



IT DOES MATTER!



THE TITANIUM NATION

Titanium, used in aircraft manufacture, is very expensive because of the method used to remove it from the ore. But South Africa is developing a method to extract titanium that will be *cheaper* and give *better quality* titanium.

ORE IS THE ROCK CONTAINING TITANIUM THAT IS MINED OUT OF THE GROUND.

GIVING WINGS TO THE TITANIUM INDUSTRY ...



Knowledge is Ncaw!

DISCOVERING METALS

1

FIND DIFFERENT THINGS MADE OUT OF DIFFERENT METALS.



3

MAKE A TABLE WITH THE FOLLOWING COLUMNS:

- SHINY OR DULL
- STRENGTH
- CAN IT BE BENT?
- IS IT MAGNETIC?

ITEM	SHINY OR DULL	STRENGTH	CAN IT BE BENT?	IS IT MAGNETIC?
SPOON				
SAFETY PIN				
WIRE				
KEY				
SCREW				
SCISSORS				
PAPER CLIP				
20c COIN				

2

FIND A MAGNET - EVEN A FRIDGE MAGNET WILL BE FINE.



4

TEST EACH OF THE METALS AND SEE HOW THEY COMPARE TO EACH OTHER. WHAT DO YOU THINK MAKES A METAL MAGNETIC OR NOT?

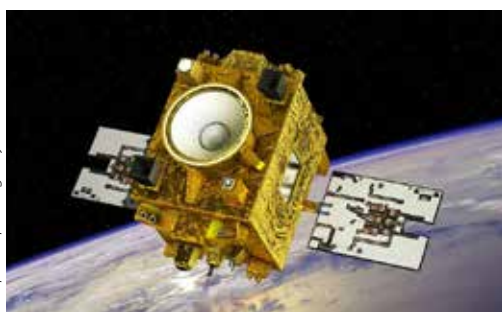


WHAT'S THE MATTER!

This world is full of different materials (called **matter**) – metals, liquids, living things...

Some matter is strong, some can be bent, and other matter breaks easily. Because they are all so different they can be used for different things.

European Space Agency (www.esa.int)



Above: Satellites are covered in a thin layer of gold

Below: Aluminium is mixed with other metals to make car wheel rims



Metals are a type of matter. Even the different metals have different properties – **aluminium** is light, **gold** can be hammered extremely thin, **titanium** is light and very strong, and **iron** is strong and magnetic!

Right: In the past steel was used to make armour – steel is strong and can be shaped



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SA REFERENCE

It is recognized how useful titanium is – it is lighter and stronger than steel. It is used to make aeroplanes and in the medical field – BUT it is expensive. The CSIR in South Africa is developing a new, cheaper method for extracting titanium. Because it is cheaper it will be able to be used for many more things...



Main picture: Many modern aeroplanes use titanium parts

Left: Titanium plate and screws to fix a broken wrist

By Wouter Hagens (Own work) [CC BY-SA 3.0 (<http://creativecommons.org/licenses/by-sa/3.0/>)], via Wikimedia Commons

CAREERS:

Metallurgical Engineers: Apart from working with metals and creating "new" metals (or alloys) by mixing different metals together, Metallurgical Engineers also work out the best ways to get the metals out of the ore. This is what they are doing at the CSIR titanium pilot plant.

Machinists work with different materials to make parts for things that are being manufactured. They use different equipment such as lathes and CNC machines.



Zizo Gxowa is a Candidate researcher at the CSIR. She holds a BSc. Engineering degree and has also completed a master's degree in metallurgy and materials. She works on creating different alloys (which are mixes of metals and other substances to give metals with different qualities). She has been very involved in the titanium project. Her typical day involves making an alloy and then analysing the alloy. She enjoys her work as there is always a new challenge and something new to learn.

CURRICULUM LINKS

- **GRADE 7, 8, 9:**
Natural Science – Matter and Materials
- **GRADE 10, 11, 12:**
Physical Science – Matter and Materials

Knowledge is Ncaw!



STRETCH YOUR MIND

MATCH UP THE DESCRIPTION IN COLUMN B TO THE RELEVANT MATTER IN COLUMN A.

A

MERCURY

GOLD

HYDROGEN

WATER

TITANIUM

IRON

TABLE SALT

NITROGEN

B

THE ONLY SUBSTANCE THAT IS LIGHTER WHEN IT IS SOLID THAN WHEN LIQUID

STRONGER AND LIGHTER THAN STEEL

BECAUSE IT CAN BE HAMMERED TO BE EXTREMELY THIN AND DOES NOT CORRODE IT IS USED TO COVER SATELLITES SENT INTO SPACE

THE ONLY METAL THAT IS LIQUID AT NORMAL ROOM TEMPERATURES

GOES FROM A GAS INTO A LIQUID AT MINUS 210°C

SOMETHING WE EAT THAT IS MADE FROM 2 SUBSTANCES THAT ARE POISONOUS ON THEIR OWN

THE LIGHTEST THING ON EARTH, AND MOST LIKELY TO EXPLODE

A METAL THAT IS MAGNETIC

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WE WANT YOUR FEEDBACK!

TELL US THE MOST INTERESTING THING YOU DISCOVERED ABOUT METALS ...



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