



Australian Mining

# 3 things

Produced by the Minerals Council of Australia



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# Everyday things mining makes possible



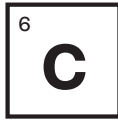
01 Electricity	16 Batteries
02 Food processing	17 Commercial printing
03 Health care	18 Dentistry
04 Smartphones	19 Funerals
05 White goods	20 Film & television
06 Electric cars	21 Meat & vegies
07 Defence	22 Home protection
08 Solar panels	23 Environmental solutions
09 Your house	24 Melbourne Cup
10 Public transport	25 Birthing suites
11 Cleaning products	26 Brewing beer
12 Sydney Harbour Bridge	27 Lenses & telescopes
13 iPads & Xboxes	28 Roads & rail
14 Personal hygiene	29 Windfarms
15 Currency	30 Space travel

**Everything comes  
from somewhere.**

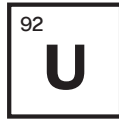
**If it didn't grow,  
it was mined.**

**Australian  
Mining**

Energy generation



Carbon  
(Coal)

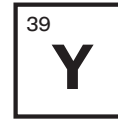


Uranium

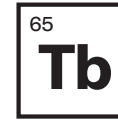
Fluorescent lighting



Lanthanum



Yttrium

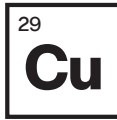


Terbium

Production and transmission



Iron



Copper

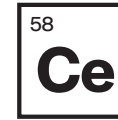


Aluminium

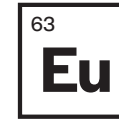
LED



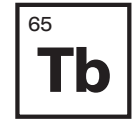
Gallium



Cerium

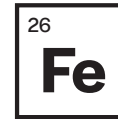


Europium

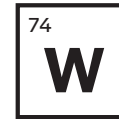


Terbium

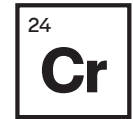
Halogen



Iron



Tungsten



Chromium

Mining makes powering the world possible

# 01 Electricity

Electricity travels  
at around 90 per cent  
of the speed of light.

## Australia an energy powerhouse

Australia exports two-thirds of the energy it produces, powering economies around the world. Coal, uranium, oil and gas make up 20 per cent of Australia's total export value, earning the nation around \$90 billion a year. Australia will increasingly play a role in meeting future global energy demand, according to the IEA.

# Zirconium



Steel alloys



Flashbulbs



Surgical instruments



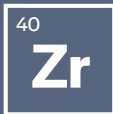
Deodorant



Catalytic converters



Abrasives



Zirconium

## Did you know?

Soviet scientists discovered they could create cubic zirconias (zirconium combined with dioxide) in a laboratory in the 1970s. They faceted the stone, named the crystals 'Djevalite' and began marketing them as simulated diamonds in 1976.

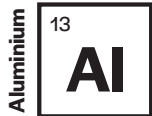
Australian  
Mining

Machinery used to process and manufacture food

26 <b>Fe</b>	6 <b>C</b>	24 <b>Cr</b>	42 <b>Mo</b>	25 <b>Mn</b>	28 <b>Ni</b>
Iron	Carbon	Chromium	Molybdenum	Manganese	Nickel

Australian  
Mining

**Coca-Cola uses  
300,000 tons of  
aluminium every  
year in the US  
– 17.4% of total  
US aluminium  
production**



Foil packets  
Drink cans

*Mining makes the  
preservation of food possible*



Tin	50 <b>Sn</b>	Canning (tin-coated steel)
Copper	29 <b>Cu</b>	Alloys reduce food contamination
Sodium	11 <b>Na</b>	Flavour enhancer Preservative

# 02 Food processing



Blender blades  
Machinery plating

## Sustainable coffee pods

Rio Tinto has partnered with coffee giant Nespresso to supply sustainable aluminium for its coffee capsules after becoming the world's first company to be certified by the Aluminium Stewardship Initiative (ASI). Certification reflects the highest environmental, social and governance practices across the aluminium lifecycle.

# Zinc



Rust prevention



Soap



Plastics



Metal alloys



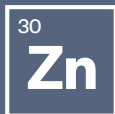
Sunscreen



Rubber



Ink



Zinc

## Did you know?

Oysters contain more zinc than any food – one reason they are believed to be an aphrodisiac. Zinc is crucial to hormone production. Casanova believed in the power of the mollusc – the 18th-century lover would breakfast on 50 oysters.

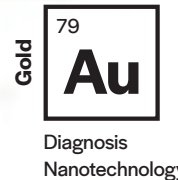
**Australian  
Mining**





*Mining makes modern medicine and treatment possible*

**Metal-based compounds  
are crucial to the diagnosis  
and treatment of disease.**



### Gold nanoparticle technology

The nanotechnology boom has opened up a new frontier of early detection, diagnosis and treatment of diseases. Gold nanoparticle technology is being used to target and deliver antibodies directly into cancerous tumors. They are also being engineered to attach to cancer-related proteins to aid earlier detection.

# 03 Health care

# Uranium



Submarines



Medical research



Clean energy



Industrial x-rays



Cancer treatments



Aerospace



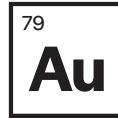
Uranium

## Did you know?

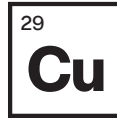
As a power source, uranium is practically infinite. Enriched uranium can produce 3.7 million times the energy of coal. It can also be reused multiple times. A golfball-sized amount of nuclear material provides a lifetime of energy for one person.

# Australian Mining

Electronics



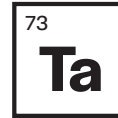
Gold



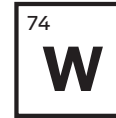
Copper



Silver

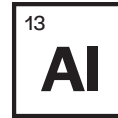


Tantalum



Tungsten

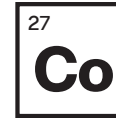
Battery



Aluminium

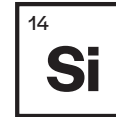


Lithium



Cobalt

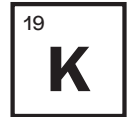
Touch screen



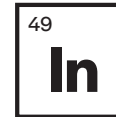
Silicon



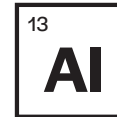
Tin



Potassium



Indium

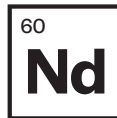


Aluminium

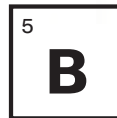


Gallium

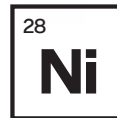
Sound



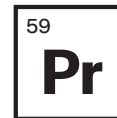
Neodymium



Boron



Nickel



Praseodymium

*Mining makes holding the world in your hand possible*

More than 40  
mined metals and  
rare earths are used  
to produce a single  
smartphone.

# 04 Smartphones

## Modern day gold mine

One tonne of mobile phones yields more gold than one tonne of gold ore. Tech companies are cashing in on this gold mine by rolling out recycling programs. Apple's recycling program reaped almost a tonne of gold in 2015. Last year Apple debuted a robot called 'Daisy' that can disassemble up to 200 iPhones an hour.

# Tungsten



Light bulbs



Microwaves



Fishing sinkers



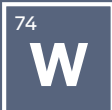
Televisions



Heating elements



Darts



Tungsten

## Did you know?

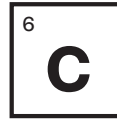
Tungsten is the metal of choice for gold counterfeiters. It has earned the dubious reputation because it shares a similar density to gold. Ingots filled with tungsten spooked markets and sparked conspiracy theories when discovered in 2012.

Australian  
Mining

Steel used to build white goods



Iron



Carbon



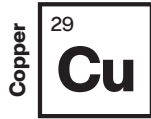
Zinc



Titanium

Paint and some finishes

*Mining makes the products that make every day possible*

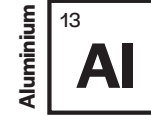


Copper

Electrical wiring  
Compressors

More than 75%  
of fridges sold in  
Australia are now  
stainless steel.

# 05 White goods



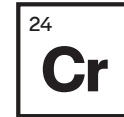
Aluminium

Condenser  
Fan blades

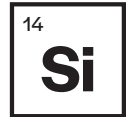
Stainless steel



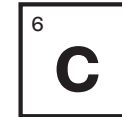
Iron



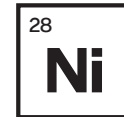
Chromium



Silicon



Carbon



Nickel



Manganese

## Lost Sock Index

Scientists devised a 'Sock Loss Index' in 2016 to find out why socks go missing in the wash. This formula  $(L(p \times f) + C(t \times s)) - (P \times A)$  explains why Britons lose on average 1.3 socks a month. Unsurprisingly it's down to the complexity and care taken while doing laundry. The research was clever marketing by a white goods company.

# Tin



Magnets



Pewter



Tin cans



Solder



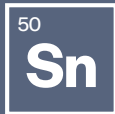
Touchscreens



Dye



Metal bearings



Tin

## Did you know?

The Academy Award's Oscar statuette is made primarily of tin. The figure, a stylised knight holding a crusader's sword and standing on a film reel, is made of Britannia metal (93% tin, 5% antimony, 2% copper) and plated with 24 carat gold.

**Australian  
Mining**

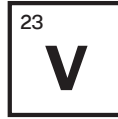
Car body and chassis made from strengthened steel and aluminium alloys



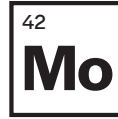
Iron



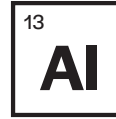
Manganese



Vanadium



Molybdenum



Aluminium



Magnesium

Australian  
Mining

*Mining makes the cars of today and tomorrow possible*



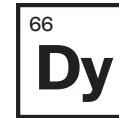
In 1899, 90% of New York City's taxi cabs were electric vehicles.



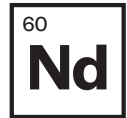
Cerium

LCD screens  
Windscreens

Magnets in EV motors



Dysprosium

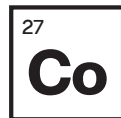


Neodymium

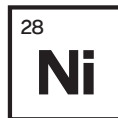
EV batteries



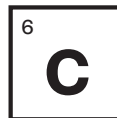
Lithium



Cobalt

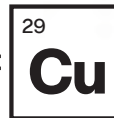


Nickel



Carbon

Copper



Connectors  
Brakes  
Bearings

## Electric cars aren't new

London inventor Thomas Parker designed and built the first practical electric car in 1884. In the 19th and early 20th centuries, electric cars fueled by high-capacity rechargeable batteries were the most popular cars on the road. It wasn't until a more advanced combustion engine and the expansion of highways that sales dropped off.

06

# Electric cars

# Sodium



Fertilisers



Table salt



Food preservation



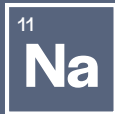
Streetlights



Baking soda



Road salt



Sodium

## Did you know?

Humans can overdose on salt. A 19-year-old man accepted a dare to chug a bottle of soy sauce in 2013. The flood of excess sodium caused his brain to lose water, landing him in a coma. Doctors flushed the salt from his system, saving his life.

**Australian  
Mining**



Manganese



Batteries  
Ship building  
Jet engines

Silver



Navigation  
Radio equipment

Bismuth



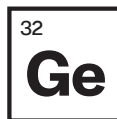
Optics (lenses)  
Ammunition

Chromium



Aircraft  
Missiles  
Engines

Germanium



Fibre optics  
Infrared optics  
Electronics

Antimony



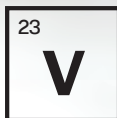
Ammunition

Rhenium



Exhausts  
Turbine fans

Vanadium



Armor plating

*Mining makes protecting  
our nation possible*

Scandium



Jet aircraft  
Missiles

# 07 Defence

**Australia's  
F-35 Joint Strike  
Fighter can  
travel at 1.6 times  
the speed of  
sound – or almost  
2000 km/h.**

## Fighter pilot futuristic tech

Australia's F-35 Joint Strike Fighter pilots will wear custom-made, augmented reality helmets worth A\$533,000 each. Made of Kevlar and carbon fiber, the helmets are packed with electronics that project data inside the visor. Vision from sensors located around the aircraft allow pilots to effectively see 'through' the jet.

# Silver



Mirrors



Jewellery



Medicine



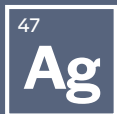
Water purification



Solar panels



3D printing



Silver

## Did you know?

Silver has been used for centuries in medicine because of its antibacterial properties. It remains a wound management agent today, especially for burns patients. Unlike manufactured antibiotics, bacteria do not develop an immunity to silver.

# Australian Mining

Solar panels

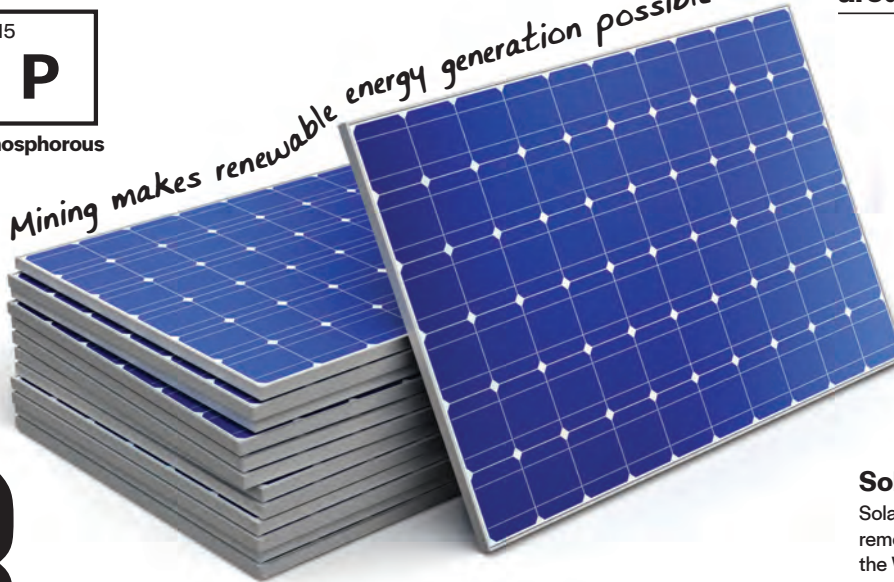
48 <b>Cd</b> Cadmium	52 <b>Te</b> Tellurium	42 <b>Mo</b> Molybdenum	4 <b>Be</b> Beryllium	32 <b>Ge</b> Germanium	31 <b>Ga</b> Gallium
49 <b>In</b> Indium	47 <b>Ag</b> Silver	14 <b>Si</b> Silicon			

Semi-conductor

5 <b>B</b> Boron	15 <b>P</b> Phosphorous
------------------------	-------------------------------

29 <b>Cu</b> Wiring
---------------------------

*Mining makes renewable energy generation possible*



**Solar PV accounts for around 3.4% of Australia's total electricity generation.**

Frame

13 <b>Al</b> Aluminium	22 <b>Ti</b> Titanium
30 <b>Zn</b> Zinc	12 <b>Mg</b> Magnesium

### Solar energy powering mining

Solar energy is increasingly powering Australia's remote mining operations. In 2015, Rio Tinto built the Weipa Solar Plant to power its bauxite mine and processing facilities on the Western Cape York Peninsula in Queensland, the first of its kind. Electricity generated by Weipa Solar offsets up to 600,000 litres of diesel usage each year.

# 08 Solar panels

# Silicon



Pottery



Computers



Sealants



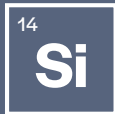
Glass



Solar panels



Cooking utensils



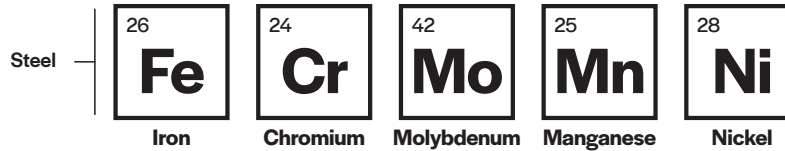
Silicon

## Did you know?

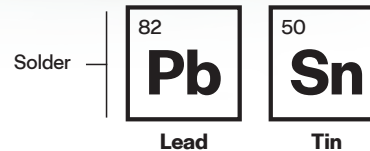
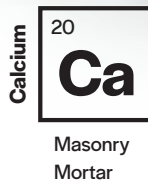
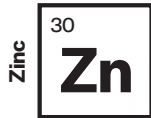
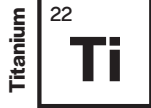
The name 'Silicon Valley' was popularised by tech reporter Don Hoefler in 1971 in a series of columns about the area's burgeoning semiconductor industry. The silicon chip remains a building block of modern day computers and electronics.

# Australian Mining

## Australian Mining



House paint



**Almost half of all  
new homes built in 2018  
were apartments.**

# 09

## Your house

### Houses are shrinking (a bit)

Australians are slowly falling out of love with the McMansion. The average house is 186.3 square metres – the smallest since 1996, according to CommSec. That's still 8 per cent bigger than 20 years ago and almost 30 per cent bigger than in 1987-88. Only the United States builds bigger houses – 230.8 square metres on average.

# Rare earths



Speakers



Wind turbines



Telescopes



MRI screening



Hybrid cars



Magnets



Rare earths

## Did you know?

Modern rare earth separation processes used today were developed around the time of WWII. The Manhattan Project drove the development of the ion exchange method which made it possible to extract plutonium for atomic bombs.

# Australian Mining

Trains, trams, buses and taxis

26 <b>Fe</b> Iron	25 <b>Mn</b> Manganese	13 <b>Al</b> Aluminium	42 <b>Mo</b> Molybdenum	82 <b>Pb</b> Lead	12 <b>Mg</b> Magnesium	73 <b>Ta</b> Tantalum
-------------------------	------------------------------	------------------------------	-------------------------------	-------------------------	------------------------------	-----------------------------

Aircraft

Aluminium 13 <b>Al</b>	Scandium 21 <b>Sc</b>
Niobium 41 <b>Nb</b>	Neodymium 60 <b>Nd</b>
Titanium 22 <b>Ti</b>	Zinc 30 <b>Zn</b>

*Mining makes getting where you need to go possible*



Air conditioning

26 <b>Fe</b> Iron	14 <b>Si</b> Silicon	29 <b>Cu</b> Copper	13 <b>Al</b> Aluminium
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GPS and electronics

29 <b>Cu</b> Copper	79 <b>Au</b> Gold	50 <b>Sn</b> Tin
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# 10 Public transport

Melbourne has the world's largest tram network with 250 kilometres of track.

## Public transport in Australia

Sydney tops the nation when it comes to public transport users, with one in five making their daily commute on trains, buses and ferries. It also has one of the most extensive networks in the country, with more than 4000 buses, 2000 train carriages, 30 ferries and a combined patronage of more than 7 million people (2016-17).

# Potassium



Fertiliser



Detergents



Salt substitute



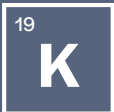
Glass



Match heads



Saline drip



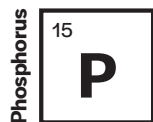
Potassium

## Did you know?

Potassium is radioactive and at the same time, vital to good health. Loaded with potassium, bananas are among the most radioactive foods. Background radiation has been with us since the earth formed. Small amounts are not harmful to humans.

Australian  
Mining





Laundry powders  
Dish detergents



Bleach  
Pool cleaner



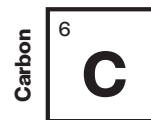
Detergents  
Oven cleaner  
Drain opener



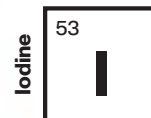
Cleansers  
Water softener  
Detergents



Plastic bottles  
Soaps



Plastic bottles  
Stain remover



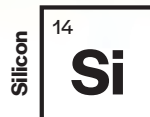
Disinfectants  
Sanitisers

Australian  
Mining

*Mining makes the unavoidable possible*



**Salt has been used as  
a natural scourer since  
medieval times.**



Steam cleaning  
Furniture polish

### Tomato sauce and elbow grease

Tomato sauce and elbow grease can make blackened pots and pans and tarnished brass objects shine like new. The acetic acid in tomato sauce breaks down the copper oxide that builds over time. Apply a layer of tomato sauce to the discoloured surface, leave for half an hour and then scrub it to a shine.

# 11 Cleaning products

# Platinum



Surgical tools



Jewellery



Catalytic converters



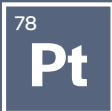
Polish



Solar panels



Dentistry



Platinum

## Did you know?

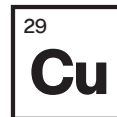
Platinum is among the most prized metals in the world, but that wasn't always the case. When the Spaniards first found the grey-white metal in Colombia in the 18th century they derided it as impure and named it 'platina', which means 'little silver'.

# Australian Mining

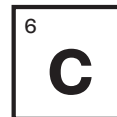


Mining makes Australian landmarks possible

Electrified  
rail lines



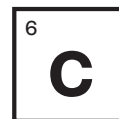
Copper



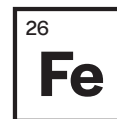
Carbon

Australian  
Mining

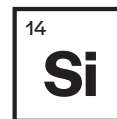
Steel beams and supports



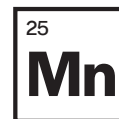
Carbon



Iron



Silicon



Manganese

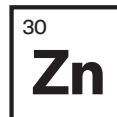
Fireworks

Antimony



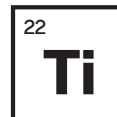
Glitter

Zinc



Smoke

Titanium



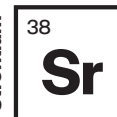
Whites

Barium



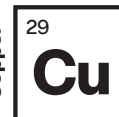
Greens

Strontium



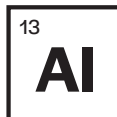
Reds

Copper

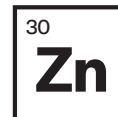


Blues

Flag pole



Aluminium



Zinc

Before he made throwing a shrimp on the barbie famous, Paul Hogan worked as a rigger building the bridge.

# 12 Sydney Harbour Bridge

## Building the bridge

The Sydney Harbour Bridge took eight years, 1400 men, 53,000 tonnes of steel and 6 million hand driven rivets to build. Labor Premier Jack Lang opened the bridge on 19 March 1932. The ceremony was briefly interrupted when ex-servicemen Francis de Groot charged on horseback and cut the ribbon with his sword.

# Nickel



Food processing



Guitar strings



Coins



Marine engineering



Electronics



Kitchen sink



Nickel

## Did you know?

A bottle of Coca-Cola could be bought for a nickel in the United States between 1885 until well into the 1950s. The company was committed to the fixed five cent price, largely because its vending machines only accepted nickels.

# Australian Mining

Computer processors

14 <b>Si</b>	15 <b>P</b>	51 <b>Sb</b>	5 <b>B</b>	73 <b>Ta</b>
Silicon	Phosphorous	Antimony	Boron	Tantalum

LCD screens

Silicon 14 <b>Si</b>	Tin 50 <b>Sn</b>
Europium 63 <b>Eu</b>	Yttrium 39 <b>Y</b>
Indium 49 <b>In</b>	



Circuit boards

79 <b>Au</b> Gold	29 <b>Cu</b> Copper	4 <b>Be</b> Beryllium
32 <b>Ge</b> Germanium	47 <b>Ag</b> Silver	74 <b>W</b> Tungsten
	3 <b>Li</b> Lithium	28 <b>Ni</b> Nickel

Batteries

13 iPads & Xboxes

There will be 6 times more devices connected to the internet than people in the world by 2020.

**Australia gave the world WiFi**

WiFi was developed in the radiophysics lab at CSIRO in the 1990s. The technology was a revolution in mobile computing and is today estimated to be in more than five billion electronic devices. For its efforts, CSIRO has earned more than \$430 million through licensing agreements with tech companies since 1996.

# Molybdenum



Petrol refining



Armour



Heaters



Saw blades



High-rises



Nuclear reactors



Molybdenum

## Did you know?

Molybdenum gives steel strength, but did you also know it is an important crime fighter? Some fingerprint powders contain molybdenum. Combined with other chemicals, the powder works by adhering to the oil and moisture of a latent print.

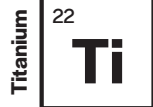
# Australian Mining

## Toothpaste

9 <b>F</b> Flourine	20 <b>Ca</b> Calcium	13 <b>Al</b> Aluminium	11 <b>Na</b> Sodium
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## Deodorant

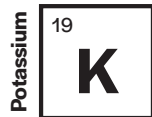
13 <b>Al</b> Aluminium	40 <b>Zr</b> Zirconium
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Whitening agent  
in powders and  
cosmetics



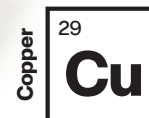
Cosmetic  
pigment  
Metal polish



Fragrances  
Tanning lotions



Sunccreens  
Soaps



Electric shavers  
and toothbrushes



Anti-caking (talc)  
Used in foundations  
powders and creams



# 14 Personal hygiene

**Australians spend  
\$4.5 billion every year on  
toiletries and cosmetics.**

## Ancient cosmetics

Humans have been enhancing their appearance for thousands of years. In Ancient Egypt, women lined their eyes using kohl, a lead sulphide. In Greece, women sought out lead carbonate to make their complexion pale. By 3000 B.C, men and women in China stained their fingernails. Well manicured nails reflected status.

# Mineral sands



Fibre optics



Aircraft engines



Pharmaceuticals



Car paint



Sporting goods



Mineral sands

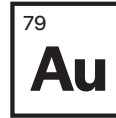
## Did you know?

Titanium mineral production comes from mineral sands. Named after the Greek Titans, titanium is twice as strong as steel but 45 per cent lighter. Resistant to corrosion, titanium is widely used in the aeronautics and aerospace industries.

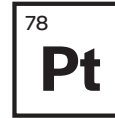
# Australian Mining



Investment metals



Gold



Platinum

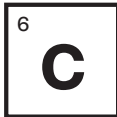


Silver

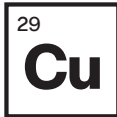
Coin press robotics



Iron



Carbon

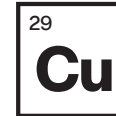


Copper

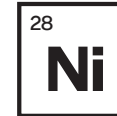


Zinc

Australia's 5, 10, 20  
and 50 cent coins

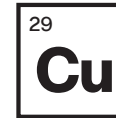


Copper

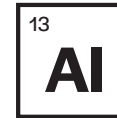


Nickel

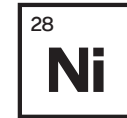
Australia's  
\$1 and \$2 coins



Copper

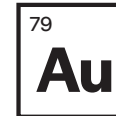


Aluminium

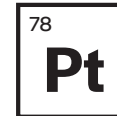


Nickel

Collector  
coins



Gold



Platinum



Silver

*Mining makes the exchange of goods and services possible*



# 15 Currency

## Making money

Robots Titan and Robbie work alongside three autonomous vehicles – Penny, Pence and Florin – and a human staff of around 170 people to produce the nation's coins at the Royal Australian Mint in Canberra. Outside maintenance and quality checks, no human hands touch the product in the coin hall.

**The Royal Australian Mint can produce up to two million coins per day.**

# Manganese



Magnet



Deoxidiser



Fertiliser



Animal feed



Steel



Colorant



Manganese

## Did you know?

Manganese is important for good health and exists in some of the foods we eat. Too much environmental manganese can have a negative impact however, causing body tremors, aggression and delusions known as 'manganese madness'.

Australian  
Mining

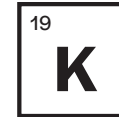
Silver-oxide batteries e.g. watches, calculators



Silver

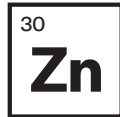


Zinc

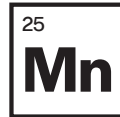


Potassium

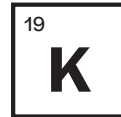
Alkaline batteries e.g. toys and electronics



Zinc



Manganese



Potassium

Electric vehicle batteries



Lithium



Cobalt



Nickel

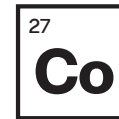


*Mining makes emerging technologies possible*

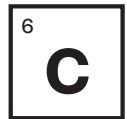
Lithium-ion batteries i.e. mobile phones



Lithium



Cobalt



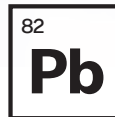
Carbon

**95% of cobalt, lithium and graphite in batteries can be reused.**

### Battery-powered telephony

French scientist Georges Leclanché invented a battery consisting of a zinc anode encompassed by a magnesium dioxide cathode which was used to power early telephones. The dry cell battery was good for intermittent use – long conversations would run the battery down and the conversation would become inaudible.

Lead



Lead acid car batteries

# 16 Batteries

# Magnesium



Aircraft



Fireworks



Cameras



Laxatives



Power tools



Racecars



Magnesium

## Did you know?

Epsom Salts originated from natural springs discovered in 1618 by cow-herd Henry Wicker in Epsom, England. The water's healing properties led physician and botanist Nehemiah Grew to extract the magnesium sulfate for medicinal purposes in 1695.

**Australian  
Mining**

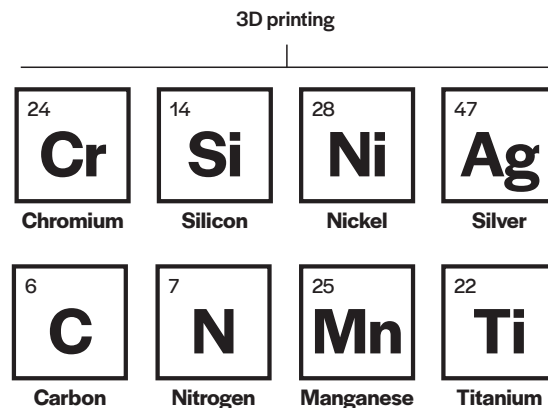
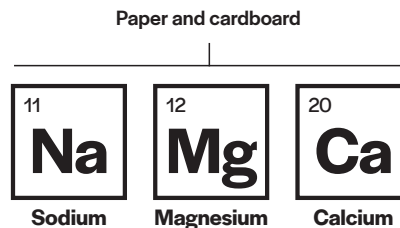
**Ink pigment**

Carbon 6 <b>C</b> Black	Chromium 24 <b>Cr</b> Green
Iron 26 <b>Fe</b> Blue	Titanium 22 <b>Ti</b> White
Cadmium 48 <b>Cd</b> Yellow	Bromine 35 <b>Br</b> Red

*Mining makes printed products possible*



Pen tips



Australian Mining

# 17 Commercial printing

Times New Roman  
uses 27 per cent less  
ink than Arial.

## Australia's first printing press

The first printing press arrived in 1788, but it wasn't until convict George Hughes taught himself to use it that the ink started flowing. NSW Governor John Hunter commissioned Hughes to print government orders and regulations. Hughes produced more than 200 documents as the government printer, a job he held until 1800.

# Lithium



Armour plate



Lubricant



Batteries



Mental health



Industrial drying



Pacemaker



Lithium

## Did you know?

An Australian POW discovered the medicinal power of lithium in 1949. Dr John Cade survived three and a half years at Changi before returning to his work in Australia where he successfully treated patients after noting the calming effects on guinea pigs.

**Australian  
Mining**

# 18

## Dentistry

*Mining makes good dental health possible*

Crowns and bridges

Gold	79 <b>Au</b>	Palladium	46 <b>Pd</b>
Silver	47 <b>Ag</b>	Platinum	78 <b>Pt</b>

Dental implants

Titanium	22 <b>Ti</b>
Zirconium	40 <b>Zr</b>

Dental amalgam (fillings)

Silver	47 <b>Ag</b>	Copper	29 <b>Cu</b>
Tin	50 <b>Sn</b>	Mercury	80 <b>Hg</b>

Aluminium

13 <b>Al</b>
-----------------

Porcelain veneers  
Synthetic resin filling

Dental drills and instruments  
(also stainless steel)

Uranium	92 <b>U</b>
---------	----------------

X-rays

74 <b>W</b>	6 <b>C</b>	27 <b>Co</b>
Tungsten	Carbon	Cobalt
28 <b>Ni</b>	45 <b>Rh</b>	22 <b>Ti</b>
Nickel	Rhodium	Titanium

### Tooth extraction with a shave?

Barbers were just as likely to pull a rotten tooth as offer a shave or a hair cut during the Middle Ages. Tooth extractions were performed by 'barber surgeons' as part of routine hygienic services. The red and white barbers' pole even represented bloodletting – the white stripe represented the bandage used to stem the blood.

**Almost 17 tonnes of gold  
were used by dentists  
globally in 2017.**

Australian Mining

# Lead



Bullets



Car batteries



Roofing



Radiation shield



Ceramics



Solder



Lead

## Did you know?

Queen Elizabeth I of England was a famous proponent of Venice Ceruse, a vinegar and lead cosmetic used to achieve the white-faced look popular in the 16th century. Lead poisoning no doubt contributed to her hair loss and bad skin.

**Australian  
Mining**



Coffins and urns

29 <b>Cu</b> Copper	47 <b>Ag</b> Silver	79 <b>Au</b> Gold	22 <b>Ti</b> Titanium	30 <b>Zn</b> Zinc
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High temperature refractory cremator bricks

13 <b>Al</b> Aluminium	12 <b>Mg</b> Magnesium	14 <b>Si</b> Silicon
20 <b>Ca</b> Calcium	24 <b>Cr</b> Chromium	

Cryogenic procedures

49 <b>In</b> Indium	7 <b>N</b> Nitrogen
---------------------------	---------------------------

Stainless steel used in cremators

26 <b>Fe</b> Iron	24 <b>Cr</b> Chromium	14 <b>Si</b> Silicon
6 <b>C</b> Carbon	28 <b>Ni</b> Nickel	25 <b>Mn</b> Manganese

*Mining makes every stage of life possible*



# 19 Funerals

**Nearly 100,000 Australians received hip or knee joint replacements in 2016.**

## Recycling post-mortem

Titanium, gold, silver and platinum are some of the metals from dental work and artificial joints not destroyed during a cremation. Crematoriums can choose to recycle these metals, shipping them free of charge to a company in the Netherlands. Local crematoriums then receive a percentage of the revenue, which they usually donate to charity.

# Iron



Whitegoods



Public transport



Cities



Roads & bridges



Manufacturing



Cars & trucks



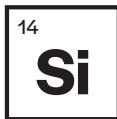
Iron

## Did you know?

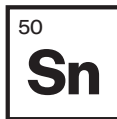
A deep-sea snail has evolved a suit of armor made from iron sulfide – the only animal on earth that uses iron this way. The scaly-foot gastropod was discovered in 2001 and lives in the hydrothermal vent fields of the Indian Ocean.

# Australian Mining

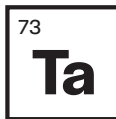
Digital film  
cameras



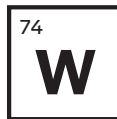
Silicon



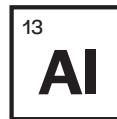
Tin



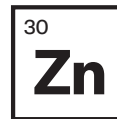
Tantalum



Tungsten



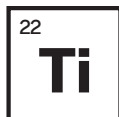
Aluminium



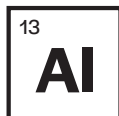
Zinc

Australian  
Mining

Sound bars  
and speakers



Titanium



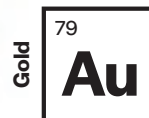
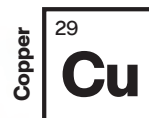
Aluminium

*Mining makes binge-worthy television possible*



Oscar statuette

Television electronics

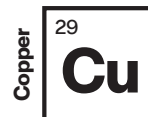
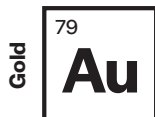


**The top grossing Australian  
box office movie is the 1986  
film, *Crocodile Dundee*.**

**Kelly Gang film the world's first**

The world's first multi-reel, feature length film, *The Story of the Kelly Gang*, was screened at Melbourne's Athenaeum Theatre in 1906. The production took six months, was shot around Melbourne and cost £1000. It ran for five weeks, with actors providing voices to the screening and youngsters creating sound effects backstage.

# 20 Film & television



# Indium



Touchscreens



Microchips



Protective eyewear



LCD televisions



Solar panels



Fire sprinklers



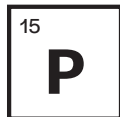
Indium

## Did you know?

After a century of near obscurity, Indium is having its moment. Indium tin oxide is the material used for touch and flat screen tech and solar panels. Soft enough to cut with a knife, indium is also notable for the high pitched 'cry' it gives off when bent.

Australian  
Mining

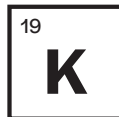
Farm  
fertilisers



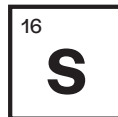
Phosphorous



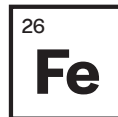
Nitrogen



Potassium

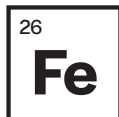


Sulfur

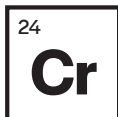


Iron

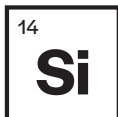
Vegetable storage and distribution



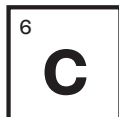
Iron



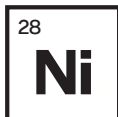
Chromium



Silicon



Carbon



Nickel



Manganese

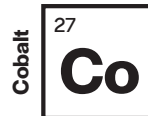
*Mining makes healthy living possible*

Around 20-40% of  
'ugly' fruit and veg is rejected  
before it reaches the  
supermarket.

Stock feed nutrients



Copper



Cobalt



Selenium



Magnesium



Manganese

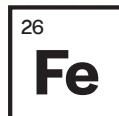


Zinc

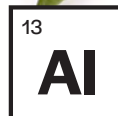
# 21

## Meat & vegies

Tractors and  
harvesters



Iron



Aluminium

### Made fresh in Australia

Australia has more than 85,000 farm businesses that produce almost 93 per cent of the nation's food supply. In fact, every Australian farmer produces enough food to feed 600 people – 150 at home and 450 overseas – which also makes us a leading food export nation. Around 65 per cent of Australia's farm production is exported.

# Gold



Awards



Investment



Electronics



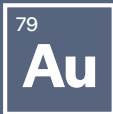
Jewellery



Hi-tech health



Aerospace



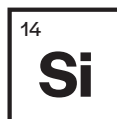
Gold

## Did you know?

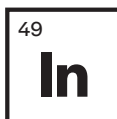
Ecuador's Jivaro tribe were so excessively taxed by the Spanish governor in 1599 they poured molten gold down his throat. The Romans and enforcers in the Spanish Inquisition are also believed to have killed using molten gold – an effective, albeit brutal, means of execution.

# Australian Mining

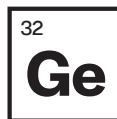
Thermal imaging home security cameras



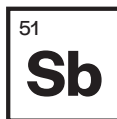
Silicon



Indium



Germanium



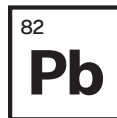
Antimony

*Mining makes protecting your home possible*

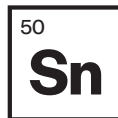
Fire sprinklers



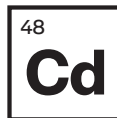
Bismuth



Lead



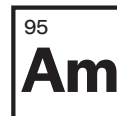
Tin



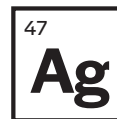
Cadmium

Smoke detectors

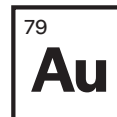
Americium



Silver



Gold



Lithium



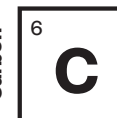
Australian Mining

Home safe

Iron



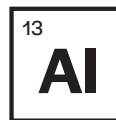
Carbon



**Australians will send and receive more than 1 billion parcels a year by 2021.**

# 22 Home protection

Fire extinguisher



Aluminium



Phosphorus

## Home security is changing

Australia's online shopping habit is seeing us send and receive parcels en masse – 841 million parcels in 2017, up from 778 million in 2016. New tech-rich ways of monitoring parcel delivery, from smart locks to digital access lock boxes to personal services that 'fetch' parcels, are adding another dimension to home security demands.

# Diamond



Jewellery



Mining exploration



Drill bits



Polishing powder



Cement cutting



Knife sharpener



Gemstones

## Did you know?

Scientists discovered a planet made of diamond in 2004. Orbiting a star in the Milky Way, 55 Cancri e is believed to be composed of diamond and graphite. Twice the size of earth, the planet moves so fast a year there lasts just 18 hours.

# Australian Mining



# 23

## Environmental solutions

Nanoscale metal blends are used to break down contaminants in groundwater.

26 <b>Fe</b> Iron	6 <b>C</b> Carbon	13 <b>Al</b> Aluminium	30 <b>Zn</b> Zinc
-------------------------	-------------------------	------------------------------	-------------------------

Carbon capture and storage

Water desalination  
Nanofibre membrane technology

6 <b>C</b> Carbon	13 <b>Al</b> Aluminium
-------------------------	------------------------------

20 <b>Ca</b> Calcium	Soil quality Fertilisers
----------------------------	-----------------------------



*Mining makes science to save the planet possible*

Potassium

19 <b>K</b>
----------------

Plant health  
Soil quality

Platinum

78 <b>Pt</b>
-----------------

Gold

79 <b>Au</b>
-----------------

Iron

26 <b>Fe</b>
-----------------

Rhodium

45 <b>Rh</b>
-----------------

Carbon

6 <b>C</b>
---------------

Manganese

25 <b>Mn</b>
-----------------

Palladium

46 <b>Pd</b>
-----------------

Cerium

58 <b>Ce</b>
-----------------

Nickel

28 <b>Ni</b>
-----------------

Catalytic converters Reduce vehicle and other emissions

6 <b>C</b> Carbon
-------------------------

Air filtration  
Humidifiers

Australian Mining

### Metal-organic frameworks

Researchers from CSIRO, Monash University and the University of Texas have developed a desalination membrane that separates salt and lithium from seawater. Metal-organic frameworks (MOFs) are a next generation material that filters chemical compounds, making seawater safe to drink and recovering lithium for use in batteries.

# Copper



Electrical wiring



Circuit board



Plumbing



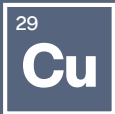
Homewares



Instruments



Electric cars



Copper

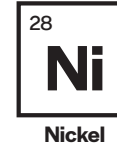
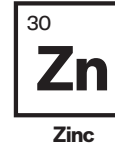
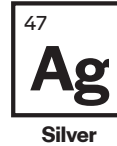
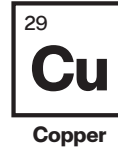
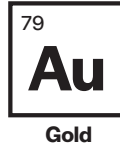
## Did you know?

Copper is considered to be humankind's oldest metal. It is thought that Neolithic communities used copper as an alternative to stone tools during 8000 BC. Ancient Egyptians believed copper was sacred and gave its wearer magical powers.

**Australian  
Mining**

18 carat gold contains metal alloys, such as:

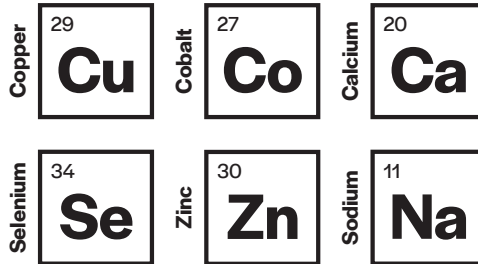
Melbourne Cup  
18 carat gold



Australian  
Mining

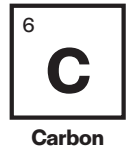
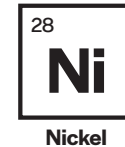
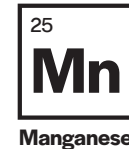
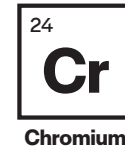
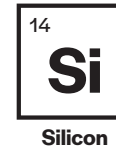
Jockeys in Victoria  
must have a blood-alcohol  
reading under 0.02

Race horse  
nutrition



Stainless steel

Bridle bits and buckles, stirrups and other equipment



24  
**Fe**  
Iron  
Horse shoes  
**Melbourne Cup**

### Queensland gold for the Cup

Evolution Mining's Mt Rawdon mine in Queensland produced the gold that made the 2018 Melbourne Cup. Manufactured by ABC Bullion, the Cup takes around 250 hours to produce using 44 hand-spun pieces of 18-carat gold. The iconic three-handled trophy was first presented to Cup winner Artilleryman in 1919.

# Cobalt



Batteries



Electric cars



Ceramics



Wind turbines



Medical tracer



Jet engines

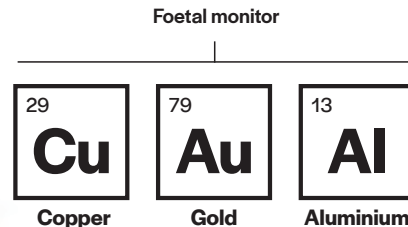
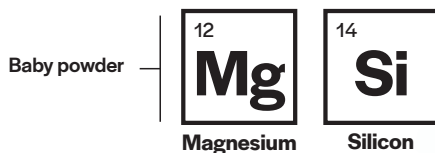


Cobalt

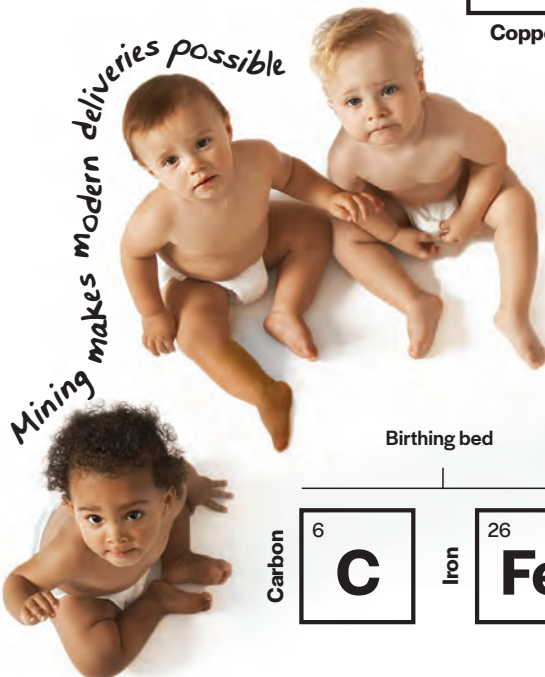
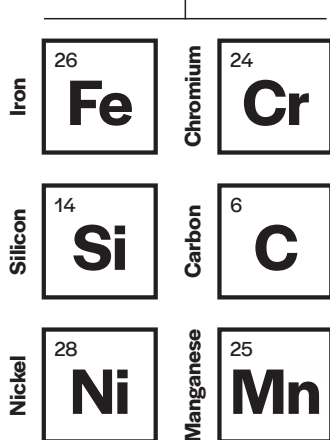
## Did you know?

Cobalt was named after the German word for goblin, *kobold*, by superstitious miners who believed it was responsible for mysterious deaths. They were right. Toxic vapors during smelting made this a dangerous ore for medieval miners.

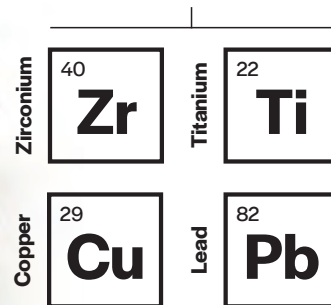
Australian  
Mining



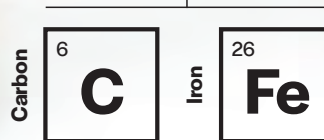
Forceps, clamps and other surgical instruments



Ultrasound machine

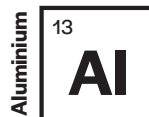


Birth bed



**A baby is born every 100 seconds in Australia, according to the ABS.**

# 25 Birthing suites



Baby station  
Nurses trolley

## Humidicrib a local invention

Tasmanian brothers Edward and Don Both invented the humidicrib in the late 1930s. Poliomyelitis was at epidemic levels and the portable device was an inexpensive alternative to the 'iron lung'. Today the humidicrib is used in hospitals across the globe and has helped save the lives of millions of premature babies.

# Coal



Electricity



Cement



Carbon fibre



Wind turbines



Water filtration



Steel

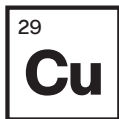


Carbon

## Did you know?

The energy we get from coal today comes from giant swamp plants that lived before the dinosaurs. Sound far-fetched? All living plants store solar energy. Coal is the product of decaying plant matter that millions of years ago locked in this energy.

# Australian Mining



Copper



Aluminium

Brewing kettle

Stainless steel equipment, pipes, storage



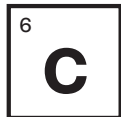
Iron



Chromium



Silicon



Carbon



Nickel



Manganese

Brass fittings and valves



Copper



Zinc

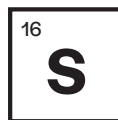


*Mining makes brewing and bottling possible*

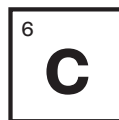
**Cenosillicaphobia**  
is the fear of an empty  
beer glass. True.

Australian  
Mining

Amber glass  
bottles



Sulfur

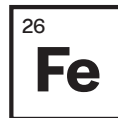


Carbon

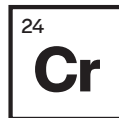


Iron

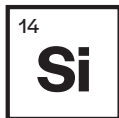
Green glass  
bottles



Iron

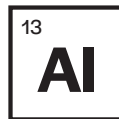


Chromium



Silicon

Beer cans

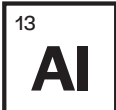


Aluminium



Tin

Aluminium



Beer tops

26

Brewing beer

### A short history of bottling

Commercial bottling is believed to have started in the latter part of the 17th century, but it wasn't until after World War I that demand for bottled beer soared. Early manufacturers struggled making glass bottles strong enough to withstand the carbonation. Producers eventually worked out that longneck beer bottles were the solution.

# Chromium



Utensils



Leather tanning



Chrome plating



Wood preservation



Fireworks



Dyes & inks



Chromium

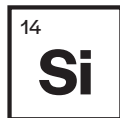
## Did you know?

Chrome plating might be synonymous with the modern era, but it was also used as early as the Qin Dynasty in China. Archaeologists discovered swords tipped with chromium oxide during the unearthing of the Terracotta Army in the 1970s.

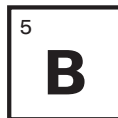
**Australian  
Mining**



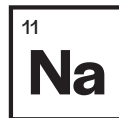
Optical glass in telescopes,  
microscopes, binoculars and  
camera lenses



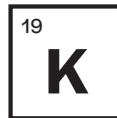
Silicon



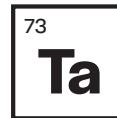
Boron



Sodium



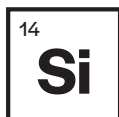
Potassium



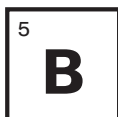
Tantalum

Australian  
Mining

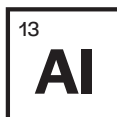
Mirrors



Silicon

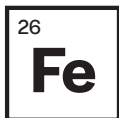


Boron

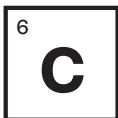


Aluminium

Hardware components



Iron



Carbon

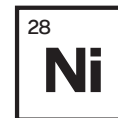


Zinc



Australia's Parkes  
Observatory radio  
telescope, 'The Dish',  
was used by NASA  
during the Apollo 11  
Moon landing.

Digital camera  
batteries



Nickel



Lithium

### Hubble Space Telescope

The Hubble Space Telescope orbits around 547 kilometres above Earth, travelling more than 6 billion kilometres since it launched in 1990. It has recorded more than 1.3 million observations for astronomers and moves at a speed of 27,300 kph. If a car moved that fast it would travel between Perth and Sydney in nine minutes.

# 27 Lenses & telescopes

# Boron



Tile glazes



Rocket propellant



Fireworks



Washing powder



Pool cleaner



Eye drops



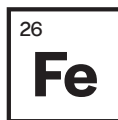
Boron

## Did you know?

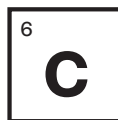
Boron compounds have been used for thousands of years. Borax (a composite of boron, sodium, oxygen and water) was mined from salt lakes in Tibet and Kashmir as early as 2000 B.C. It was used by gold and silversmiths and pottery makers.

Australian  
Mining

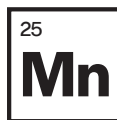
Railway tracks



Iron

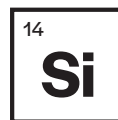


Carbon

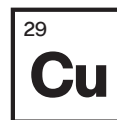


Manganese

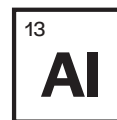
Traffic lights



Silicon

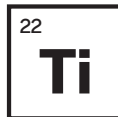


Copper



Aluminium

Titanium



White

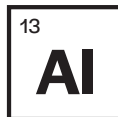
Chromium



Yellow

Road markings

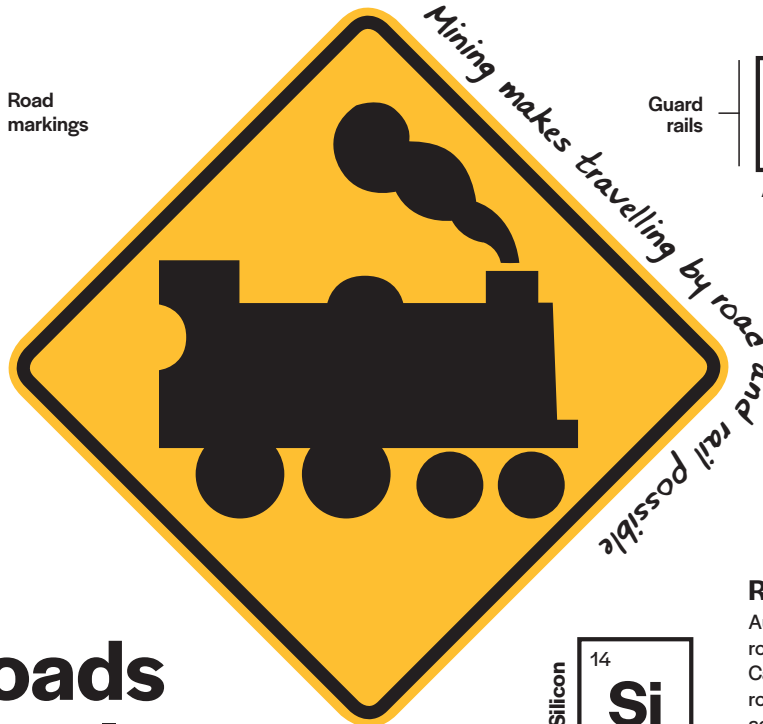
Road signs



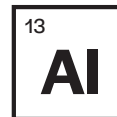
Aluminium



Zinc



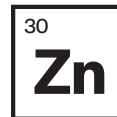
Guard rails



Aluminium

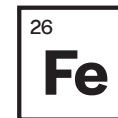


Magnesium



Zinc

Bridges

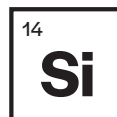


Iron



Molybdenum

Silicon



Cats eyes

**There are 874,500 km  
of road in Australia.**

### Road and rail in Australia

Australia has one of the world's most extensive road networks per capita – twice the length of Canada's. 17 per cent of the 874,500 km road network is urban, the rest non-urban, according to the Department of Infrastructure and Regional Development. Australia also has 33,000 km of heavy rail and 291 km of light rail.

# 28 Roads & rail

# Antimony



Batteries



Fire retardant



Ammunition



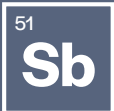
Cable sheathing



Paint



Fireworks

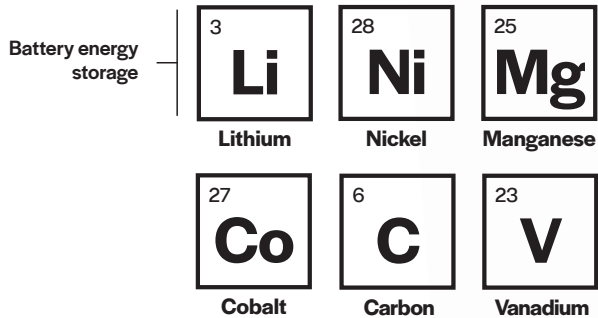
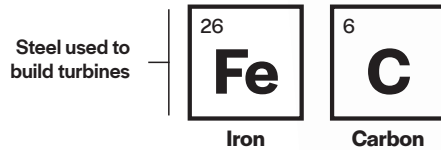
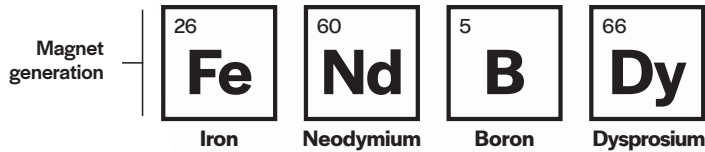


Antimony

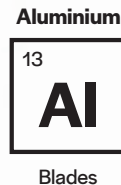
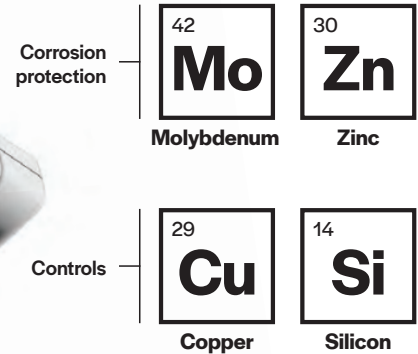
## Did you know?

Antimony was a popular remedy in the 19th century for the chronically constipated. Ingested as a small metal ball, it became known as the everlasting pill and would be collected and reused, sometimes passed down through generations.

Australian  
Mining



*Mining makes wind power generation possible*



Australian Mining

# 29 Windfarms

More than 220 tonnes of coal is required to build a wind turbine.

## Wind power across Australia

Windfarms generated 12,700 gigawatt hours of electricity across Australia in 2017 – enough to power over two million homes. More than 5,600 megawatts of wind capacity is now connected to the grid, with wind generation accounting for around 5 per cent of Australia's total electricity generation.

# Aluminium



Aircraft



Canned food



Transport



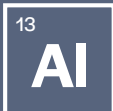
Housing



Cookware



Bicycles

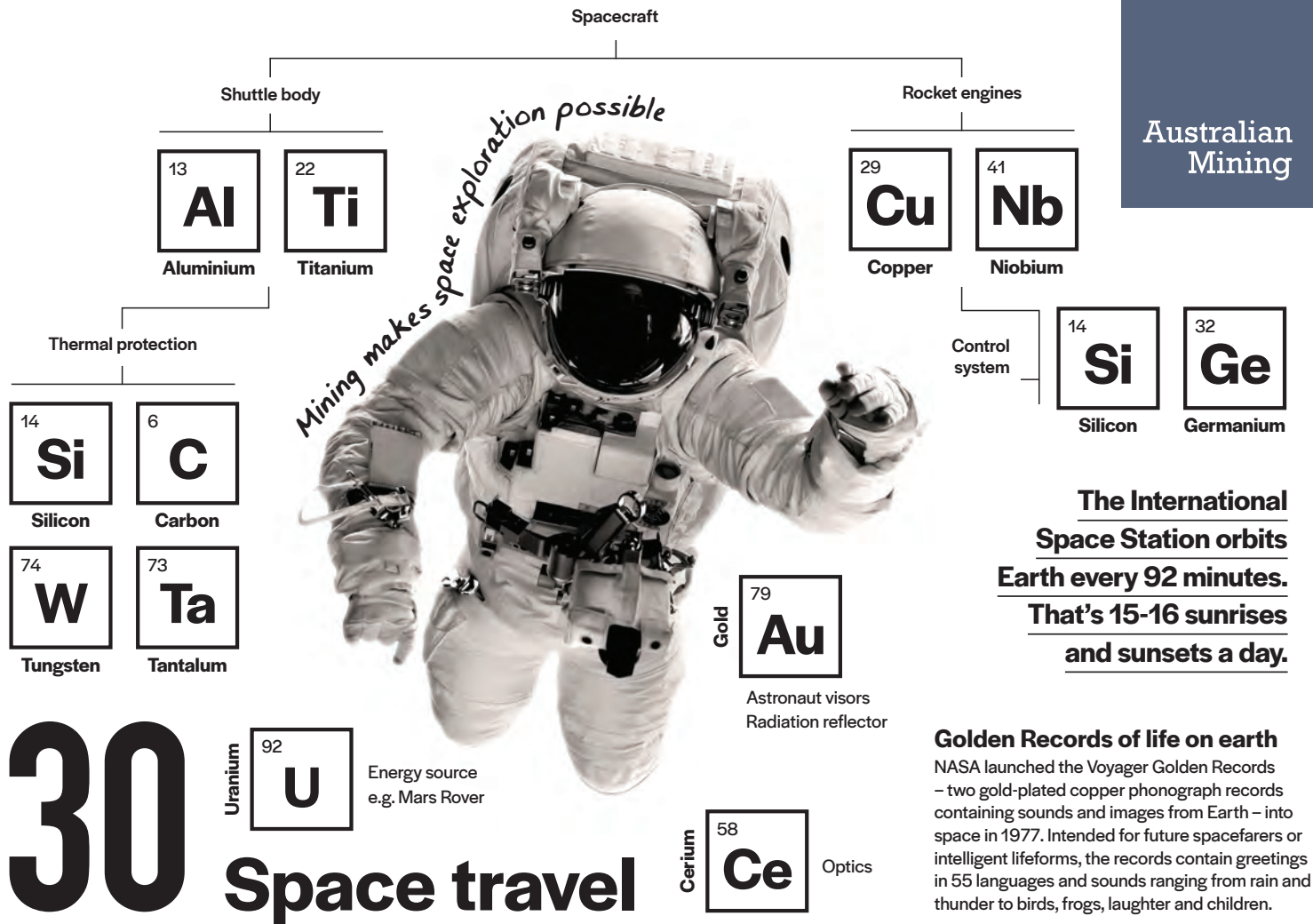


Aluminium

## Did you know?

Life Savers and Toblerone chocolate bars were among the first commercial uses of aluminium foil. Swiss chocolatier Tobler began wrapping bars in rolled foil in 1911. In the United States, aluminium replaced tin foil Life Saver wrappers in 1925.

Australian  
Mining



**The International  
Space Station orbits  
Earth every 92 minutes.  
That's 15-16 sunrises  
and sunsets a day.**

### Golden Records of life on earth

NASA launched the Voyager Golden Records – two gold-plated copper phonograph records containing sounds and images from Earth – into space in 1977. Intended for future spacefarers or intelligent lifeforms, the records contain greetings in 55 languages and sounds ranging from rain and thunder to birds, frogs, laughter and children.



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**SDG**