

Mainstream metals

These shiny substances make up the vast majority of elements in the periodic table. The transition metals are generally malleable (able to be shaped without breaking), can be mixed to make alloys, and will conduct electricity. They are also the best conductors of heat—that's why they are cold to the touch, since they take heat away from your hand. Many metals are magnetic.



WARNING!
DON'T TRY
THIS AT
HOME

Aluminum and iron oxide
In this chemical reaction, carried out under strict laboratory conditions, the poor metal aluminum frees the transition metal iron from iron oxide (a compound of iron and oxygen).



1 Powdered iron oxide and aluminum are mixed in a glass beaker. As a precaution, the beaker is placed in a cast-iron vessel filled with sand. It's a dangerous combination!

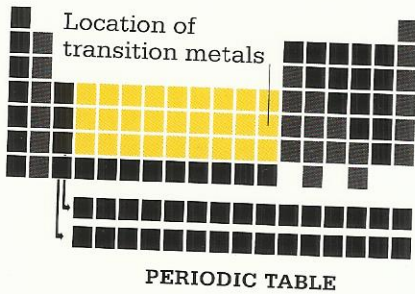
Types of metal

Transition metals form the main body of the periodic table. They are strong and hard, with high melting points. The poor metals, to the right, have lower melting points and are softer. The lanthanoids are all very similar and are usually set apart from the main block of metals. The same is true of the actinoids. Metalloids have both metallic and nonmetallic properties.

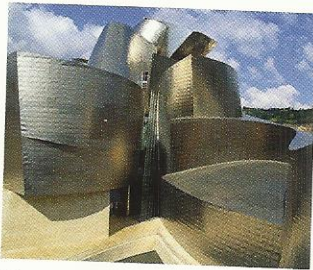
										13				
										5				
										B				
										BORON				
										13	14			
										Al	Si			
										ALUMINUM	SILICON			
3	4	5	6	7	8	9	10	11	12					
21	22	23	24	25	26	27	28	29	30	31	32	33		
Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As		
SCANDIUM	TITANIUM	VANADIUM	CHROMIUM	MANGANESE	IRON	COBALT	NICKEL	COPPER	ZINC	GALLIUM	GERMANIUM	ARSENIC		
39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	
YTIPIUM	ZIRCONIUM	NIOSIUM	MOLYBDENUM	TECHNETIUM	RUTHENIUM	RHODIUM	PALLADIUM	SILVER	CADMIUM	INDIUM	TIN	ANTIMONY	TELLURIUM	
57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	
La-Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	
LANTHANOIDES	HAFNIUM	TANTALUM	TUNGSTEN	RHENIUM	OSMIUM	IRIDIUM	PLATINUM	GOLD	MERCURY	THALLIUM	LEAD	BISMUTH	POLONIUM	
89-103	104	105	106	107	108	109	110	111	112			114	116	
Ac-Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn			Uuq	Uuh	
ACTINOIDES	RIENBERGDIUM	DUBNIUM	SEABORGIUM	BOHRDIUM	HASSIUM	MEITNERIUM	DARMSTADTIUM	ROENTGENIUM	COPERNICIUM			UNUNQUADIUM	UNUNHEXIUM	
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
LANTHANUM	CERIUM	PRASEODYMIUM	NEODYMIUM	PROMETHIUM	SAMARIUM	EUROPIUM	GADOLINIUM	TERBIUM	DYSPROSIUM	HOLMIUM	ERBIUM	THULIUM	YTTERIUM	LUTETIUM
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
ACTINIUM	THORIUM	PROTACTINIUM	URANIUM	NEPTUNIUM	PLUTONIUM	AMERICIUM	CURIUM	BERKELIUM	CALIFORNIUM	EINSTEINIUM	FERMIUM	MENDELEVIUM	NOBELIUM	LAWRENCIUM

Actinoids (light green)

Transition metals [Movers



Most of these metals are dense, hard, and strong, with high melting points. They conduct electricity, resist corrosion, and are easily mixed to make alloys. Transition metals also make the colored compounds used in paint pigments and fireworks.



Guggenheim Bilbao
This Spanish museum is clad in titanium panels.

22
Ti
TITANIUM

Titanium
Titanium is a wonder metal, incredibly strong and amazingly hard. It is used in jet engines, ships, spacecraft, sports equipment, replacement hips, dental implants, and much more.

<i>What it is</i>	A shiny, very tough metal
<i>Melting point</i>	3,034°F (1,668°C)
<i>Boiling point</i>	5,949°F (3,287°C)

47
Ag
SILVER

Silver
Silver conducts electricity better than any other element, including copper (see pages 54–55). It is used for high-quality electrical wires. Germs are unable to grow on silver, so it is ideal for wound dressings and medical equipment.



Cup of champions
Silver can be polished to give a beautiful shine, which makes it popular for jewelry and trophies.

<i>What it is</i>	A shiny silver metal
<i>Melting point</i>	1,763.2°F (961.78°C)
<i>Boiling point</i>	3,924°F (2,162°C)

28
Ni
NICKEL

Nickel
Supershiny nickel does not tarnish in air. It is sometimes used to make coins. Added to alloys, it gives extra protection against rust.

<i>What it is</i>	A silvery, shiny, hard metal
<i>Melting point</i>	2,651°F (1,455°C)
<i>Boiling point</i>	5,275.4°F (2,913°C)



NICKEL (5-CENT) COIN

<i>What it is</i>	A shiny silver metal
<i>Melting point</i>	1,763.2°F (961.78°C)
<i>Boiling point</i>	3,924°F (2,162°C)

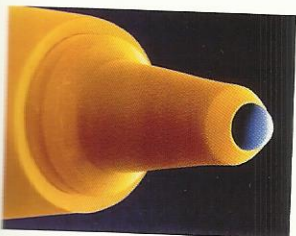
25% proportion of nickel in a **“nickel” coin**

Other transition metals:

Vanadium (V); Chromium (Cr); Manganese (Mn); Iron (Fe); Cobalt (Co); Copper (Cu); Zinc (Zn); Zirconium (Zr); Niobium (Nb); Molybdenum (Mo); Technetium (Tc); Ruthenium (Ru); Rhodium (Rh); Cadmium (Cd); Hafnium (Hf); Tantalum (Ta); Rhenium (Re); Osmium (Os); Iridium (Ir); Platinum (Pt); Gold (Au)

74
W
TUNGSTEN

Tungsten
Combined with carbon, tungsten forms tough tungsten carbide. This compound is used for rock drills, bulletproof armor plating, and even pen points!



TUNGSTEN CARBIDE BALLPOINT PEN NIB

<i>What it is</i>	A hard steel-gray metal
<i>Melting point</i>	6,192.6°F (3,422°C)
<i>Boiling point</i>	10,031°F (5,555°C)

80
Hg
MERCURY

Mercury
This is the only metal that is liquid at room temperature. Mercury was used in thermometers until people realized that it is poisonous. Amalgam, a safe mercury alloy, is used in dentistry to fill cavities in teeth.



Liquid mercury
Mercury “clumps” and does not feel wet to the touch.

<i>What it is</i>	A slinky, silvery, liquid metal
<i>Melting point</i>	-37.89°F (-38.83°C)
<i>Boiling point</i>	674.11°F (356.73°C)

Number of years a titanium hip implant can last:

20