

# Uses of Minerals in Sports

## Sledding Sports

Steel is the basis of competitive sports such as luge, skeleton and bobsleigh, and allows sledders to reach speeds of up to 140 km/hour! Molybdenum is a key component in the manufacture of steel, giving it strength. Bobsleds got their name when sledders bobbed up and down as they sent their steel-bodied sleds down the run. Now, the shell, or cowl, of the bobsled is made of fibre glass, which is made by weaving glass into a fine fibre. Glass is made from silica, or in other words, quartz sand.



## Metals to Medals

The gold, silver, and bronze medals for the Vancouver 2010 Olympic and Paralympic Games were the first Olympic medals to contain recycled metals recovered from e-waste! Gold medals are not made of solid gold - they are made by placing a layer of gold (7.5%) on a silver base (92.5%). Silver medals contain 7.5 % copper because pure silver is too soft for the medals. Bronze (an alloy of copper and tin) medals are made mostly of copper. ~ 903 kgs of Copper were used in the production of all 2010 Olympic medals.



## Hockey

You wouldn't be able to play hockey without mineral resources. Many minerals are needed to make hockey happen! Blades are made from chrome-plated carbon steel. Aluminum, titanium, and graphite help make hockey sticks light and flexible. Sulphur is used in the manufacture of rubber from crude gum for hockey pucks. Helmet and mask cages use stainless steel, made with iron, nickel and chromium. Helmets themselves are made of composite material that may include carbon fibre. Goal posts are made of steel, PVC (polyvinyl chloride), and aluminum. Wow!



## Lacrosse

Lacrosse evolved from Native American warrior training into what is now recognized as Canada's national summer sport. The sticks for lacrosse rely on shafts made of minerals such as aluminum, graphite, and titanium, or alloys of aluminum, magnesium, scandium, and zinc. Sulphur is incorporated in the production of rubber (made from crude gum) for the balls. The goal posts are made of steel, PVC (polyvinyl chloride), and aluminum.



## Bicycling

A bicycle, a popular recreational and transportation vehicle, is made mostly of metal. Titanium frames are featherweight, quite flexible but also very expensive. Aluminum frames are lightweight and cheaper, but not as flexible. Chromoly (chromium-molybdenum) steel frames are strong and affordable, but heavy. Most other parts in a bicycle (breaks, gears, crank, etc.) also require steel, titanium, aluminum, magnesium, sulphur, etc. Helmets are a must when biking! Bike helmets are made of calcium carbonate (limestone), talc, clays, mica and more.



## Football and Soccer

Footwear in these sports needs to have good grip for stability. Cleats are made with zinc and other metals. Borax, salt, chromium, and sulphur are used in preparing the shoe leather. Molybdenum and titanium are used to help stabilize the sole. The playing surfaces require fertilizer made from potash (KCl). Stadiums require mineral products such as steel (iron, zinc, molybdenum, etc.), concrete (limestone, clay, gypsum, and aggregates), glass (silica sand and feldspar), tile (clay and feldspar), aluminum, and dimension stone.



# Uses of Minerals in Sports (page 2)

## Running

Running wear has improved tremendously in recent years – minerals help keep runners safe and keep their laundry hampers smelling a little fresher. Silver is now used in running apparel such as shirts and socks to kill bacteria, and more importantly

odour. Zippers are made with chrome-plated zinc teeth. Aluminum is used to make reflective tape and shiny fabric so runners are more visible. Copper is also sometimes incorporated in fabrics and other materials for its antibacterial properties.



## Skiing/Snowboarding

Ski and snowboard bases use aluminum, titanium, carbon fibre, and boron fibre.



Bindings are made of steel. Weights of tungsten alloys help steady the ride. Other than steel, the advanced ceramics used in making boots contain composites that include aluminum oxide, clay, hydroxyapatite, lead zirconate titanate, lithium, silica, silicon carbide, tin oxide, titanium dioxide, yttria-stabilized zirconia, and zirconium diboride. Poles have aluminum or carbon-graphite shafts and tungsten carbide tips.

## Curling

The first written record of curling dates back to 1541 in Scotland. Adult curling stones, or "rocks", are expensive, 42-pound stones composed of a unique, dense granite quarried on Ailsa Craig, Scotland. Curling composites of granite and other rocks may be



used to create lighter "junior" stones for children and seniors. The molded plastic handle is attached with a steel bolt. The bolt hole is lined with brass (copper and zinc) that may also contain aluminum, lead, manganese, silicon, and tin.

## Golf

Ever since the beginning of the sport, metals have been used in golf clubs. Golf players in the 15th century used metal for the head of the club, giving us the term "iron".

In the 16th century, players started having their clubs professionally made. By the 19th century, club makers started using metal shafts to give players better control over the ball. Clubs are now made of graphite, titanium, beryllium, copper, aluminum, carbon fibres, steel, tungsten, and alloys of these and other metals. The course itself depends on fertilizers made from potash (KCl), and also on sand for the traps.



## Baseball & Softball

Most high-quality bats are now made from a scandium-aluminum alloys, which makes them light, durable and easy to use. Scandium occurs in more than 800 minerals, and is mostly commonly obtained as a by-product of uranium refining.

Clay is used in much of the playing surface; clay-sand composites are used to construct the base paths, batter's box, bullpen, and pitcher's mound.

Minerals become especially important for night games: aluminum, copper, gases (halides, neon, sodium), glass fibre, lighting glass, steel, and tungsten are all used to light up the field.



## Swimming

Competitive swimming has existed for 2,000 years, and records continue to fall at a blistering pace.

The timing devices to keep and display those records require an array of minerals: boron, copper, gold, and quartz to name a few. Silicone is used in making swim caps, and the headbands and nosepieces of swim goggles. Silicone is made from silicon and methyl chloride, and silicon is in turn made from silica (quartz sand) and carbon. Silver ions are used in purifying water. Building the pool itself requires products such as concrete (limestone, clay, gypsum, and aggregates) and tile (clay and feldspar).



The following links are meant to be complementary information on some of the minerals mentioned in the table and their different uses along with their applications in sports. For an overall look at major mining operations in BC and Canada, visit [MREPBC's BC's Mineral Resources](#) section, [InfoMine](#) and [Natural Resources Canada](#). You can also see the [USGS Minerals in Sports](#) information.

**Molybdenum:** Learn more about the impressive uses of Moly at the [International Molybdenum Association](#). Also, read the [USGS Molybdenum](#) minerals information. *Mined in:* BC - Eg. [Endako](#), [Max](#), [Gibraltar](#), [HVC](#), [Huckleberry](#).

**Silicon:** Read about some of the [most common uses](#) of Silicon. Also, read the [USGS Silicon](#) minerals information. *Mined in:* BC - Eg. [Monteith Bay](#), [Apple Bay](#), and various other parts in Canada and the world.

**Gold:** Learn more about the widely varied uses of gold from the [World Gold Council](#). Also, read the [USGS Gold](#) minerals information. *Mined in:* BC - Eg. [Kemess](#), [Myra Falls](#), [Table Mountain](#), [QR](#).

**Silver:** Learn more about the widely spread uses of Ag at the [Silver Institute](#) and read the [USGS Silver](#) minerals information. *Mined in:* BC - Eg. [Myra Falls](#) and various other parts in Canada and the world.

**Copper:** Learn all you can and more at the [Copper Development Association](#). Also, read the [USGS Copper](#) minerals information. *Mined in:* BC - Eg. [HVC](#), [Gibraltar](#), [Huckleberry](#), [Myra Falls](#), [Mount Polley](#).

**Zinc:** Learn more about the amazing uses of from the [International Zinc Association](#) and read the [USGS Zinc](#) minerals information. *Mined in:* BC - Eg. [Myra Falls](#), [Table Mountain](#), [Shasta](#), [Lexington](#).

**Chromium:** Learn about the uses of chromium in [sports nutrition!](#) Also, read the [USGS Chromium](#) minerals information. 80 % of the world's chromium production is in India, Kazakhstan, Turkey and southern Africa. Southern Africa itself produces about half of this.

**Aluminum:** Learn more about the wide range of [uses of aluminum](#) or read up on the [history of aluminum](#). Look at the [USGS Aluminum](#) minerals information. The majority of aluminum production in Canada takes place in Quebec.

**Graphite:** Read about the popular [uses of graphite](#) or read the [USGS Graphite](#) minerals information. In tonnage, South Korea is the largest producer of graphite in the world, followed by Austria and a dozen others.

**Sulphur:** Read interesting [facts about sulphur](#) or learn from the [USGS Sulphur](#) minerals information. Notable occurrences of sulphur are in Michigan and Ohio, USA, Sicily, Poland and Chile.

**Tungsten:** Learn about the [uses of tungsten](#) and read the [USGS Tungsten](#) minerals information. Nearly half of the world's tungsten resources are found in China. Canada and Russia also have large reserves.

**Nickel:** Learn more about the nickel uses of from the [Nickel Institute](#) and read the [USGS Nickel](#) minerals information. Large reserves of nickel are found in Ontario and in Eastern Canada.

**Manganese:** Read up on the [uses of manganese](#) or explore the [USGS Manganese](#) minerals information. Over 80% of the known world manganese resources are found in South Africa and Ukraine.

**Scandium:** Learn more about the uses of scandium from the [Jefferson Lab](#) and read the [USGS Scandium](#) minerals information. The majority of scandium production comes from thortveitite deposits but it is also recovered from mine tailings of tantalum and uranium deposits.

**Gypsum:** Read about the multiple [uses of gypsum](#) and learn more from the [USGS Gypsum](#) minerals information. BC has many industrial operations which produce gypsum, but it is also commonly found all around the world.

**Tin:** Learn more about the interesting [facts about tin](#) or read the [USGS Tin](#) minerals information. Tin is primarily mined in China, Indonesia, and Peru with lesser amounts from Brazil, Bolivia, Australia and about a dozen other countries.

**Lead:** Learn more about the varied [uses of lead](#) and read the [USGS Lead](#) minerals information. Canada is the leading exporter of lead to the US, followed by Mexico, Australia, and Peru. More than 1 million tons of lead is recovered in recycling annually, the majority of which is from the recycling of batteries.