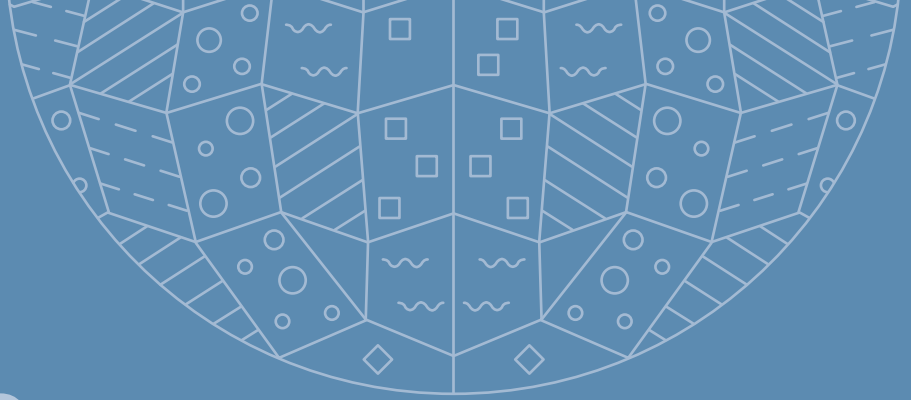

There's more to
Australian
Mining
Produced by the
Minerals Council of Australia
10
things
Toothpaste

Minerals Council of Australia

There's more to Australian Mining

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	Wind farms
15	Currency	30	Space travel



Everything comes from somewhere.

If it didn’t grow, it was mined.

minerals.org.au

There's more to Australian Mining

Energy generation

6	92
C	U
Carbon (Coal)	**Uranium**

Fluorescent lighting

57	39	65
La	Y	Tb
Lanthanum	**Yttrium**	**Terbium**

Production and transmission

26	29	13
Fe	Cu	Al
Iron	**Copper**	**Aluminium**

LED

31	58	63	65
Ga	Ce	Eu	Tb
Gallium	**Cerium**	**Europium**	**Terbium**

Halogen

26	74	24
Fe	W	Cr
Iron	**Tungsten**	**Chromium**

01 Electricity

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

Australia an energy powerhouse

Australia exports three-quarters of the energy it produces, powering economies around the world. Coal, uranium, oil and gas make up 33 per cent of Australia's total export revenue, earning the nation $196 billion in 2021-22. Australia will play an increasingly important role supplying the minerals necessary for global decarbonisation.

Aluminium

Aircraft

Canned food

Transport

Housing

Cookware

Bicycles

13
Al
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.

Machinery used to process and manufacture food

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

Aluminium — 13 Al

Foil packets
Drink cans

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

Mining makes the preservation of food possible

Tin — 50 Sn

Canning (tin-coated steel)

Copper — 29 Cu

Alloys reduce food contamination

Sodium — 11 Na

Flavour enhancer
Preservative

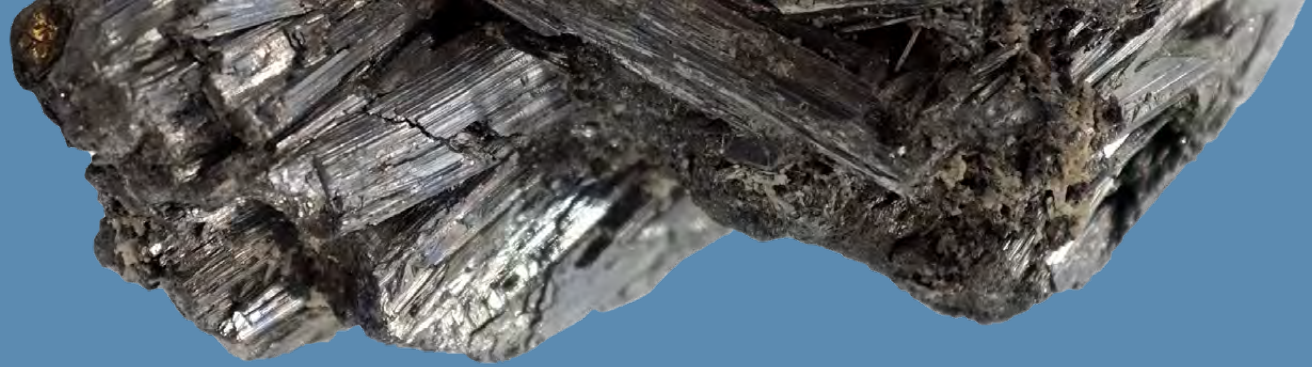
02 Food processing

Chromium — 24 Cr

Blender blades
Machinery plating

Sustainable coffee pods

Rio Tinto partnered with coffee giant Nespresso in 2018 to supply sustainable aluminium for its coffee capsules. Rio Tinto was 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.



Antimony

Batteries

Fire retardant

Ammunition

Cable sheathing

Paint

Fireworks

51
Sb
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.

minerals.org.au

There's more to Australian Mining

Titanium 22 **Ti**
Artificial joints
Prosthetic limbs
Surgical equipment

Copper 29 **Cu**
Kills surface microbes and reduces infections
Electronic devices

Platinum 78 **Pt**
Pacemakers
Medical apparatus

Lithium 3 **Li**
Treatment of bipolar disorder
Medical implant batteries

Silver 47 **Ag**
Anti-bacterial
Aids healing

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

Uranium 92 **U**
Cancer treatments
Radiation therapy

Niobium 41 **Nb**
Medical devices

Gadolinium 64 **Gd**
MRIs and x-rays
Diagnostic tracer

Gold 79 **Au**
Cancer treatment
Diagnosis

03 Health care

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.

Boron

Tile glazes

Rocket propellant

Fireworks

Washing powder

Pool cleaner

Eye drops

5
B
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.

minerals.org.au

There's more to Australian Mining

Electronics

79	29	47	73	74
Au	Cu	Ag	Ta	W
Gold	Copper	Silver	Tantalum	Tungsten

Mining makes holding the world in your hand possible

Battery

13	3	27
Al	Li	Co
Aluminium	Lithium	Cobalt

Touch screen

14	50	19
Si	Sn	K
Silicon	Tin	Potassium

49	13	31
In	Al	Ga
Indium	Aluminium	Gallium

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

Sound

60	62	28	59
Nd	Sm	Ni	Pr
Neodymium	Samarium	Nickel	Praseodymium

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. In 2018 Apple debuted a robot called 'Daisy' that can disassemble up to 200 iPhones an hour.

Chromium

Utensils

Leather tanning

Chrome plating

Wood preservation

Fireworks

Dyes & inks

24
Cr
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.

There's more to
Australian Mining

Steel used to build white goods

26 **Fe** Iron
6 **C** Carbon
30 **Zn** Zinc

Titanium
22 **Ti**
Paint and some finishes

Aluminium
13 **Al**
Condenser
Fan blades

Copper
29 **Cu**
Electrical wiring
Compressors

Stainless steel

26 **Fe** Iron
24 **Cr** Chromium
14 **Si** Silicon
6 **C** Carbon
28 **Ni** Nickel
25 **Mn** Manganese

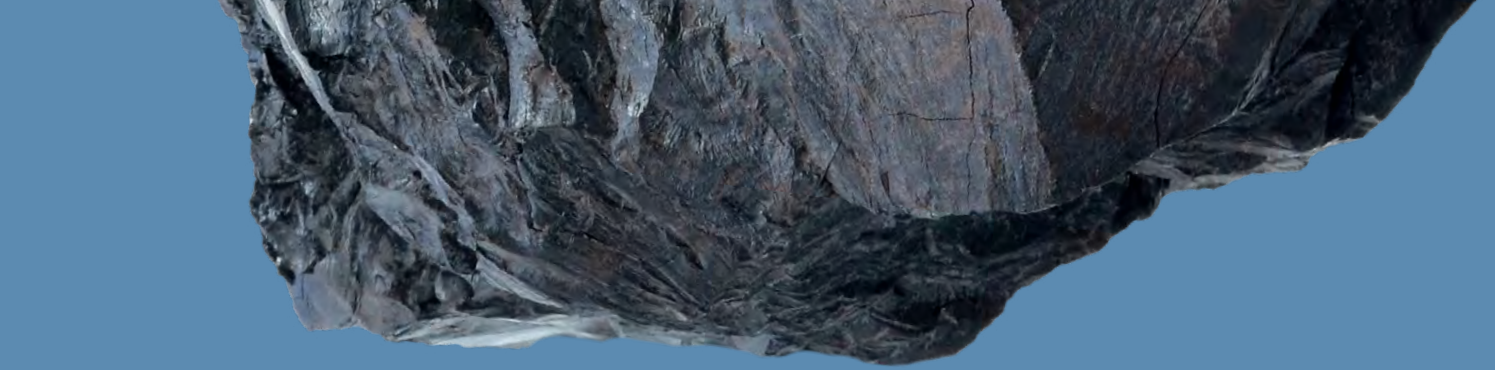
Mining makes the products that make every day possible

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

05 White goods

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.



Coal

Electricity

Cement

Carbon fibre

Wind turbines

Water filtration

Steel

6
C
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.

There's more to Australian Mining

Car body and chassis made from strengthened steel and aluminium alloys

- 26 **Fe** — Iron
- 25 **Mn** — Manganese
- 23 **V** — Vanadium
- 42 **Mo** — Molybdenum
- 13 **Al** — Aluminium
- 12 **Mg** — Magnesium

Mining makes the cars of today and tomorrow possible

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

Cerium — 58 **Ce**

LCD screens
Windscreens

Magnets in EV motors

- 66 **Dy** — Dysprosium
- 60 **Nd** — Neodymium

EV batteries

- 3 **Li** — Lithium
- 27 **Co** — Cobalt
- 28 **Ni** — Nickel
- 6 **C** — Carbon

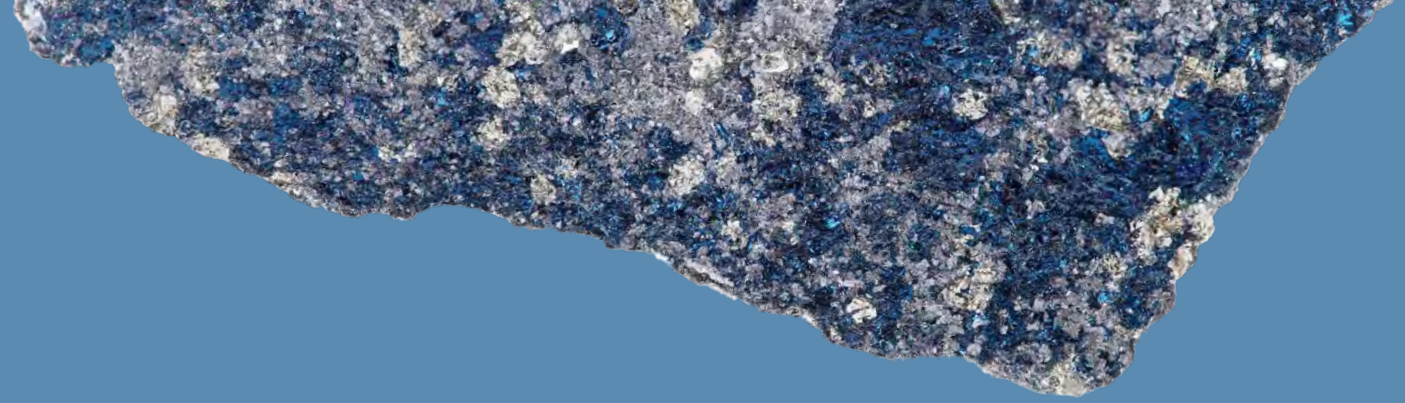
Copper — 29 **Cu**

Connectors
Brakes
Bearings

06 Electric cars

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.



Cobalt

Batteries

Electric cars

Ceramics

Wind turbines

Medical tracer

Jet engines

27
Co
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.

There's more to Australian Mining

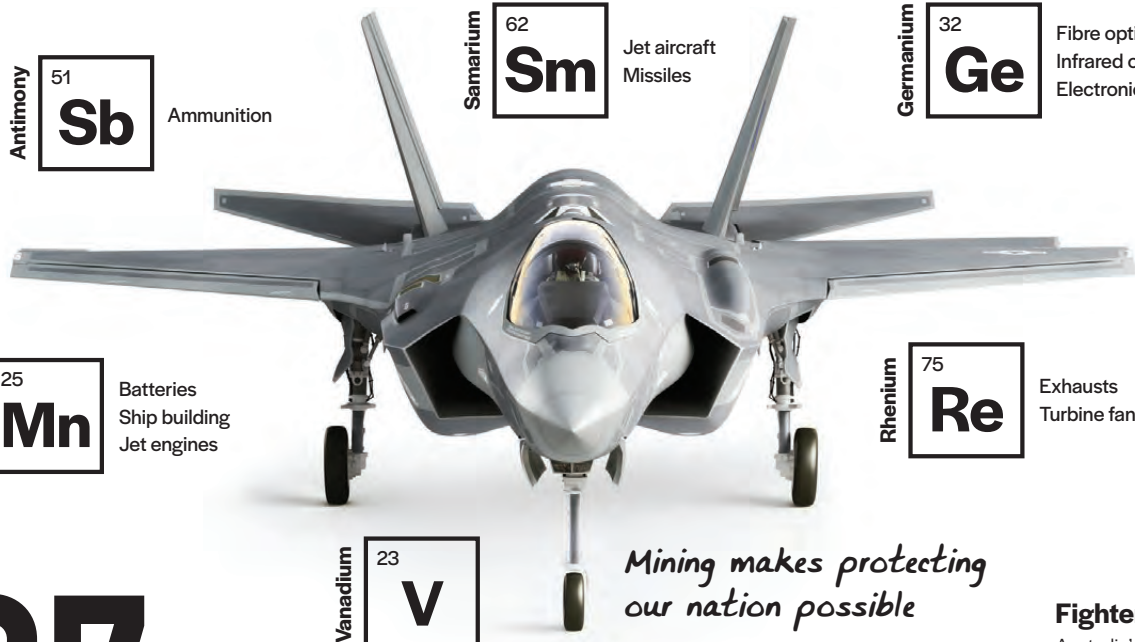
Silver 47 Ag
Navigation
Radio equipment

Neodymium 60 Nd
Communications
Missiles

Antimony 51 Sb
Ammunition

Samarium 62 Sm
Jet aircraft
Missiles

Germanium 32 Ge
Fibre optics
Infrared optics
Electronics



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

Manganese 25 Mn
Batteries
Ship building
Jet engines

Rhenium 75 Re
Exhausts
Turbine fans

Vanadium 23 V
Armor plating

Mining makes protecting our nation possible

07 Defence

Yttrium 39 Y
Targeting systems
Radar

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.

Copper

Electrical wiring

Circuit board

Plumbing

Homewares

Instruments

Electric cars

29
Cu
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.

minerals.org.au

There's more to Australian Mining

Solar panels

48 **Cd** Cadmium

52 **Te** Tellurium

42 **Mo** Molybdenum

4 **Be** Beryllium

32 **Ge** Germanium

31 **Ga** Gallium

49 **In** Indium

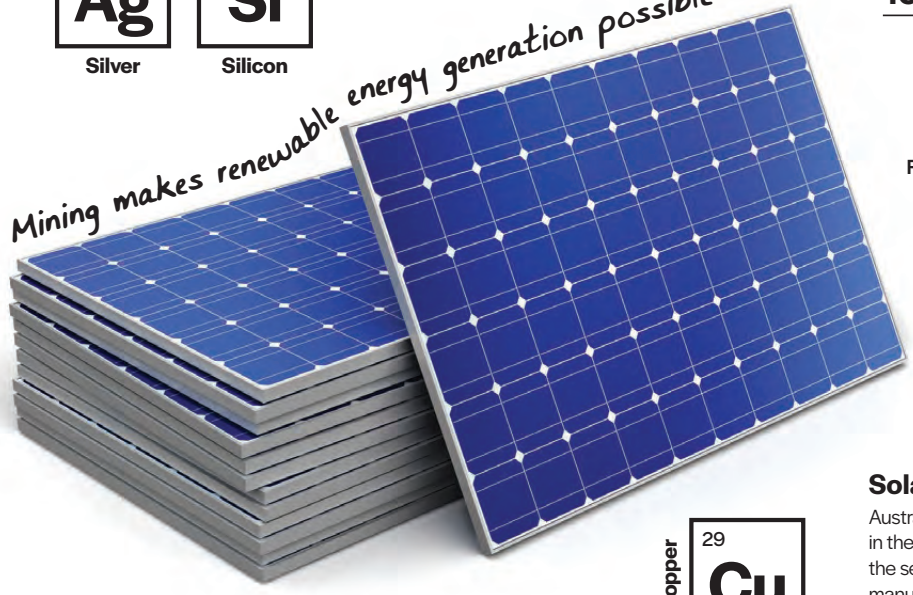
47 **Ag** Silver

14 **Si** Silicon

Semi-conductor

5 **B** Boron

15 **P** Phosphorous



Solar PV accounted for around 10% of Australia's electricity generation in 2020-21.

Frame

13 **Al** Aluminium

22 **Ti** Titanium

30 **Zn** Zinc

12 **Mg** Magnesium

Copper

29 **Cu** Wiring

08 Solar panels

Solar energy powering mining

Australia's mining industry is playing a key role in the deployment of solar power. Not only is the sector providing the silica sands needed to manufacture solar panels, mines are installing large solar farms near their operations to reduce reliance on fossil fuels as part of their commitments to achieving net zero carbon emissions.

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.

minerals.org.au

There's more to
Australian Mining

Steel
- 26 Fe — Iron
- 24 Cr — Chromium
- 42 Mo — Molybdenum
- 25 Mn — Manganese
- 28 Ni — Nickel

House paint
- Titanium: 22 Ti
- Magnesium: 12 Mg
- Zinc: 30 Zn

- Copper: 29 Cu — Plumbing, Electrical wiring, Airconditioning
- Aluminium: 13 Al — Cladding, Window frames, Fixtures

Almost half of all new homes built in 2019 were apartments.

Carbon: 6 C
Mortar
Concrete

Solder
- 82 Pb — Lead
- 50 Sn — Tin

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.

Gold

Awards

Investment

Electronics

Jewellery

Hi-tech health

Aerospace

79
Au
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.

minerals.org.au

Trains, trams, buses and taxis

26	25	13	42	82	12
Fe	Mn	Al	Mo	Pb	Mg
Iron	Manganese	Aluminium	Molybdenum	Lead	Magnesium

There's more to Australian Mining

Aircraft

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

Mining makes getting where you need to go possible

Air conditioning

26	14	29	13
Fe	Si	Cu	Al
Iron	Silicon	Copper	Aluminium

GPS and electronics

29	79	50
Cu	Au	Sn
Copper	Gold	Tin

10 Public transport

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

Public transport in Australia

Over 12 million Australians use public transport in an average three-month period, according to Roy Morgan in 2020. That includes 3.4 million Sydneysiders, equal to 76 per cent of the city's population, and over 3 million Melburnians (71 per cent of the population). Although the pandemic put a dent in the numbers, usage is on the rise again.

Indium

Touchscreens

Microchips

Protective eyewear

LCD televisions

Solar panels

Fire sprinklers

49
In
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.

minerals.org.au

There's more to Australian Mining

Sodium 11 **Na**
Detergents
Oven cleaner
Drain opener

Boron 5 **B**
Cleansers
Water softener
Detergents

Zinc 30 **Zn**
Plastic bottles
Soaps

Phosphorus 15 **P**
Laundry powders
Dish detergents

Chlorine 17 **Cl**
Bleach
Pool cleaner

Mining makes the unavoidable possible

Carbon 6 **C**
Plastic bottles
Stain remover

Iodine 53 **I**
Disinfectants
Sanitisers

Silicon 14 **Si**
Steam cleaning
Furniture polish

11 Cleaning products

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

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.

Iron

Whitegoods

Public transport

Cities

Roads & bridges

Manufacturing

Cars & trucks

26
Fe
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.

minerals.org.au

There's more to
Australian Mining

Electrified rail lines

29 **Cu** Copper

6 **C** Carbon

Steel beams and supports

6 **C** Carbon

26 **Fe** Iron

14 **Si** Silicon

25 **Mn** Manganese

Fireworks

Antimony — 51 **Sb** — Glitter

Zinc — 30 **Zn** — Smoke

Titanium — 22 **Ti** — Whites

Barium — 56 **Ba** — Greens

Strontium — 38 **Sr** — Reds

Copper — 29 **Cu** — Blues

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

Flag pole

13 **Al** Aluminium

30 **Zn** Zinc

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.

Lead

Bullets

Car batteries

Roofing

Radiation shield

Ceramics

Solder

82
Pb
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.

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There's more to
Australian Mining

Computer processors

14	15	51	5	73
Si	P	Sb	B	Ta
Silicon	Phosphorous	Antimony	Boron	Tantalum

LCD screens

Silicon	14 Si	Tin	50 Sn
Europium	63 Eu	Yttrium	39 Y
Indium	49 In		

Circuit boards

79	29	4
Au	Cu	Be
Gold	Copper	Beryllium

32	47	74
Ge	Ag	W
Germanium	Silver	Tungsten

Batteries

3	28
Li	Ni
Lithium	Nickel

13 iPads & Xboxes

By 2025, IoT-connected devices globally will more than double to 30.9 billion units, according to Statista.

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.

Lithium

Armour plate

Lubricant

Batteries

Mental health

Industrial drying

Pacemaker

3
Li
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.

minerals.org.au

Toothpaste

9	20	13	11
F	Ca	Al	Na
Fluorine	Calcium	Aluminium	Sodium

Deodorant

13	40
Al	Zr
Aluminium	Zirconium

There's more to
Australian Mining

Titanium 22 **Ti**

Whitening agent in powders and cosmetics

Potassium 19 **K**

Fragrances
Tanning lotions

Iron 26 **Fe**

Cosmetic pigment
Metal polish

Zinc 30 **Zn**

Suncreens
Soaps

Copper 29 **Cu**

Electric shavers and toothbrushes

Magnesium 12 **Mg**

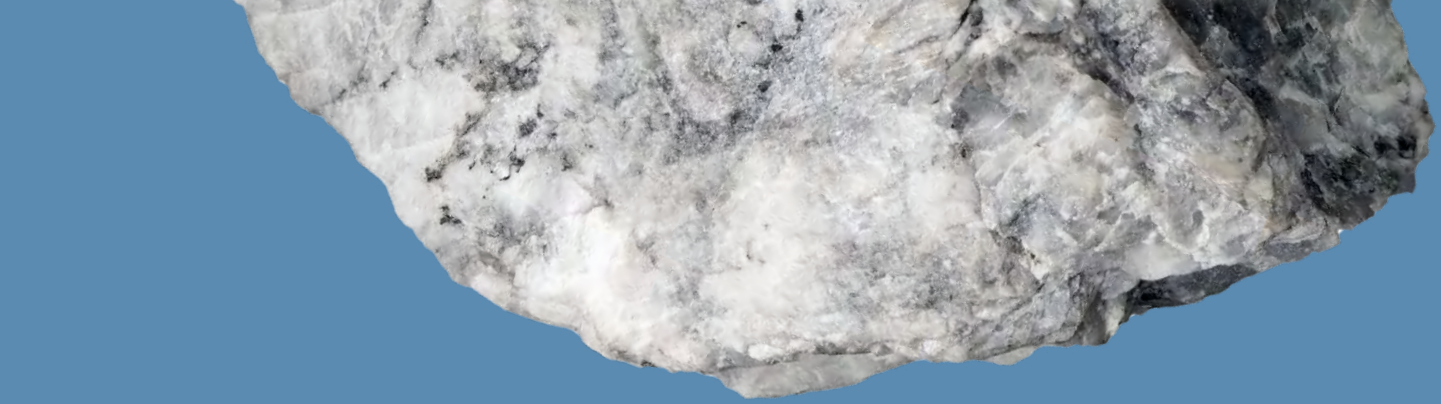
Anti-caking (talc)
Used in foundations powders and creams

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.



Magnesium

Aircraft

Fireworks

Cameras

Laxatives

Power tools

Racecars

12
Mg
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.

minerals.org.au

There's more to
Australian Mining

Coin press robotics

26	6
Fe	C
Iron	Carbon
29	30
Cu	Zn
Copper	Zinc

Investment metals

79	78	47
Au	Pt	Ag
Gold	Platinum	Silver

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

29	28
Cu	Ni
Copper	Nickel

Australia's $1 and $2 coins

29	13	28
Cu	Al	Ni
Copper	Aluminium	Nickel

Collector coins

79	78	47
Au	Pt	Ag
Gold	Platinum	Silver

15 Currency

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

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.

Manganese

Magnet

Deoxidiser

Fertiliser

Animal feed

Steel

Colorant

25
Mn
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’.

minerals.org.au

There's more to Australian Mining

16 Batteries

Alkaline batteries e.g. toys and electronics

30	25	19
Zn	Mn	K
Zinc	Manganese	Potassium

Silver-oxide batteries e.g. watches, calculators

47	30	19
Ag	Zn	K
Silver	Zinc	Potassium

Electric vehicle batteries

3	27	28
Li	Co	Ni
Lithium	Cobalt	Nickel

Lithium-ion batteries i.e. mobile phones

3	27	6
Li	Co	C
Lithium	Cobalt	Carbon

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

Lead

82
Pb
Lead acid car batteries

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.

Molybdenum

Petrol refining

Armour

Heaters

Saw blades

High-rises

Nuclear reactors

42
Mo
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.

minerals.org.au

There's more to Australian Mining

Mining makes printed products possible

Ink pigment

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

Paper and cardboard

11 Na	12 Mg	20 Ca
Sodium	Magnesium	Calcium

3D printing

24 Cr	14 Si	28 Ni	47 Ag
Chromium	Silicon	Nickel	Silver
6 C	7 N	25 Mn	22 Ti
Carbon	Nitrogen	Manganese	Titanium

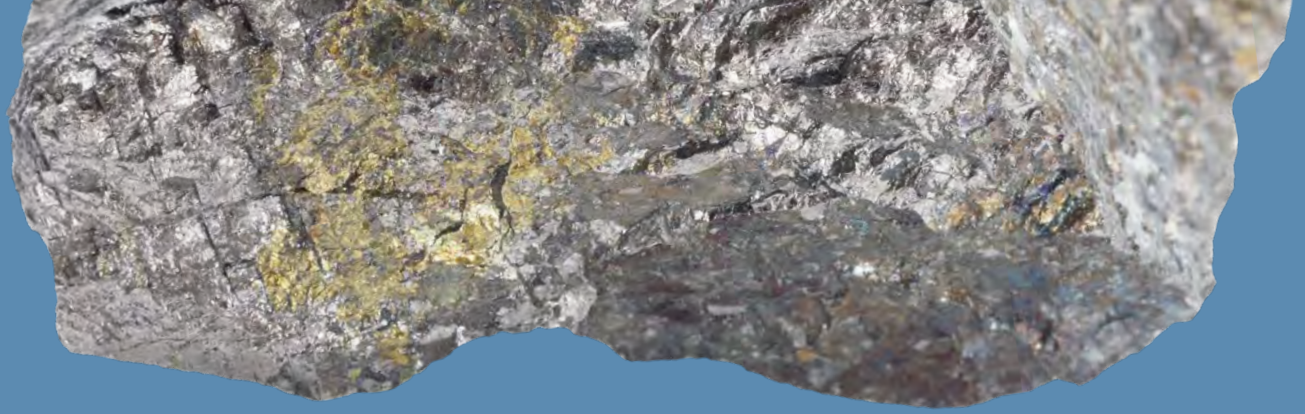
Osmium 76 Os — Pen tips

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.



Nickel

Food processing

Guitar strings

Coins

Marine engineering

Electronics

Kitchen sink

28
Ni
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.

minerals.org.au

There's more to Australian Mining

18 Dentistry

Mining makes good dental health possible

Crowns and bridges

- Gold — 79 Au
- Palladium — 46 Pd
- Silver — 47 Ag
- Platinum — 78 Pt

Dental implants

- Titanium — 22 Ti
- Zirconium — 40 Zr

Dental amalgam (fillings)

- Silver — 47 Ag
- Copper — 29 Cu
- Tin — 50 Sn
- Mercury — 80 Hg

- Aluminium — 13 Al — Porcelain veneers; Synthetic resin filling

Dental drills and instruments (also stainless steel)

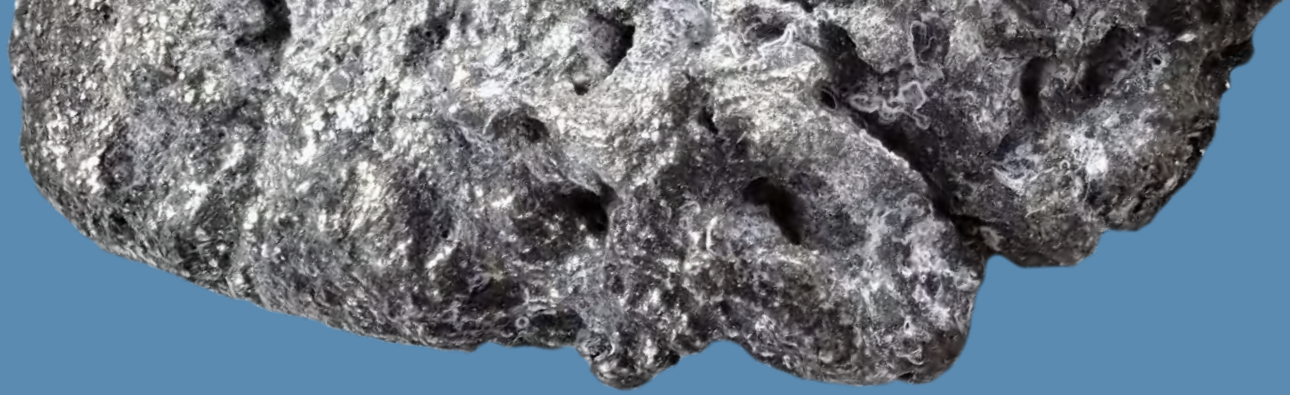
- 74 W Tungsten
- 6 C Carbon
- 27 Co Cobalt
- 28 Ni Nickel
- 45 Rh Rhodium
- 22 Ti Titanium

- Uranium — 92 U — X-rays

Historians believe the Etruscans were the real founders of gold teeth, not the ancient Egyptians.

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.



Platinum

Surgical tools

Jewellery

Catalytic converters

Polish

Solar panels

Dentistry

78
Pt
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'.

minerals.org.au

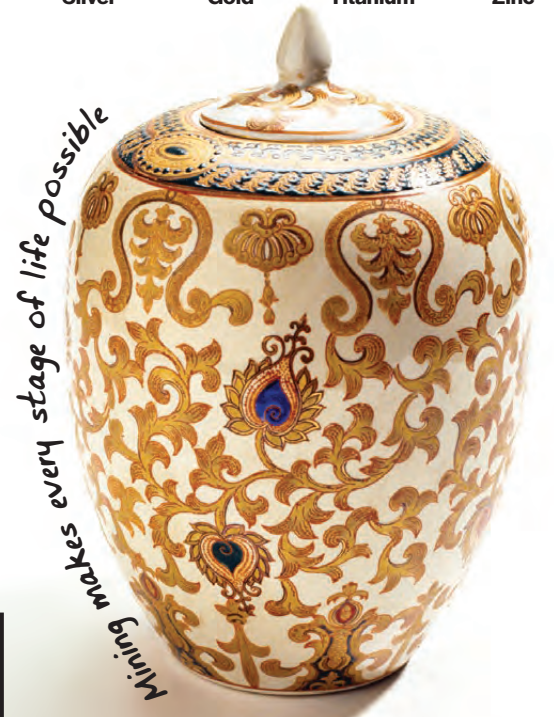
There's more to
Australian Mining

Coffins and urns

29	47	79	22	30
Cu	Ag	Au	Ti	Zn
Copper	Silver	Gold	Titanium	Zinc

High temperature refractory cremator bricks

13	12	14	20	24
Al	Mg	Si	Ca	Cr
Aluminium	Magnesium	Silicon	Calcium	Chromium



Stainless steel used in cremators

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

Cryogenic procedures

49	7
In	N
Indium	Nitrogen

19 Funerals

Over 115,000 Australians received hip or knee joint replacements in 2018.

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.

Potassium

Fertiliser

Detergents

Salt substitute

Glass

Match heads

Saline drip

19
K
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.

Digital film cameras

14	50	73	74	13	30
Si	Sn	Ta	W	Al	Zn
Silicon	Tin	Tantalum	Tungsten	Aluminium	Zinc

There's more to Australian Mining

Sound bars and speakers

22	13
Ti	Al
Titanium	Aluminium

Television electronics

Copper	Chromium	Silicon	Gold	Tin	Zinc
29 Cu	24 Cr	14 Si	79 Au	50 Sn	30 Zn

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

Oscar statuette

Gold	Tin	Antimony	Copper
79 Au	50 Sn	51 Sb	29 Cu

20 Film & television

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.

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.

minerals.org.au

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

There's more to
Australian Mining

Farm fertilisers

15	7	19	16	26
P	N	K	S	Fe
Phosphorous	Nitrogen	Potassium	Sulfur	Iron

Vegetable storage and distribution

26	24	25	6	28
Fe	Cr	Mn	C	Ni
Iron	Chromium	Manganese	Carbon	Nickel

Stock feed nutrients

	29		27
Copper	Cu	Cobalt	Co
	34		12
Selenium	Se	Magnesium	Mg
	25		30
Manganese	Mn	Zinc	Zn

21 Meat & vegies

Tractors and harvesters

26	13
Fe	Al
Iron	Aluminium

Made fresh in Australia

Australia has more than 87,000 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 72 per cent of Australia's farm production is exported.

Silicon

Pottery

Computers

Sealants

Glass

Solar panels

Cooking utensils

14
Si
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.

minerals.org.au

Mining makes protecting your home possible

There's more to Australian Mining

Thermal imaging home security cameras

14	49
Si	In
Silicon	Indium

32	51
Ge	Sb
Germanium	Antimony

Fire sprinklers

83	82	50	48
Bi	Pb	Sn	Cd
Bismuth	Lead	Tin	Cadmium

Smoke detectors

Americium	Silver	Gold	Lithium
95 Am	47 Ag	79 Au	3 Li

Home safe

Iron	Carbon
26 Fe	6 C

Australians ordered more than 1 billion parcels in 2020.

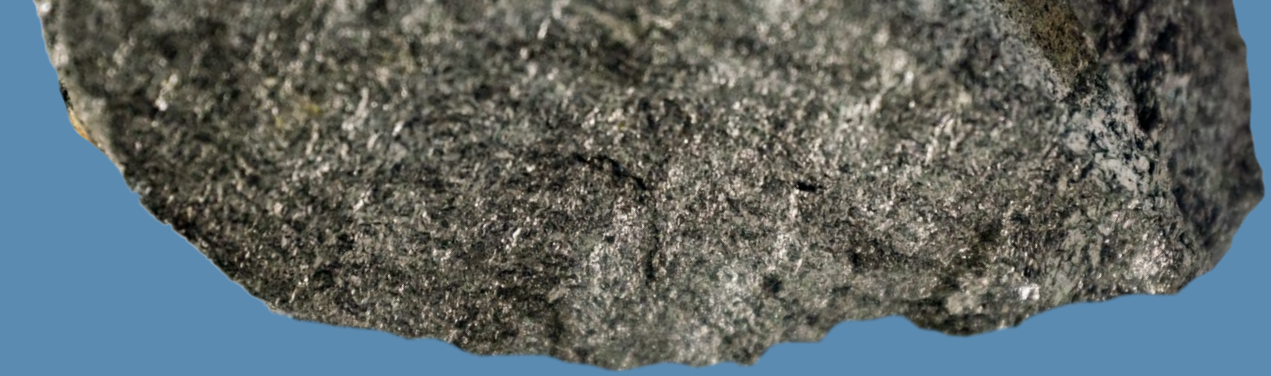
22 Home protection

Fire extinguisher

13	15
Al	P
Aluminium	Phosphorus

Home security is changing

Australia's online shopping habit is seeing us send and receive parcels en masse – more than 1 billion parcels during 2020, according to the Pitney Bowes parcel shipping index. New ways of monitoring parcel delivery, from smart locks to digital access lock boxes, are adding another dimension to home security demands.



Silver

Mirrors

Jewellery

Medicine

Water purification

Solar panels

3D printing

47
Ag
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.

minerals.org.au

Carbon
6
C
Air filtration
Humidifiers

Calcium
20
Ca
Soil quality
Fertilisers

Carbon capture and storage

26
Fe
Iron

6
C
Carbon

13
Al
Aluminium

30
Zn
Zinc

Water desalination
Nanofibre membrane technology

6
C
Carbon

13
Al
Aluminium

Mining makes science to save the planet possible

There's more to
Australian Mining

Catalytic converters
Reduce vehicle and other emissions

Platinum
78
Pt

Rhodium
45
Rh

Palladium
46
Pd

Gold
79
Au

Carbon
6
C

Cerium
58
Ce

Iron
26
Fe

Manganese
25
Mn

Nickel
28
Ni

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

23 Environmental solutions

Potassium
19
K
Plant health
Soil quality

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.

Sodium

Fertilisers

Table salt

Food preservation

Streetlights

Baking soda

Road salt

11
Na
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.

minerals.org.au

18 carat gold
contains metal alloys such as:

29	47	30	28
Cu	**Ag**	**Zn**	**Ni**
Copper	**Silver**	**Zinc**	**Nickel**

Iron

26
Fe
Horse shoes

There's more to
Australian Mining

Michelle Payne was the first female jockey to win the Cup in 2015.

Race horse nutrition

Copper	Cobalt	Calcium
29 **Cu**	27 **Co**	20 **Ca**
Selenium	**Zinc**	**Sodium**
34 **Se**	30 **Zn**	11 **Na**

Stainless steel
Bridle bits and buckles, stirrups and other equipment

14	24	26
Si	**Cr**	**Fe**
Silicon	**Chromium**	**Iron**
25	28	6
Mn	**Ni**	**C**
Manganese	**Nickel**	**Carbon**

Melbourne Cup
18 carat gold

79
Au
Gold

24 Melbourne Cup

Victorian gold for the Cup

The 2021 Melbourne Cup was made from gold mined at Agnico Eagle's Fosterville mine in Victoria. Manufactured by ABC Bullion, the Melbourne 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.

Tin

Magnets

Pewter

Tin cans

Solder

Touchscreens

Dye

Metal bearings

50
Sn
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.

minerals.org.au

There's more to Australian Mining

Foetal monitor

29	79	13
Cu	Au	Al
Copper	Gold	Aluminium

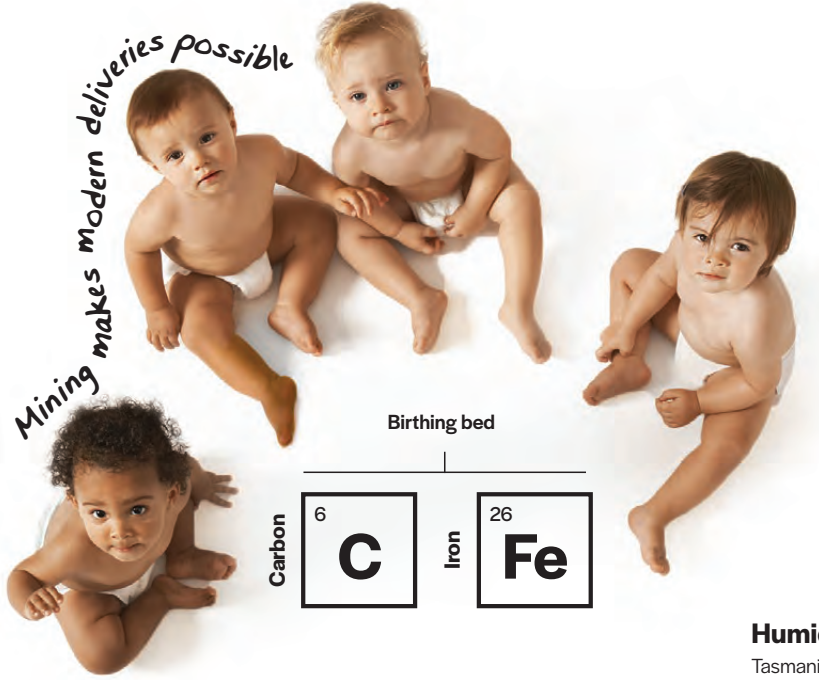
Baby powder

12	14
Mg	Si
Magnesium	Silicon

Ultrasound machine

Zirconium	Titanium
40 Zr	22 Ti
Copper	Lead
29 Cu	82 Pb

Aluminium: 13 Al — Baby station, Nurses trolley



Birthing bed

Carbon	Iron
6 C	26 Fe

Forceps, clamps and other surgical instruments

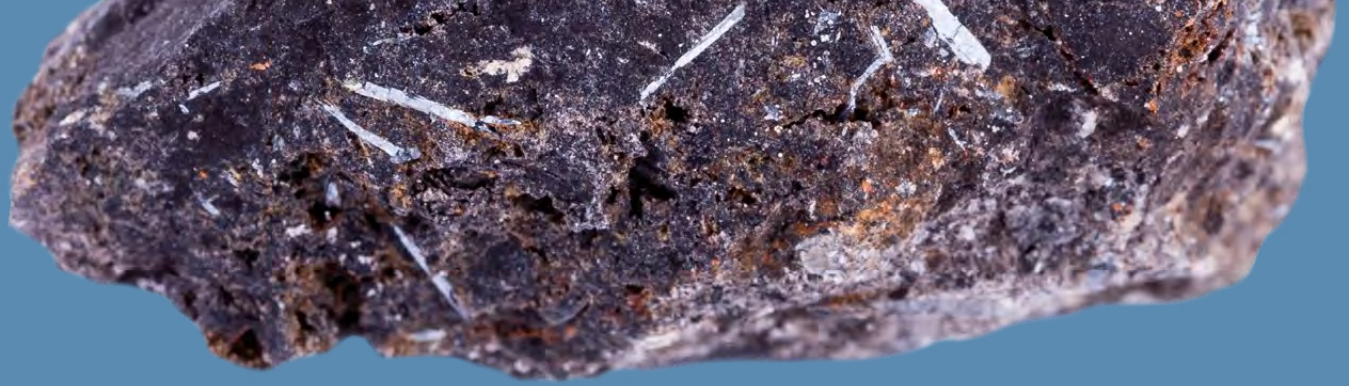
Iron	Chromium
26 Fe	24 Cr
Silicon	Carbon
14 Si	6 C
Nickel	Manganese
28 Ni	25 Mn

25 Birthing suites

A baby is born every 105 seconds in Australia, according to the ABS.

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.



Titanium

Fibre optics

Sunscreen

Aircraft engines

Medical implants

Car paint

Sporting goods

22
Ti
Titanium

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 in widely used in the aeronautics and aerospace industries.

minerals.org.au

There's more to Australian Mining

26 Brewing beer

'Cenosillicaphobia' is fear of an empty beer glass. True.

Mining makes brewing and bottling possible

Brass fittings and valves

29 **Cu** Copper

30 **Zn** Zinc

Brewing kettle

29 **Cu** Copper

13 **Al** Aluminium

Stainless steel equipment, pipes, storage

26 **Fe** Iron

24 **Cr** Chromium

14 **Si** Silicon

6 **C** Carbon

28 **Ni** Nickel

25 **Mn** Manganese

Amber glass bottles

16 **S** Sulfur

6 **C** Carbon

26 **Fe** Iron

Green glass bottles

26 **Fe** Iron

24 **Cr** Chromium

14 **Si** Silicon

Beer cans

13 **Al** Aluminium

50 **Sn** Tin

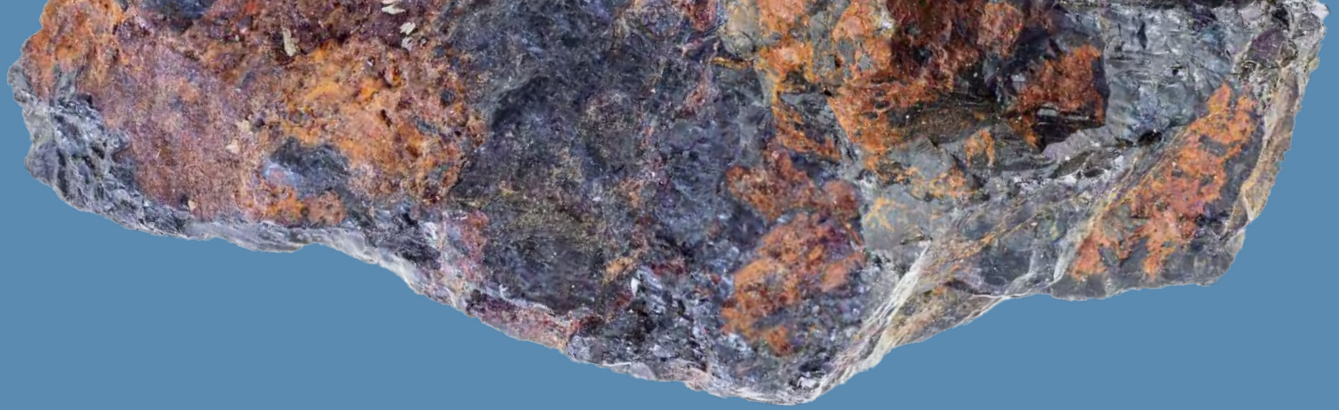
Aluminium

13 **Al**

Beer tops

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.



Tungsten

Light bulbs

Microwaves

Fishing sinkers

Televisions

Heating elements

Darts

74
W
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.

minerals.org.au

There's more to Australian Mining

Optical glass in telescopes, microscopes, binoculars and camera lenses

14	5	11	19	73
Si	B	Na	K	Ta
Silicon	Boron	Sodium	Potassium	Tantalum

Mirrors

14	5	13
Si	B	Al
Silicon	Boron	Aluminium

Hardware components

26	6	30
Fe	C	Zn
Iron	Carbon	Zinc

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

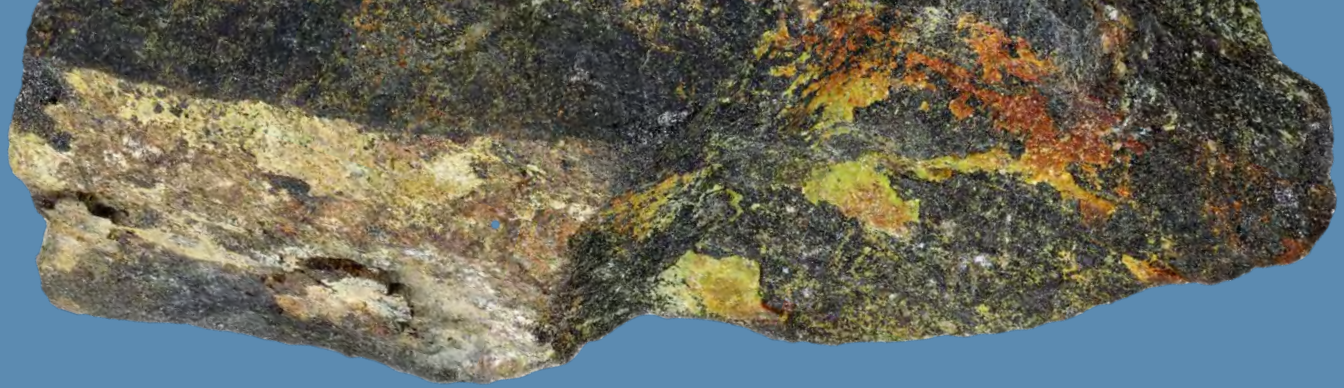
Digital camera batteries

28	3
Ni	Li
Nickel	Lithium

27 Lenses & telescopes

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.



Uranium

Submarines

Medical research

Clean energy

Industrial x-rays

Cancer treatments

Aerospace

92
U
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.

minerals.org.au

There's more to Australian Mining

Railway tracks

26	6	25
Fe	C	Mn
Iron	Carbon	Manganese

Traffic lights

14	29	13
Si	Cu	Al
Silicon	Copper	Aluminium

Titanium 22 Ti — White

Chromium 24 Cr — Yellow

Road markings

Guard rails

13	12	30
Al	Mg	Zn
Aluminium	Magnesium	Zinc

Bridges

26	42
Fe	Mo
Iron	Molybdenum

Road signs

13	30
Al	Zn
Aluminium	Zinc

There are 874,500 km of road in Australia.

28 Roads & rail

Silicon 14 Si — Cats eyes

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.

Vanadium

Batteries

Car chassis

Railway tracks

Wind turbines

Bridges

Jet engines

23
V
Vanadium

Did you know?

One of the first uses of vanadium was in the steel chassis of the 1908 Model T Ford. 'Tin Lizzie' represented the first affordable family car thanks to fabrication efficiencies and was declared Car of the Century at a glitzy ceremony in Las Vegas in 1999.

minerals.org.au

There's more to
Australian Mining

Generator magnet

26	60	5	66
Fe	Nd	B	Dy
Iron	Neodymium	Boron	Dysprosium

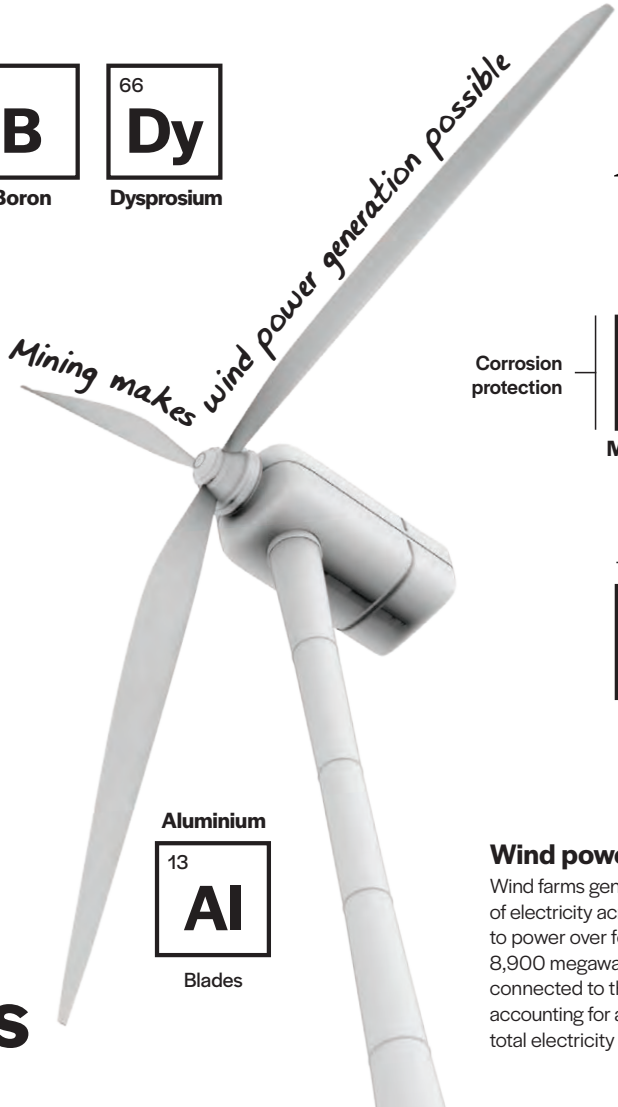
Steel used to build turbines

26	6
Fe	C
Iron	Carbon

Battery energy storage

3	28	25
Li	Ni	Mg
Lithium	Nickel	Manganese

27	6	23
Co	C	V
Cobalt	Carbon	Vanadium



Aluminium

13
Al
Blades

Corrosion protection

42	30
Mo	Zn
Molybdenum	Zinc

Controls

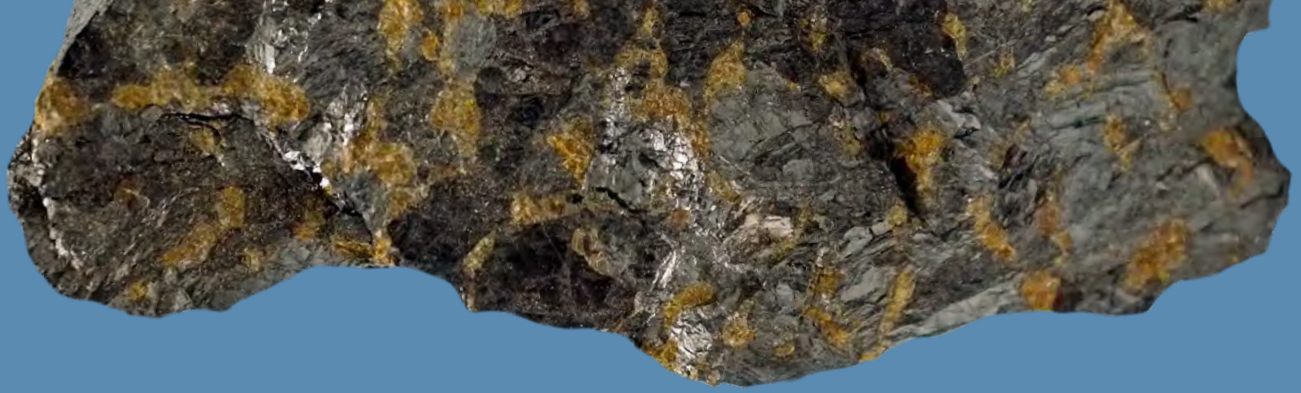
29	14
Cu	Si
Copper	Silicon

29 Wind farms

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

Wind power across Australia

Wind farms generated 26,800 gigawatt hours of electricity across Australia in 2021 – enough to power over four million homes. More than 8,900 megawatts of wind capacity is now connected to the grid, with wind generation accounting for around 10 per cent of Australia's total electricity generation.



Zinc

Rust prevention

Soap

Plastics

Metal alloys

Sunscreen

Rubber

Ink

30
Zn
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.

minerals.org.au

There's more to Australian Mining

30 Space travel

Spacecraft

Shuttle body

13 Al Aluminium

22 Ti Titanium

Thermal protection

14 Si Silicon

6 C Carbon

74 W Tungsten

73 Ta Tantalum

Rocket engines

29 Cu Copper

41 Nb Niobium

Control system

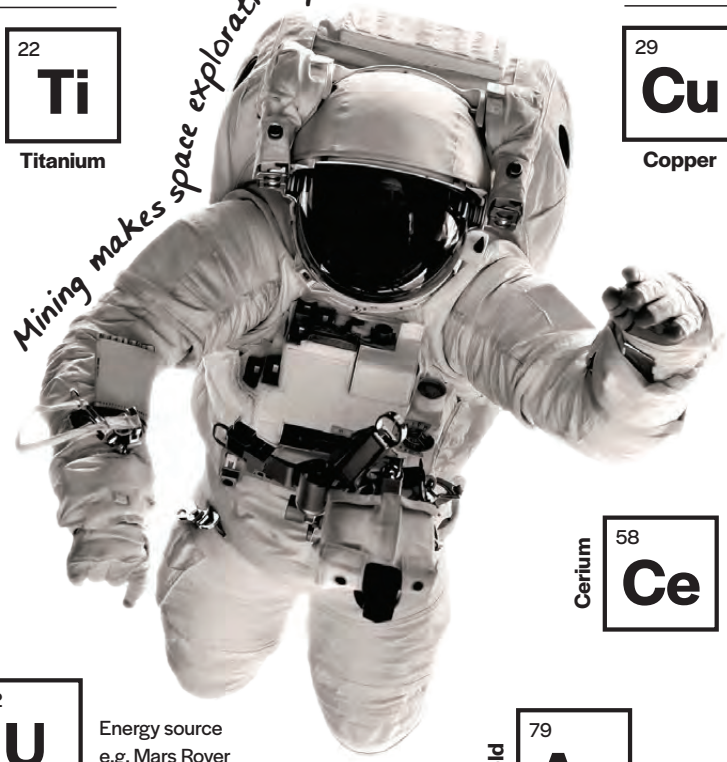
14 Si Silicon

32 Ge Germanium

58 Ce Cerium — Optics

92 U Uranium — Energy source e.g. Mars Rover

79 Au Gold — Astronaut visors, Radiation reflector



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.

Zirconium

Steel alloys

Flashbulbs

Surgical instruments

Deodorant

Catalytic converters

Abrasives

40
Zr
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.

minerals.org.au

Mine-a-word

There's more to Australian Mining

Can you mine the minerals and metals that make every day possible?

Aluminium
Antimony
Beryllium
Boron
Cerium
Chromium
Coal
Cobalt
Copper
Dysprosium
Erbium
Europium
Gadolinium
Gold
Hafnium
Holmium
Indium
Iron
Lanthanum
Lead
Lithium
Magnesium
Manganese
Mineral sands
Molybdenum
Neodymium
Nickel
Platinum
Potassium
Praseodymium
Promethium
Rare earths
Samarium
Scandium
Silicon
Silver
Sodium
Terbium
Thulium
Tin
Titanium
Tungsten
Uranium
Vanadium
Ytterbium
Yttrium
Zinc
Zirconium

Y	N	O	M	I	T	N	A	M	U	I	B	R	E	K	T	R	C	O	P	B	R	L
R	E	P	P	O	C	V	H	G	M	V	C	S	M	U	I	M	Y	D	O	E	N	W
B	C	I	J	T	M	F	F	Z	A	N	I	T	G	I	Z	A	N	K	C	F	J	R
T	O	R	P	E	T	S	D	N	A	S	L	A	R	E	N	I	M	H	K	M	I	J
P	A	M	I	R	P	A	A	C	N	M	M	U	I	D	N	I	R	F	U	M	M	G
R	L	U	Q	B	M	D	D	M	U	I	D	O	S	A	C	O	E	I	A	U	O	H
O	M	I	K	I	I	C	L	N	Y	C	A	W	C	Y	M	D	N	N	I	S	L	L
M	U	R	D	U	X	E	A	H	P	E	L	X	Z	I	N	O	G	S	F	P	Y	I
E	I	A	M	M	A	H	S	F	L	R	U	X	U	E	C	A	E	X	T	L	B	T
T	S	M	J	D	T	D	H	L	K	I	M	M	G	R	N	N	O	I	J	C	D	H
H	S	A	U	N	V	C	T	L	U	U	I	X	I	E	G	J	T	Q	B	E	E	I
I	A	S	A	P	O	N	R	E	M	M	N	Z	S	A	T	A	O	O	I	U	N	U
U	T	L	G	B	Q	O	A	K	C	P	I	E	M	C	N	L	R	D	Y	R	U	M
M	O	X	A	E	Q	C	E	C	N	M	U	I	N	I	L	O	D	A	G	O	M	M
O	P	L	O	E	O	I	E	I	I	Y	M	L	U	Q	N	W	R	Q	G	P	Y	U
M	T	U	X	R	R	L	R	N	Z	S	L	M	L	W	E	H	D	I	O	I	F	I
U	B	A	P	D	R	I	A	H	Q	S	C	A	N	D	I	U	M	J	F	U	V	N
I	T	P	M	A	N	S	R	E	K	T	H	U	L	I	U	M	R	P	F	M	W	F
R	B	E	R	Y	L	L	I	U	M	U	I	M	Y	D	O	E	S	A	R	P	N	A
T	T	Q	V	M	U	G	G	C	T	U	N	G	S	T	E	N	L	H	B	Y	Y	H
T	Q	Y	T	T	E	R	B	I	U	M	R	D	L	O	G	M	U	I	M	L	O	H
Y	V	S	I	L	V	E	R	C	V	Y	T	S	U	O	M	U	N	I	T	A	L	P
M	U	I	N	A	R	U	R	Y	H	E	S	D	Y	S	P	R	O	S	I	U	M	S

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September 2022


Li-ion
ELECTRIC VEHICLE BATTERY
Clean
Window Cleaner
Toilet Cleaner
Minerals Council of Australia