

All six PGMs in one rock - Merensky reef



The Platinum Group Metals (PGMs) – platinum, palladium, rhodium, ruthenium, iridium and osmium – are mostly found together in the same rock from a remarkable Southern African ore resource that produces not just one rare metal, but six!

These metals are highly valued and used in many industrial processes to make items such as auto-components, electronics, fertiliser, glass and medical devices.

Platinum, palladium and rhodium are particularly renowned for their catalytic properties. This means that they can speed up chemical reactions without being changed in the process.

In the automotive sector, these metals are a key component in autocatalysts (catalytic converters), which reduce harmful emissions from vehicles.

Platinum and rhodium are used together as an alloy for the gauze used in the making of nitric acid, a key ingredient of fertiliser. The gauze acts as a catalyst, making the process faster and more efficient.

Platinum is also used as a catalyst in a number of refining processes in the petroleum industry. This, for example, increases the amount of higher-octane fuel per barrel of oil refined.

INTRODUCING THE PLATINUM GROUP METALS

Platinum shares many of its unique physical and chemical properties with the other Platinum Group Metals

PLATINUM GROUP METALS

Pt

Platinum

Atomic number: 78
Melting point: 1768 °C
Density: 21.45 g/cc

Palladium

Atomic number: 46
Melting point: 1554 °C
Density: 12.02 g/cc

Pd

Rh

Rhodium

Atomic number: 45
Melting point: 1960 °C
Density: 12.41 g/cc

Ruthenium

Atomic number: 44
Melting point: 2310 °C
Density: 12.45 g/cc

Ru

Ir

Iridium

Atomic number: 77
Melting point: 2443 °C
Density: 22.65 g/cc

Osmium

Atomic number: 76
Melting point: 3050 °C
Density: 22.61 g/cc

Os

Due to their biological compatibility, platinum and, to a lesser extent, iridium are used to make medical devices such as pacemakers, stents and aural and retinal implants.

They are also both used in the treatment of certain cancers. Platinum and palladium are visible under x-ray and are extensively used in equipment needed for 'keyhole' surgery techniques.

Some of the lesser known applications of the PGMs include osmium's use in forensic science to stain fingerprints, and in DNA analysis. As the hardest of all PGMs, osmium is also used to make fountain pen nibs, styluses and instrument pivots.

The history of PGMs

Platinum was discovered in 1735, and little was known about the PGMs before the early 19th century.

This is due to the very properties that make them so sought-after today. The high melting points and resistance to corrosion that typify PGMs mean that complex techniques are needed to extract and refine the individual metals from the platinum ore.

Deposits of platinum are rare and concentrated in Southern Africa, where 80 per cent of the world's reserves are located. Of the ore mined here, platinum accounts for more than half of the refined PGM content recovered.

Platinum, palladium and rhodium are the most economically important of the PGM family. Platinum is the most prominent of all due to its wide use across the broadest range of segments. As well as its industrial applications, platinum is a precious metal used in the fabrication of premium jewellery. Furthermore, platinum is established as the pre-eminent PGM metal for investment.

Contacts:

Sally Singer, Investor Development, ssinger@platinuminvestment.com

Brendan Clifford, Investor Development, bclifford@platinuminvestment.com

Trevor Raymond, Research, traymond@platinuminvestment.com

Vicki Barker, Investor Communications, vbarker@platinuminvestment.com



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