

Jewellery metals



Jewellery on display

A number of different transition metals can be used to make jewellery. The choice of a metal will depend on its price, appearance and properties. Different metals are suitable for different purposes.

Some metals are hallmarked to guarantee their purity. Hallmarking was Europe's first form of consumer protection and was introduced by the French in 1260. England followed in the 1300s first with a standard for silver and then for gold. Metals or metal items are assayed by an assay office and then stamped or hallmarked to show their purity. Silver is assayed by titration, platinum by a form of spectrometry and gold by cupellation. This involves heating the gold to separate the noble metals such as gold from base metals such as copper and iron. It works on the principle that the unreactive metals will remain unchanged while the cheaper, reactive metals will oxidise and form compounds.

Hallmarking for platinum was introduced in England in 1973 and for palladium in 2010.



Gold jewellery

Gold

Gold has been valued for jewellery and coinage since before the beginning of recorded history. It is shiny and yellow as well as being dense, soft, malleable and ductile. It is one of the least reactive solid elements and is usually found 'native' in the Earth – that is, as the element and not chemically combined with anything else. The properties of gold can be changed by alloying it with other metals. As it is a very soft metal it scratches easily so harder alloys are often preferred for making jewellery which will be used for a long time. The colour can also be changed. Adding copper to the alloy gives rose gold which has a pink colour and adding nickel, platinum or palladium gives white gold. As gold is fairly soft and malleable, the size of gold rings can be changed if a person's ring changes size.

The purity of gold is measured in carats. 24-carat gold is 99.9% pure gold; 18-carat is 75% gold and 9-carat is 37.5%.

1 H																	2 He	
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
55 Cs	56 Ba	* 57-70	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
87 Fr	88 Ra	** 89-102	Lr	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub	Uuq					

* Lanthanide series

57	58	59	60	61	62	63	64	65	66	67	68	69	70
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
138.905	140.12	140.908	140.908	140.908	150.36	151.964	157.25	158.925	162.50	164.930	167.259	168.930	173.054

** Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
227.033	232.037	231.036	238.028	237.043	244.040	243.061	247.065	247.065	251.078	252.083	257.103	258.104	261.108

The positions of the most common jewellery metals in the periodic table

Platinum

Platinum is a white metal which is very hard wearing. Unlike gold, it is used in jewellery in nearly pure form (about 95% pure). It is very dense and heavy so will feel heavier than a similarly-sized 18ct gold ring. It is significantly more expensive than gold, though, and will cost approximately twice the price of a similar 18ct gold item.



A platinum engagement ring

Palladium

A few years ago, palladium was more expensive than platinum and until recently was very difficult to cast so making jewellery from it wasn't possible. Since that problem has been resolved and the price reduced, it has quickly grown in popularity and now more than a fifth of the palladium produced world-wide is used for jewellery. It looks similar to platinum, which is immediately below it on the periodic table, and has similar chemical properties making it very resistant to corrosion and oxidation.

Silver

Like gold, silver has been used for jewellery since prehistoric times. Sterling silver is at least 92.5% pure silver. It is a white-grey coloured metal and is less expensive than gold and other precious metals. As it is softer (so more likely to be scratched) and more reactive (so more likely to oxidise and turn black) than some other jewellery metals it is not usually used for jewellery which will be worn every day.



A Portuguese silver collar from the second century BC, still shiny after 2000 years.

Titanium

Titanium is a hard, strong and very light-weight metal and has become popular for jewellery in recent years. It is also very inert so it is unlikely to cause an allergic reaction. It is dent and corrosion resistant and so a popular choice for watch cases. Titanium has a surface coating of its oxide. The thickness of this can be varied to produce a range of colours and patterns. Titanium cannot be soldered so titanium rings cannot normally be re-sized.



A watch with titanium case and strap

Tungsten carbide

Tungsten carbide is a chemical compound containing equal numbers of tungsten and carbon atoms but can be worked to look like a metal. It has the chemical formula WC. Tungsten carbide is mainly used for men's wedding rings. It is extremely scratch resistant as it is very hard and can hold its shine for years. It has a darker colour than platinum. Tungsten carbide cannot be cut and re-soldered so tungsten carbide rings cannot be re-sized.



A tungsten carbide ring