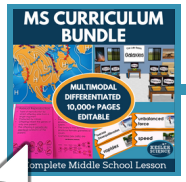
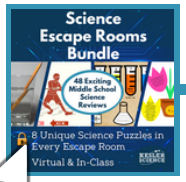
What Can Kesler Science Do for You?

4th - 8th grade science teachers love our Life, Earth, and Physical Science materials! With these easy and engaging materials, teachers can save planning time and put their focus back on the teaching that really matters.



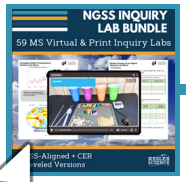
5E LESSONS

Two-week lessons with over 100 topics



ESCAPE ROOMS

Engaging activities for review



INQUIRY LABS

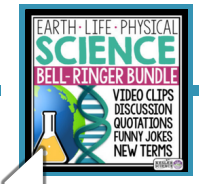
Three different levels to fit every student

AMAZING ANCHORS

Anchoring phenomenon to book-end your lessons

SUB PLANS

Never worry about planning for a sub again.



WARM-UPS

Bellringers for the entire year

STATION LABS

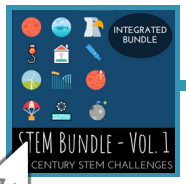
Student-led exploration

INTERACTIVE NOTEBOOKS

Bring science journals to life.

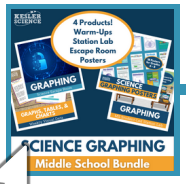
WIKI TICKETS

Quick formative assessments



STEM CHALLENGES

Real-world STEM problem-solving

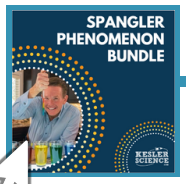


GRAPHING

Table and charts and graphs ... OH MY!

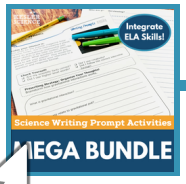
SCIENCE READING COMPREHENSION

Leveled reading passages with mini-activities



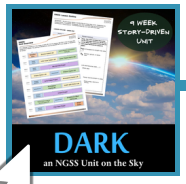
SPANGLER COLLABORATION

Exclusive Steve Spangler lessons and videos



WRITING PROMPTS

Writing activities covering 100+ topics



EXPLORIES

Story-driven units with integrated activities

The Kesler Science Professional Learning Network (PLN) group on Facebook has a huge community of engaged and supportive science teachers - come join us!

KESLER SCIENCE

Name: _____

Date: _____

Alchemy... for Real?

Humans have a long history of obsessing over riches and long life. Before chemistry existed, people explored "alchemy," an attempt to transform simple metals into "the philosopher's stone." This magical sounding mixture was supposed to provide both gold and immortality!

The alchemy trend was hot in the 1600's. Hennig Brandt was an alchemist so committed that he boiled down **thousands** of gallons of human urine. Even Isaac Newton, one of the most influential scientists who ever lived, was secretly consumed with finding the philosopher's stone.

Today, their pursuit seems silly - converting lead into gold? Lead and gold are two elements on the periodic table. Lead, which has 82 protons inside each atom, would have to lose three protons to change into gold, which has 79 protons. Human urine isn't going to make that happen!

BUT… here's the plot twist: scientists today **can** change lead into gold.

Turns out, all you need is a 16-mile-long tube with supercooled magnets shooting particles at nearly the speed of light. Oh, and a really good camera that can track millisecond changes in atoms. No big deal! 😂

All that can be found at the impressive Large Hadron Collider, which is buried underground in Geneva, Switzerland. In tests between 2015 and 2018, beams of lead ions were fired at each other from opposite ends of the giant collider. Years later, the team released the results: the nuclei of 86 billion lead atoms lost three protons each - technically converting them to atoms of gold!

Before you get any ideas, no one's getting rich off of this. 89 billion atoms of gold can't even be seen with the naked eye. Scientists would need to make a **trillion** times more atoms to make **one gram of gold**.

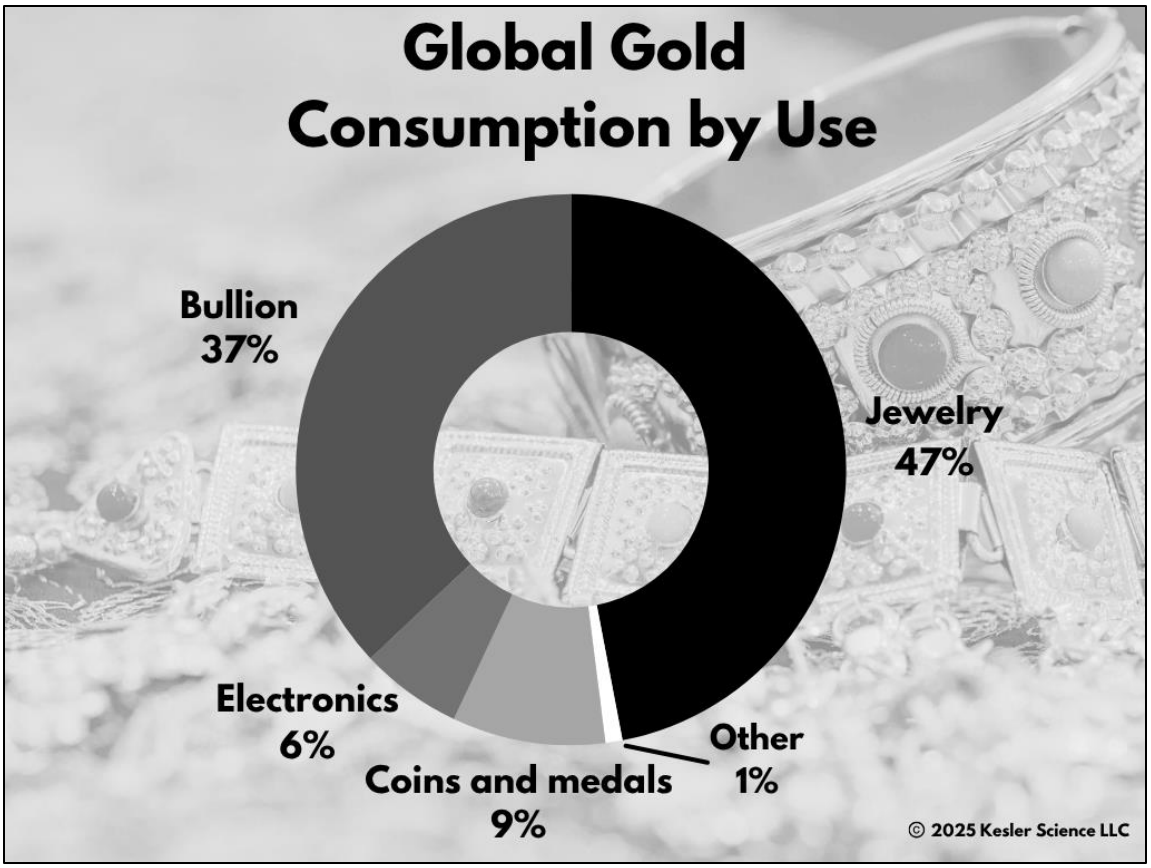
The other problem is these gold atoms only existed for a millisecond before they smashed into the side of the collider or completely disintegrated. So… not exactly ready for jewelry production.

Why is it we place so much value on the element gold, anyway?

First off, it's rare - but it's not so rare that ancient cultures couldn't find it through mining or sifting through river deposits. Gold also has some physical properties that make it special. It has a relatively low melting point, which helps when making jewelry. It's also extremely malleable, so it can be easily shaped into coins or gold leaf. It's also an excellent electrical conductor, used in expensive electronics like our phones and computers. And unlike other many other metals, gold will not corrode. Beautiful objects crafted from gold will stay beautiful for a really long time.

If you are curious about how gold was used across different industries, check out the graphic on the next page.

Alchemy... for Real?



1. What application is gold used for the most? What properties does gold have that make it a good material for this purpose?

_____

_____

2. What percent of the world's gold is used for electronics? How might gold's inability to corrode help for this application?

_____

_____

3. "Bullion" refers to bars made with gold of a very high purity. Gold bullion is usually used to store and exchange gold as investments (ways to store money for later use). How much of gold in the world is used for no other purpose than storage and trade?

_____

_____

_____

_____

Blog Link: https://blog.keslerscience.com/phenomenon-and-graphing/alchemy-for-real

Alchemy... for Real?

Humans have a long history of obsessing over riches and long life. Before chemistry existed, people explored "alchemy," an attempt to transform simple metals into "the philosopher's stone." This magical sounding mixture was supposed to provide both gold and immortality!

The alchemy trend was hot in the 1600's. Hennig Brandt was an alchemist so committed that he boiled down **thousands** of gallons of human urine. Even Isaac Newton, one of the most influential scientists who ever lived, was secretly consumed with finding the philosopher's stone.

Today, their pursuit seems silly - converting lead into gold? Lead and gold are two elements on the periodic table. Lead, which has 82 protons inside each atom, would have to lose three protons to change into gold, which has 79 protons. Human urine isn't going to make that happen!

BUT… here's the plot twist: scientists today **can** change lead into gold.

Turns out, all you need is a 16-mile-long tube with supercooled magnets shooting particles at nearly the speed of light. Oh, and a really good camera that can track millisecond changes in atoms. No big deal! 😂

All that can be found at the impressive Large Hadron Collider, which is buried underground in Geneva, Switzerland. In tests between 2015 and 2018, beams of lead ions were fired at each other from opposite ends of the giant collider. Years later, the team released the results: the nuclei of 86 billion lead atoms lost three protons each - technically converting them to atoms of gold!

Before you get any ideas, no one's getting rich off of this. 89 billion atoms of gold can't even be seen with the naked eye. Scientists would need to make a **trillion** times more atoms to make **one gram of gold**.

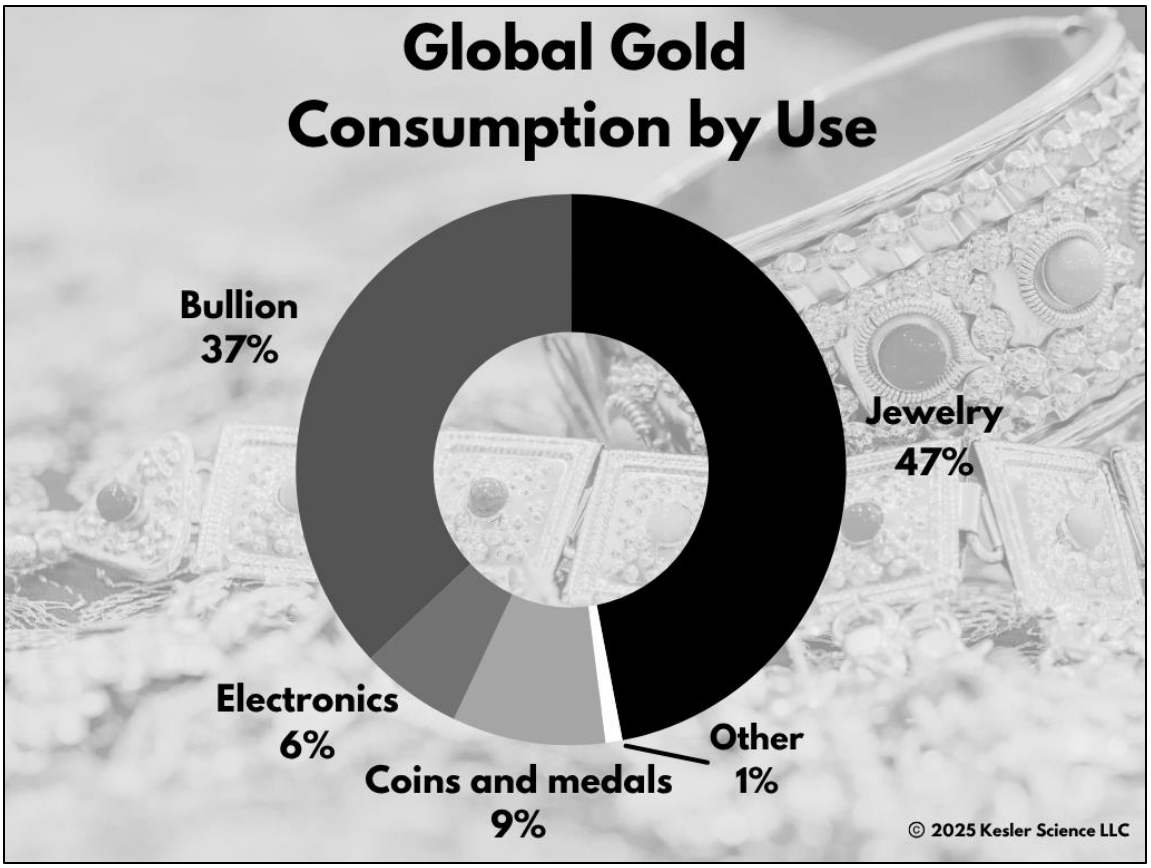
The other problem is these gold atoms only existed for a millisecond before they smashed into the side of the collider or completely disintegrated. So… not exactly ready for jewelry production.

Why is it we place so much value on the element gold, anyway?

First off, it's rare - but it's not so rare that ancient cultures couldn't find it through mining or sifting through river deposits. Gold also has some physical properties that make it special. It has a relatively low melting point, which helps when making jewelry. It's also extremely malleable, so it can be easily shaped into coins or gold leaf. It's also an excellent electrical conductor, used in expensive electronics like our phones and computers. And unlike other many other metals, gold will not corrode. Beautiful objects crafted from gold will stay beautiful for a really long time.

If you are curious about how gold was used across different industries, check out the graphic on the next page.

Alchemy... for Real?



1. What application is gold used for the most? What properties does gold have that make it a good material for this purpose?

   47% of gold consumed is used for jewelry. Gold can be easily shaped, blends well with other metals due to its low melting point and will not corrode.

2. What percent of the world's gold is used for electronics? How might gold's inability to corrode help for this application?

   6% of the world's gold is used for electronics. If gold does not corrode, circuits made with gold can last for a long time without failing.

3. "Bullion" refers to bars made with gold of a very high purity. Gold bullion is usually used to store and exchange gold as investments (ways to store money for later use). How much of gold in the world is used for no other purpose than storage and trade?

   The graph shows that 37% of the world's gold is turned into bullion, so 37% of the world's gold is used for nothing other than storage and trade.