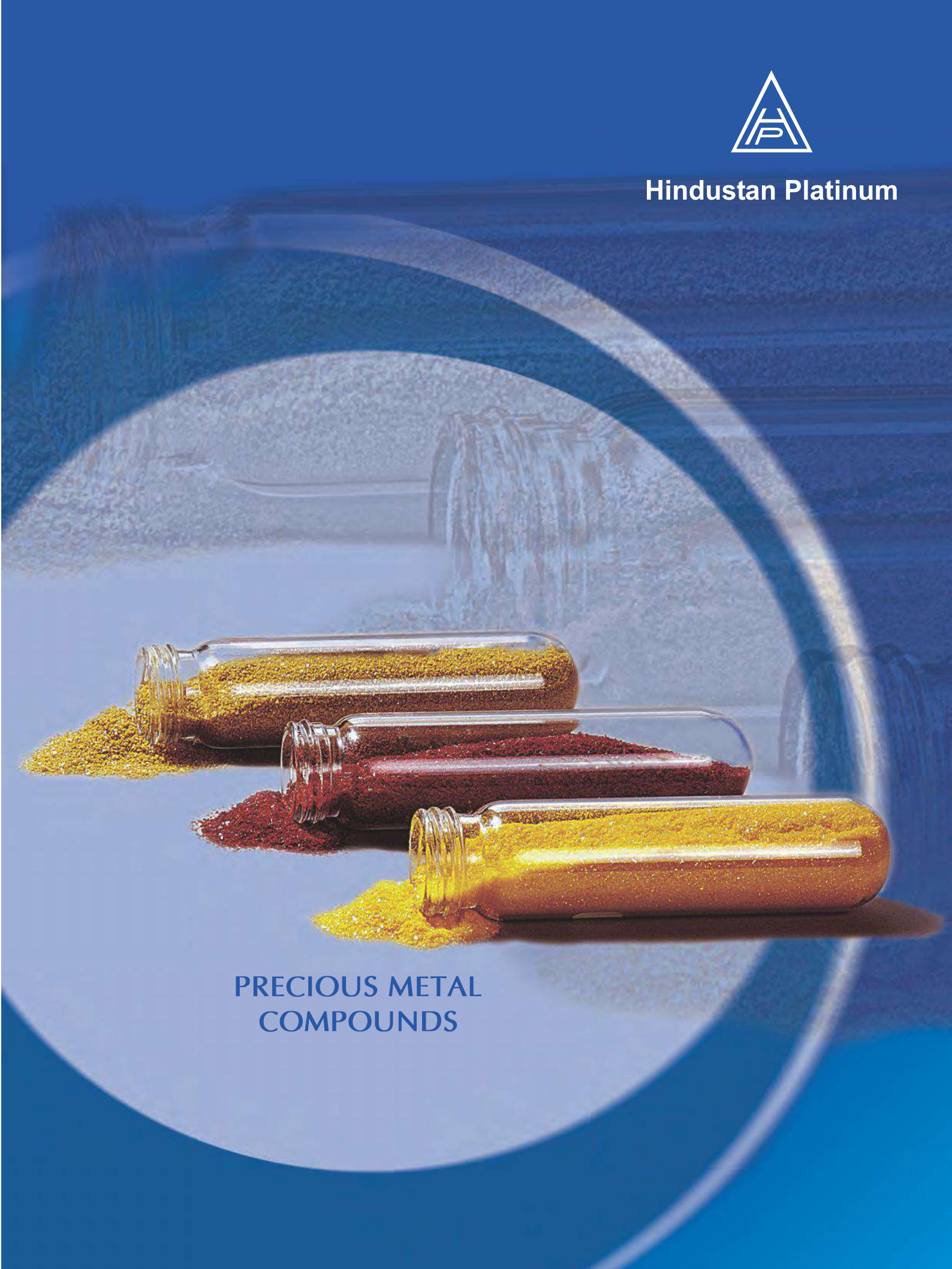

PRECIOUS METAL COMPOUNDS

precious metal compounds

The leaflet lists precious metal compounds manufactured by Hindustan Platinum. All precious metal compounds have metallic purity of 99.95+ and are supplied with an assay certificate. In addition to the precious metal compounds listed, tailor made compounds can be prepared according to the customer's desired specifications.

Some of the precious metal compounds can find applications in the following fields :

- Precursors for heterogeneous & homogeneous catalysts.
- Precursors for automotive catalysts & fuel cells.
- Electroplating & Coating Industry.
- Jewellry Industry.

PLATINUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$(NH_4)_2PtCl_6$	Ammonium hexachloroplatinate (IV)	16919-58-7	443.89	43.95	slightly soluble in water
$(NH_4)_2PtCl_4$	Ammonium tetrachloroplatinate (II)	13820-41-2	372.98	52.29	water
$PtCl_2(NH_3)_2$	cis-Diamminedichloroplatinum (II)	15663-27-1	300.06	65	in DMF
$PtCl_4(NH_3)_2$	trans-Diamminetetrachloroplatinum (IV)	16893-06-4	370.96	52.6	
$Pt[(C_2H_5)_2S]_2Cl_2$	cis-Dichlorobis (diethylsulfied) platinum (II)	15442-57-6	446.37	43.7	acetone, alcohol
$PtCl_2(H_2NCH_2CH_2NH_2)$	Dichloro(ethylenediammine) platinum (II)	14096-51-6	326.1	59.8	
$H_2PtCl_6.6H_2O$	Dihydrogen hexachloroplatinate (IV)	26023-84-7	409.82		water, acetone, alcohol
$(CH_3)_3PtI$	Iodotrimethylplatinum (IV)	14364-93-3	367.09	53.1	
Pt	Platinum black	7440-06-4	195.08	98	
$PtCl_2$	Platinum chloride (II)	10025-65-7	266	73	HCl, NH_4OH
$PtCl_4$	Platinum chloride (IV)	13454-96-1	336.9	57.9	H_2O, HCl, acetone
$PtO_2.xH_2O$	Platinum (IV) oxide	1314-15-4	227.09	80-84	
Pt	Platinum sponge	7440-06-4	195.08	99.95+	aquaregia
K_2PtCl_4	Potassium tetrachloroplatinate (II)	10025-99-7	415.11	46.99	water
$Na_2PtCl_6.6H_2O$	Sodium hexachloroplatinate (IV)	19583-77-8	453.79	34	water, ethanol, acetone
$Pt(NH_3)_4Cl_2.H_2O$	Tetraammineplatinum (II) chloride	13933-32-9	334.11	55.4	water

PALLADIUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$Pd(NH_3)_2Cl_2$	Trans-Dichlorodiammine palladium (II)chloride	14323-43-4	211.37	50.3	NH_4OH
$(NH_3)_2Pd(NO_2)_2$	Diamminepalladium (II) nitrite	14852-83-6	232.47	46	
Pd	Palladium black	7440-05-3	106.4	98	
Pd	Palladium sponge	7440-05-3	106.4	99.95+	
$PdCl_2$	Palladium (II) chloride	7647-10-1	177.31	60	dil. HCl
K_2PdCl_6	Potassium hexachloropalladate (IV)	16919-73-6	397.32	26.8	slightly soluble in HCl
$Pd(NO_3)_2.xH_2O$	Palladium (II) nitrate	10102-05-3	230.43	46.18	dil, HNO_3
PdO	Palladium (II) oxide	1314-08-5	122.4	87	48% HBr
K_2PdCl_4	Potassium tetrachloropalladate (II)	10025-98-6	326.42	32.59	water
$K_2[Pd(CN)_4].3H_2O$	Potassium tetracyanopalladate (II)	14516-46-2	288.68	31.1	
$Na_2PdCl_4.xH_2O$	Sodium tetrachloropalladate (II)	13820-53-6	294.2	36.17	water, C_2H_5OH
$Pd(NH_3)_4Cl_2.H_2O$	Tetraamminepalladium (II) chloride	13933-31-8	245.43	40.2	
$[Pd(NH_3)_4][PdCl_4]$	Tetraamminepalladium(II) tetrachloropalladate(II)	13820-44-5	422.8	25.17	

RHODIUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$(NH_4)_3RhCl_6.xH_2O$	Ammonium hexachlororhodate (III)	15336-18-2	369.74	27.83	water
$Rh_6(CO)_{16}$	Hexadecacarbonyl hexarhodium	28407-51-4	1065.61	58	sparingly soluble in $CHCl_3$, CCl_4, CH_2Cl_2
$RhH[P(C_6H_5)_3]_4$	Hydridotetrakis (triphenylphosphine) rhodium (I)	18284-36-1	1153.09	8.9	toluene, chloroform
K_3RhCl_6	Potassium hexachlororhodate (III)	13845-07-3	432.93	23.77	
$[Rh(CO_2CH_3)_2]_2$	Rhodium (II) acetate, dimer	15956-28-2	441.99	46.57	water
Rh	Rhodium black	7440-16-6	102.9	98	
$RhCl_3.xH_2O$	Rhodium (III) chloride	20765-98-4	209.26	39	water, alcohol, HCl
Rh	Rhodium sponge	7440-16-6	102.9	99.9+	
$Rh_2(SO_4)_3$	Rhodium (III) sulphate 10% solution	10489-46-0	494	41.66	
$[Rh(C_7H_{15}COO)_2]_2$	Rhodium octanoate dimer	73482-96-9	778.62	26.46	hot alcohol, CH_2Cl_2, toluene, acetic acid

IRIDIUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$(NH_4)_3IrCl_6.xH_2O$	Ammonium hexachloroiridate (III)	15752-05-3	459.06	41.9	
Ir	Iridium black	7439-88-5	192.22		
$IrCl_3.xH_2O$	Iridium chloride hydrate	14996-61-3	298.58	64.4	water, alcohol
IrO_2	Iridium (IV) oxide	12030-49-8	224.2	85.7	
Ir	Iridium sponge	7439-88-5	192.22	99.9	
$Na_3IrCl_6.xH_2O$	Sodium hexachloroiridate (III)	123334-23-6	473.89	40.6	
K_2IrCl_6	Potassium hexachloroiridate (IV)	16920-56-2	483.12	39.8	

GOLD

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$(NH_4)AuCl_4.xH_2O$	Ammonium tetrachloroaurate (III)	13874-04-9	356.82	55.2	water, alcohol
Au	Gold powder	7440-57-5	196.97	99.95+	
AuCl	Gold (I) chloride	10294-29-8	232.42	84.75	
AuCN	Gold (I) cyanide	506-65-0	222.98	88.33	
$HAuCl_4.xH_2O$	Hydrogen tetrachloroaurate (III)	27988-77-8	339.79	50	HNO_3
$NaAuCl_4.2H_2O$	Sodium tetrachloroaurate (III)	13874-02-7	361.77	49.5	water, alcohol, ether
$KAuCl_4$	Potassium tetrachloroaurate (III)	13682-61-6	377.88	52.1	water

SILVER

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
AgBr	Silver bromide	7785-23-1	187.78	57.44	partially soluble in NH_3
AgCl	Silver (I) chloride	7783-90-6	143.32	75.26	NH_3, alkali cyanide
AgF	Silver (I) fluoride	7775-41-9	126.87	85	HF, NH_3, CH_3CN
AgI	Silver (I) iodide	7783-96-2	234.77	45.95	alkali cyanides & iodides
$AgNO_3$	Silver (I) nitrate	7761-88-8	169.87	63.5	water, alcohol
Ag_2O	Silver (I) oxide	20667-12-3	231.74	93	dil.HNO_3, NH_3
Ag	Silver powder	7440-22-4	107.86	99.99	dil.HNO_3
AgCOOCH3	Silver acetate	563-63-3	168.9	64.63	dilute nitric acid
AgCOOCH(OH)CH3	Silver lactate	128-00-7	197.7	50-55	water
Ag2CO3	Silver carbonate	534-16-7	275.75	78.23	all acids

RUTHENIUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$K_2RuCl_5.XH_2O$	Potassium pentachlororuthenate (III)	14404-33-2	356.54	28.3	
$RuCl_3.xH_2O$	Ruthenium (III) chloride	14898-67-0	207.43	38-43	water, alcohol
Ru	Ruthenium black	7440-18-8	101.07		
Ru	Ruthenium powder	7440-18-8	101.07	99.9	

Air sensitive Hygroscopic Light sensitive Moisture Sensitive Anhydrous

precious metal precursors and catalysts

PALLADIUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$[Pd(C_2H_3O_2)_2]_3$	Palladium (II) acetate	3375-31-3	673.46	47.4	as a monomer in pyridine, NH_3, toluene
$Pd[P(C_6H_5)2CH_3]_4$	Tetrakis (methyldiphenylphosphine) palladium (0)	24981-80-4	907.29	11.73	
$Pd[P(C_6H_5)_3]_4$	Tetrakis(triphenylphosphine) palladium (0)	14221-01-3	1155.57	9.21	C_2H_5OH, C_6H_6
$PdCl_2[P(C_6H_5)_3]_2$	trans-Dichlorobis(triphenylphosphine) palladium (II)	13965-03-2	701.89	15.16	benzene, toluene
$[PdCl(C_3H_5)]_2$	Allylpalladium(II)chloride dimer	12012-95-2	365.85	58.13	chloroform, benzene
$Pd(COOCF_3)_2$	Palladium trifluoroacetate	42196-31-6	332.45	31	ether, acetone
$PdCl_2(C_6H_5CN)_2$	Bis(benzonitrile)dichloropalladium	14220-64-5	383.57	27	chloroform
$PdCl_2(CH_3CN)_2$	Dichlorobis(acetonitrile)palladium(II)	14592-56-4	259	40.4	acetone, chloroform
$Pd[(C_6H_5CH=CH)_2CO]_2$	Bis(dibenzylideneacetone)palladium(0)	32005-36-0	575	18.5	chloroform
$Pd_2[(C_6H_5CH=CH)_2CO]_3$	Tris(dibenzylideneacetone)dipalladium(0)	51364-51-3	916	23.2	chloroform
$Pd_2[(C_6H_5CH=CH)_2CO]_3.CHCl_3$	Tris(dibenzylideneacetone)dipalladium-	52522-40-4	1035	20.5	chloroform
$PdCl_2[(C_5H_4P(C_6H_5)_2)_2Fe]$	Dichloro-1,1'-bisdiphenylphosphinoferrocene	72287-26-4	728	14.5	moderate in chloroform
$PdCl_2[(C_5H_4P(C_6H_5)_2)_2Fe]$ $(CH_3)_2CO$	Dichloro-1,1'-bisdiphenylphosphinoferrocene palladium(II)acetone adduct	851232-71-8	789	13.7	chloroform, dichloromethane
$PdCl_2[(C_5H_4P(C_6H_5)_2)_2Fe]$ CH_2Cl_2	Dichloro-1,1'-bisdiphenylphosphinoferrocene palladium(II)dichloromethane adduct	95464-05-4	816	13	dichloromethane
$PdCl_2[(C_6H_5)_2P(CH_2)_2P(C_6H_5)_2]$	Dichloro-1,1'-bisdiphenylphosphinoethane palladium(II)	19978-61-1	575	18.5	dichloromethane
$PdCl_2[(C_6H_5)_2P(CH_2)_3P(C_6H_5)_2]$	Dichloro-1,1'-bisdiphenylphosphinopropane palladium(II)	59831-02-6	590	18	dichloromethane
$PdCl_2[(C_6H_5)_2P(CH_2)_4P(C_6H_5)_2]$	Dichloro-1,1'-bisdiphenylphosphinobutane palladium(II)	29964-62-3	603	18.5	sparingly in DMF
$Pd[P(t\text{-}C_4H_9)_3]_2$	Bis-tri-t butylphosphine palladium(0)	53199-31-8	510	20.9	not soluble, but decomposes
$PdCl(CH_2C_6H_5)P[(C_6H_5)_3]_2$	Benzyl(chloro)Bis triphenylphosphine palladium(II)	22784-59-4	757.58	14	dichloromethane
$PdCl_2[(C_4H_9)_2P(C_5H_4)]_2Fe$	1,1-Bis(di-tert butylphosphineo)ferrocene palladium(II)chloride	95408-45-0	651	16.3	not soluble
PdCl2(C7H8)	Dichloro(norbornadiene)palladium(II)	12317-46-3	269	39.5	chloroform
PdCl2(C8H12)	Dichloro(1,5-cyclooctadiene)palladium(II)	12107-56-1	286	37.3	moderate in dichloromethane

PLATINUM RUTHENIUM RHODIUM

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$[RhCl(C8H_{12})]_2$	Chloro(1,5-cyclooctadiene)rhodium(I)dimer	12092-47-6	493	41.7	acetone, methanol
$RhCl(CO)[P(C_6H_5)_3]_2$	Carbonylchlorobis (triphenylphosphine)rhodium (I)	13938-94-8	690.71	15	acetone, ethanol
$[RhCl(C_2H_4)_2]_2$	Chlorobis (ethylene) rhodium (I) dimer	12081-16-2	388.93	52.9	
$[Rh(C_8H_{12})Cl]_2$	Chloro(1,5-cyclooctadiene) rhodium(I) dimer	12092-47-6	493.08	41	sparingly soluble in common solvents
$RhCl[(C_6H_5)_3P]_3$	Chlorotris (triphenylphosphine) rhodium (I)	14694-95-2	925.23	11.1	benzene, toluene
$RhCl_2(C_2H_8N_2)_2NO_3$	trans-Dichlorobis(ethylenediamine) rhodium(III)nitrate		356.01	28.9	
$RhH[P(C_6H_5)_3]_4$	Hydridotetrakis (triphenylphosphine) rhodium (I)	18284-36-1	1153.09	8.	
$[Rh(CO_2CH_3)_2]_2$	Rhodium (II) acetate, dimer	15956-28-2	441.99	46.57	water
$[Rh(C_7H_{15}COO)_2]_2$	Rhodium octanoate dimer	73482-96-9	778.62	26.46	hot alcohol, CH_2Cl_2, toluene, acetic acid

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$RuO_2.x\ H_2O$	Ruthenium(IV)Oxide,Hydrated	32740-79-7	187	52-55	hydrochloric acid aqueous
$[(C_8H_{12})RuCl_2]n$	Dichloro(1,5-cyclooctadiene)ruthenium(II) polymer	50982-12-2	280	34-36	not soluble
$(CH_3CH_2CH_2)_4N^+RuO^-_4$	Tetrapropylammonium perruthenate	114615-82-6	351.43	28.75	
$[RuCl_2(C_{10}H_{14})]_2$	Dichlorobis(p-cymene))ruthenium(II)dimer	52462-29-0	612	33	alcohol
$Ru_2Cl_4[(S)\text{-}BINAP]_2$. complex	Ruthenium -(S)- BINAP complex		1690	11 approx	
$Ru(CH_3COCHCOCH_3)_3$	Tris(acetylacetonate)ruthenium(III)	14284-93-6	398	25.4	chloroform

COMPOUND	NAME	CAS	F.W.	% P.M.	SOLUBILITY
$Pt_2[CH_2=CH(CH_3)_2SiO$	Platinum(0)1,1,3,3-divinyldisiloxane	68478-92-2		5% Pt in	xylene, polysiloxanes
$Si(CH_3)_2CH\text{-}CH_2]_3$	OR Karsted Catalyst /solution in xylene			solution	
$Pt[P(C_6H_5)_3]_4$	Tetrakis (triphenylphosphine) platinum (0)	14221-02-4	1244.21	15.68	benzene

Air sensitive Hygroscopic Light sensitive Moisture Sensitive Anhydrous

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