Element 3

Lithium, Presented by Lillian

From The Magical Elements of the Periodic Table Series

Lithium

By Sybrina Durant with Illustrations by Pranavva et al.

Lillian Presents Lithium

This book features the periodic table element, Lithium. It is presented by Lillian, a member of the Elemental Dragon Clan. Each dragon has a magical tail tipped with an element that gives them unique powers. Their powers are based on the properties of its periodic table element.

Lillian is just one of the 118 elementals who will present all of the Magical Elements of the Periodic Table to readers who are curious about the wonders of the world.

Lillian introduces Lithium in her book.

The Elemental Dragon Clan and their other techno-magical friends are the perfect group to introduce you to the elements in the Periodic Table. Hopefully, this Magical Elements of the Periodic Table book will spark an interest in the magical and real world properties of all the elements known today. You may be surprised at how prominently they feature in our every day lives.

Each page in this book contains terms that might not be completely familiar to the reader. Refer to the definitions in the back of the book to get a clear understanding of each meaning.

There is also a fun elemental themed Periodic Table at the back of the book. It features 118 elements presented by fanciful characters like unicorns, dragons, wizards, knights and goblins.. They want you to remember that if there's no metal...there's no magic or technology.

Remember, "No metal - No Magic. . .and No Technology".

It's Techo-Magical.

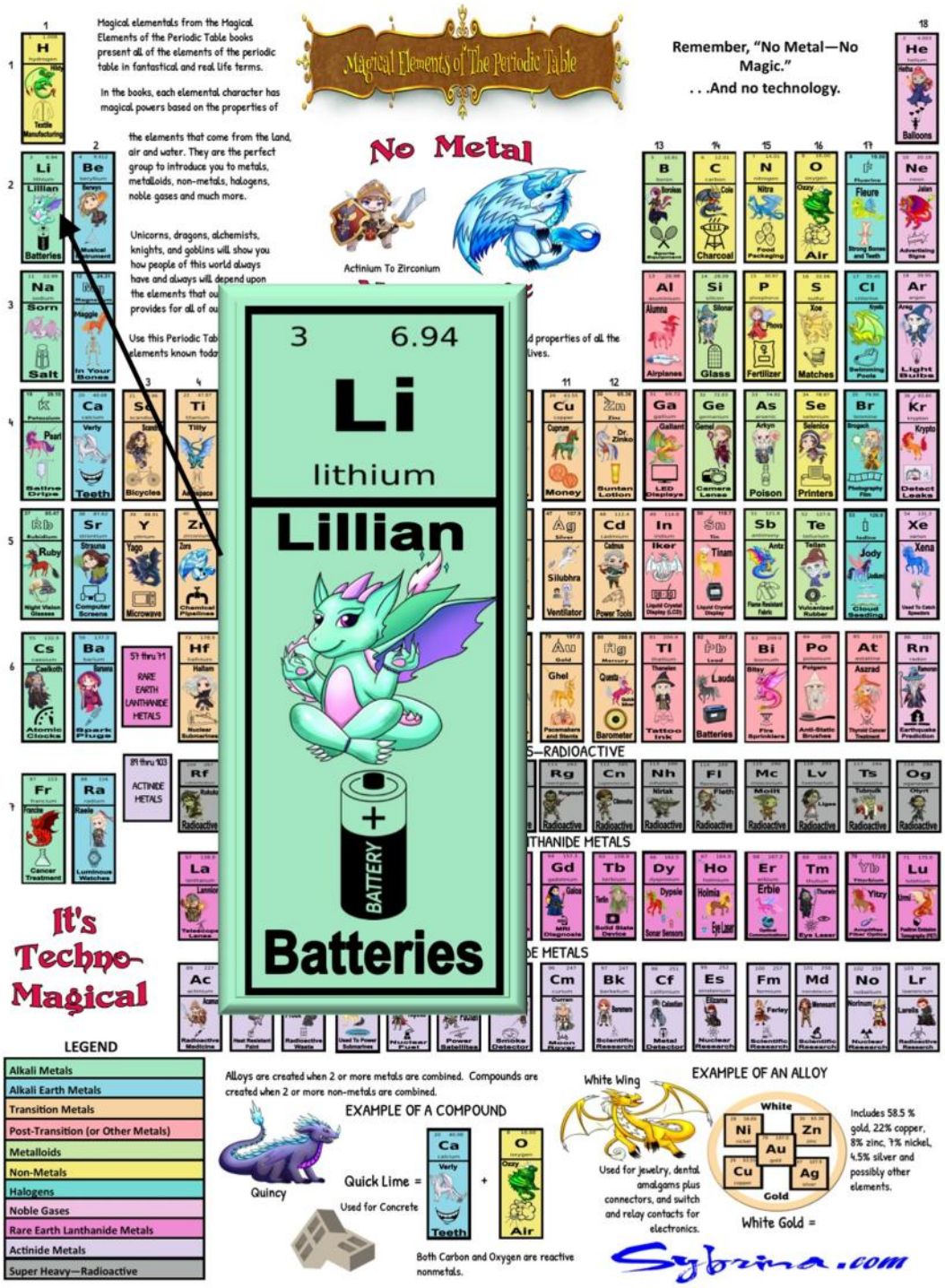
Note: Sybrina Publishing websites are Sybrina.com and MagicalPTElements.com. Follow sybrinapublishing on Instagram, Magical Elements of the Periodic Table on Facebook, @sybrinad on Pinterest and Sybrina_SPT on Twitter.

Lillian

The Dragon With The Lithium Tipped Tail

Symbol: Li Atomic Number: 3 Atomic Mass: 6.94

Lithium resides in Group 1 Period 2 on the Periodic Table.



Lithium is an Alkali Metal

Lithium was discovered in 1817 by Swedish chemist Johan August Arfvedson while studying the mineral petalite on Utö island (some say Stockholm), Sweden. He later found lithium in spodumene and lepidolite.

Lithium is a soft, silvery-white, metal that reacts violently with water. It must be stored in air tight environments.

Lithium is a good conductor of heat and electricity. Heat can flow through it pretty quickly. Free movement of electrons enables lithium to conduct electricity effectively.

Lithium is paramagnetic, meaning it has a slight magnetic response but isn't as magnetic as iron or nickel. Lithium ions are non-magnetic and exhibit diamagnetism.

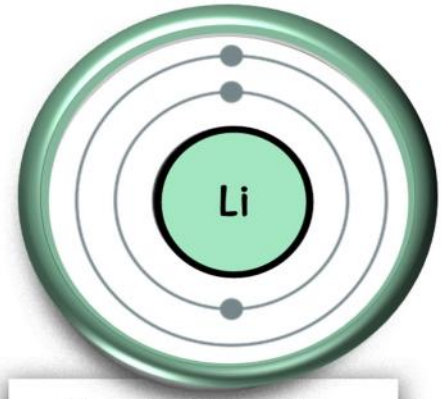
Lithium is a ductile metal, meaning it can be stretched into wires without breaking. It is also malleable, allowing it to be hammered into thin sheets.

Lithium is an Alkali Metal. It is the lightest of all metals.

LEGEND

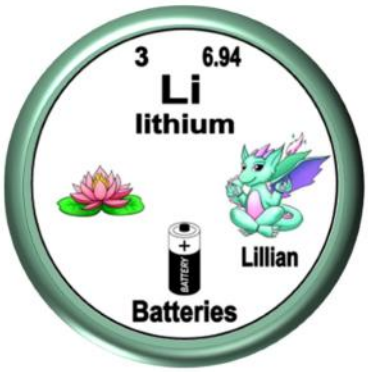
- Alkali Metals
- Alkali Earth Metals
- Transition Metals
- Post-Transition (or Other Metals)
- Metalloids
- Non-Metals
- Halogens
- Noble Gases
- Rare Earth Lanthanide Metals
- Actinide Metals
- Super Heavy—Radioactive

Lithium Element



Atomic Structure

Alkali Metals—Some metals on the periodic table are soft and shiny. They are so soft that they can be cut with a knife! These metals are excited to give away electrons to elements in need, making them highly reactive. This electron transfer creates a compound known as a salt. Surprisingly, these metals are not found in nature alone; they must be extracted from other sources. Examples of these metals include lithium, sodium, potassium, rubidium, cesium, and francium.



Lithium is a crucial element in our modern world, playing a key role in many technologies we use every day. Known as the lightest metal, lithium's properties make it an exceptional energy storage solution. Devices like smartphones, laptops, and electric vehicles (EVs) all depend on lithium-ion batteries, celebrated for holding considerable energy while being lightweight. This characteristic enables the design of sleek, compact devices that can last longer without needing a recharge, catering to our fast-paced, mobile lifestyles. The efficiency of lithium-ion technology has transformed our energy consumption habits, providing lasting power that fits our on-the-go demands.

Historically, the uses of lithium began to be recognized in the 19th century, primarily in the field of medicine. The earliest known application of lithium as a therapeutic agent dates back to the 1810s when it was first used to treat gout and various nervous disorders. By the mid-19th century, lithium carbonate had gained popularity as a cure-all tonic, marketed to alleviate a range of ailments, making it a groundbreaking substance in early therapeutic practices. This medicinal application paved the way for further exploration into lithium's potential, eventually leading to its role as a mood stabilizer in the treatment of bipolar disorder in the late 20th century. This evolution illustrates how lithium shifted from a curative element steeped in anecdotal claims to a scientifically supported medication, underscoring its importance in mental health treatment today.

In addition to its medicinal uses, lithium's initial applications in various industrial processes have also had profound impacts on technology and manufacturing. The introduction of lithium into glass and ceramics significantly improved production techniques; it lowers the melting point of the raw materials, which increases the efficiency of production and elevates the quality of the final products. Lithium is also utilized in lubricating greases that endure extreme temperatures and pressures, owing to its ability to maintain consistency and performance where traditional oils would fail. These early industrial applications set the stage for lithium's later breakthrough as a cornerstone of modern energy storage solutions, marking it as a crucial element in the evolution of industrial chemistry.

As we glance toward the future, the possibilities for lithium usage continue to expand and diversify. Current research is examining its potential in powering emerging technologies, such as solid-state batteries, which promise enhanced energy density and safety compared to traditional lithium-ion batteries. Solid-state batteries replace the liquid electrolyte used in conventional batteries with a solid electrolyte, potentially reducing the risk of flammability and allowing for faster charging times. This innovation could lead to longer-lasting batteries suitable for electric vehicles, thereby further accelerating the transition from fossil fuels to renewable energy sources. Such advancements will likely play a vital role in reducing global dependence on fossil fuels while simultaneously promoting cleaner energy consumption.

Moreover, as the world grapples with the pressing challenges posed by climate change, lithium's role in

renewable energy storage solutions will become even more critical. The integration of solar and wind energy into our energy grid hinges significantly on efficient storage systems that can store excess electricity generated during peak production periods and release it during times of high demand. With ongoing investments in grid-scale battery technology and advancements in lithium extraction methods that are more sustainable and environmentally friendly, the future could see lithium becoming an even more integral player in the renewable energy landscape. The convergence of these factors positions lithium not only as a vital mineral for today's technologies but as a cornerstone of tomorrow's sustainable energy solutions.

The demand for lithium continues to rise in advanced applications such as artificial intelligence, aerospace, and the burgeoning field of quantum computing. In aerospace, lithium's lightweight properties are invaluable, as they can significantly reduce aircraft and spacecraft weight, enhancing fuel efficiency and performance. As industries seek innovative ways to innovate and optimize, lithium's capacity to improve energy efficiency and support high-performance systems places it at the forefront of technological advancements. Likewise, the intersection of lithium with quantum technology could unlock groundbreaking applications in computing and data storage, paving the way for next-generation devices that operate with unprecedented speed and efficiency.

lithium's trajectory from a historical medicinal compound to a central element in modern energy technology marks a significant evolution in its importance. Its multifaceted applications across diverse industries underscore how lithium will continue to be pivotal in shaping not only our current technological landscape but also guiding us toward a more sustainable future. With ongoing advancements in science and engineering, the significance of lithium is poised to grow exponentially, responding to and addressing the pressing challenges of our time while unlocking new possibilities for technological innovation. As such, lithium will undoubtedly remain a driving force in our quest for ecological sustainability and a cleaner, greener future.

Uses For Lithium

Small rechargeable Lithium batteries are used in pacemakers, digital cameras, smart phones, laptops, watches and more. Large lithium batteries are used in scooters, golf carts, trolleys, boats, cars, trucks, recreational vehicles and more. Small rechargeable lithium batteries play a crucial role in the functionality of various everyday devices, enabling convenience and portability in our fast-paced lives. Meanwhile, large lithium batteries power a range of vehicles and equipment, driving innovation in electric transportation and contributing to the growing shift towards sustainable energy solutions.

Lithium is a medication that effectively reduces manic symptoms and is a treatment for bipolar episodes. It works by stabilizing mood fluctuations, making it an essential component of long-term management for individuals with bipolar disorder. Additionally, regular monitoring of lithium levels is crucial, as it requires careful dosage adjustments to ensure its efficacy while minimizing potential side effects.

The Source of Lithium

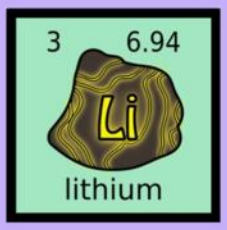
Lithium is extracted from Spodumene and other ores like petalite and lepidolite. It's also found in great quantities in salt water. Australia and Chile are the world's largest producers of lithium.

Lithium, a highly reactive alkali metal, was first identified in 1817 by Swedish chemist Johan August Arfwedson. While examining petalite, a lithium-rich mineral sourced from Sweden, Arfwedson discovered the presence of this new element, paving the way for a scientific exploration that would lead to its critical applications in industries like batteries and pharmaceuticals. Naturally occurring lithium is primarily found in mineral deposits and brine sources, predominantly in pegmatitic minerals such as spodumene, lepidolite, and petalite, which are mined globally. Key producers of lithium-bearing minerals include Australia, China, and Zimbabwe. Furthermore, lithium-rich brines are sourced from salt flats, or salars, particularly in South America, with Argentina, Bolivia, and Chile forming a notable region known as the "Lithium Triangle," rich in lithium as well as other essential minerals.

The commercial extraction of lithium can vary based on whether it is derived from hard rock minerals or brine resources. For hard rock mining, spodumene is the most commonly utilized mineral. The extraction process involves crushing the ore and heating it to approximately 1,000 degrees Celsius to facilitate calcination, converting lithium into a soluble form. It is then leached out using sulfuric acid or other solvents, purified further, and precipitated into lithium carbonate or lithium hydroxide based on the intended usage.

In contrast, extracting lithium from brine is generally less energy-intensive. This process involves pumping lithium-rich brine to the surface and allowing it to evaporate in large ponds. As water evaporates, the lithium concentration increases, along with the precipitation of various salts. Though this method can take several months to years, it is typically regarded as more environmentally friendly compared to traditional hard rock mining. However, both extraction methods raise significant environmental concerns, including water depletion, habitat destruction, and pollution, which are critical considerations as the demand for lithium continues to rise. Once the brine achieves the desired lithium concentration, the remaining solution undergoes further processing to isolate lithium carbonate or lithium hydroxide.

Lillian Presents Lithium



Did You Know?

Until 1948, the citrus-flavored soda, 7 Up, contained a mood-altering substance! Lithium citrate, a powerful psychiatric medication for bipolar disorder and severe depression, was once an ingredient, secretly shaping your mood with every refreshing sip. But in 1948, the U.S. government stepped in and forced beverage manufacturers to scrub all traces of this element from their recipes.

Magical Elements of The Periodic Table

- Lithium citrate was part of the 7 Up soft drink recipe until 1948 when the U.S. government forced American beverage makers to remove all lithium from their recipes.
- Lithium is named from the Greek word "lithos," which means "stone," reflecting its discovery in mineral form rather than in plant or animal matter. Its naming emphasizes its association with minerals, highlighting its status as the lightest metal and the first alkali metal in the periodic table.
- Pure lithium metal is extremely corrosive and requires special handling. Because it reacts with air and water, the metal is stored under oil or enclosed in an inert atmosphere. When lithium catches fire, the reaction with oxygen makes it difficult to extinguish the flames.
- Lithium, a lightweight and highly reactive metal, is utilized in the production of foldable glass due to its ability to improve the flexibility and durability of the material. When incorporated into the glass matrix, lithium helps to enhance thermal resistance and reduce brittleness, allowing for greater bending without breakage. This innovative application of lithium not only advances the technology of flexible screens but also contributes to the broader development of foldable electronic devices.
- An Aluminum Lithium alloy's lightweight and strong properties make it an ideal material for the construction of military aircraft, particularly in facilitating fuel efficiency and enhancing maneuverability. As researchers seek ways to improve aircraft performance, lithium alloys are incorporated into fuselage skin and wings to reduce weight without compromising structural integrity. This innovation contributes significantly to the advancement of military aviation technology, allowing for faster and more agile planes during critical missions.

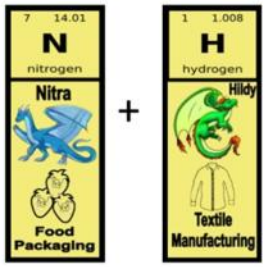
Polyatomic Ions

While individual elements are typically not polyatomic, certain elements can form polyatomic molecules or ions. Many polyatomic ions exist, formed by groups of atoms covalently bonded together with an overall charge. Polyatomic ions carry a net electric charge, either positive (cation +) or negative (anion -). Despite being made of multiple atoms, polyatomic ions behave as a single, distinct entity in chemical reactions and compounds.

Ammonium =

(NH4+)

Contains one nitrogen and four hydrogen atoms.

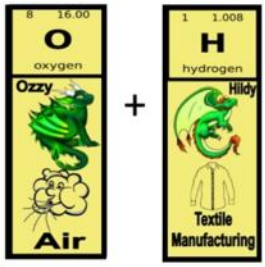


Ammonium is widely used in agriculture as a fertilizer and in industrial applications for cleaning, refrigeration, and chemical manufacturing.

Hydroxide =

(OH-)

Contains one oxygen and one hydrogen atom.

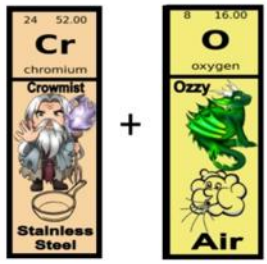


Hydroxide is commonly used for cleaning, paper production, water treatment, food processing, and as a component in pharmaceuticals and various industrial processes

Chromate =

(CrO4 -2)

Contains one chromium and four oxygen atoms.



Chromate is commonly used for corrosion prevention on metals, as a pigment in paints and dyes, and in leather tanning. It also finds applications in cement and mortar, and as a corrosion inhibitor in cooling water systems.

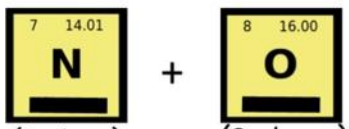
Sulfate =

(SO4 2-)

Contains one sulfur and four oxygen atoms.

Sulfates are found in detergents, shampoos, and other cleaning products as surfactants, which help create lather and remove dirt and oil. Additionally, sulfates are used in agriculture, medicine, and industrial processes.

Can you guess the most commonly used polyatomic ion?



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The above chart only shows a few of the polyatomic ions formed by those elements. There is no known fixed finite number of polyatomic ions but some other important ones are:

Carbonate (CO3 2-): Crucial in construction, medicine, agriculture, and food production. **Phosphate (PO4 3-):** Most notably used in fertilizers to enhance plant growth, in animal feed supplements, and in cleaning products. **Acetate (CH3COO-):** Used in the preparation of metal acetates, used in some printing processes; vinyl acetate, employed in the production of plastics; cellulose acetate, used in making photographic films and textiles.

The most commonly used Polyatomic Ion is ***Nitrate (NO3-)*** : Primarily used in medicine, food preservation, and as fertilizers .

Meet Lillian, The Dragon With The Lithium Tipped Tail

Lillian is a pretty green dragon who lives in an enchanted valley. Her smooth green skin shimmers like satin in the sunlight, while her magnificent purple wings sparkle with hues of lavender and violet. Lillian is a special dragon who possesses a magical ability wield the power of Lithium that tips her extraordinary tail.

Lillian can soothe the hearts of those in turmoil with a gentle caress from her tail. As she trails her tail across the chaotic souls around her, a wave of calm spreads like soft ripples on a still pond, silencing their fears and anxieties. But her powers extend beyond mere tranquility; she has the unique ability to absorb the tumultuous emotions that surround her and transform them into brilliant bursts of energy. This light can be released in various forms—a dazzling display of sparks that fill the air with laughter or radiant beams that ignite creativity in the hearts of artists and dreamers.

One sunny afternoon, Lillian had just finished her flight over the valley when she heard a cacophony of shouts near the old wishing tree, where villagers often gathered to share their hopes and fears. She swooped down, her heart racing with concern. As she landed gracefully, she saw a group of children huddled together, their faces twisted in worry. It seemed the tree had stopped granting wishes, leaving the townsfolk in despair.

Lillian glided over and curled her tail around the children. "Shhh," she whispered softly, invoking her Lithium power. A warm glow enveloped her tail, and soon, the children were lulled into a state of calm. Their chaotic fears began to drain away, replaced by a comforting sense of serenity.

"What's wrong?" she asked gently.

"The tree," one child whimpered, "it stopped listening. We wished for fun and adventure, but nothing happened!"

With her heart swelling with empathy, Lillian thought for a moment. "What if I showed you the magic of believing?" She lifted her wings and, channeling her Lithium energy, she unleashed a cascade of shimmering sparks into the air. They danced around the children, illuminating their faces with wonder.

One by one, the children began to giggle and clap, their minds filling with visions of fantastical adventures—their imaginations untamed. "Look!" shouted a girl with curly hair, pointing to the sky where sparkles twisted into the shape of dragons and castles.

Seeing their joy rekindled something within Lillian. Could it be possible to use her power to restore the old wishing tree? She approached the gnarled trunk, caressing it with her tail while summoning her energy. The tree trembled for a moment, then released a soft glow. To Lillian's delight, flowers began to bloom at its base, and a gentle breeze rustled through its leaves.

The wishes were not lost. They had merely been waiting for the right spark of encouragement. With Lillian's help, the tree pulsed with renewed vigor, ready to listen once more.

The villagers soon returned, their amazement evident as they could see the tree thriving again. Lillian beamed, knowing that her Lithium power had reignited the hope of an entire community. She spread her wings, soaring into the twilight sky, leaving behind a shimmering trail of light that promised creativity, adventure, and the assurance that chaos could always yield to calm.

And from that day forward, Lillian was not just another dragon; she was a guardian of dreams, weaving tranquility amidst the turmoil of life, reminding all that sometimes, a little magic and kindness are all it takes to turn fear into wonder.

Enjoy This Coloring Page Featuring

Lillian The Dragon With The Lithium Tipped Tail

Magical Elements of The Periodic Table

Create Your Own Magical Dragon Elemental

Lillian — The Dragon With The Lithium Tipped Tail

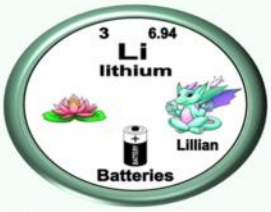
Symbol: Li Atomic Number: 3 Atomic Mass: 6.94

Magical Clan Crest Symbol

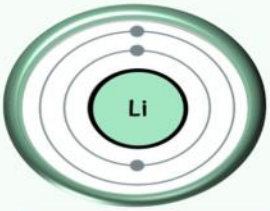
Lithium is extracted from Spodumene

Alkali Metal

3 6.94
Li
lithium



Lithium Periodic Symbol



Atomic Structure

Lillian's Magical Abilities

- A soft caress from Lillian's Lithium tipped tail quiets and calms chaotic feelings.

Symbol: Atomic Number: Atomic Mass:

Magical Clan Crest Symbol

Atomic Structure

Magical Abilities

Uses For

Magical Dragon Elemental Research Sheet

Before starting your Magical Dragon Elemental graphics page, do some research on your chosen element.

Name of Magical Dragon:	
Dragon's Magic Power Based on the Element's Properties:	
Magical Clan Crest Symbol:	
Element Name:	
Element Symbol:	
Atomic Number:	
Atomic Mass:	
What year and where was this Element discovered?	
Who discovered this Element?	
Element Group:	
Element Period:	
Element Family Name:	
State of Element At Room Temperature:	
What is Element Mined or Extracted From?	
Is Element Magnetic?	
Does Element Conduct Electricity?	
Where is the Element commonly found in Nature?	
What is 1 alloy of the Element? How used?	
What is 1 compound of the Element? How used?	
Name the most common use for this Element:	
Name a little known use for this Element:	
Name one more use for this Element:	
Interesting and Fun Facts:	

Write a paragraph below to describe your magical dragon elemental. Based on the information obtained from research of your chosen element, how did you determine your dragon's name? What are your dragon's magic powers? What are their likes/dislikes, strengths/weaknesses, personality traits? What color is your dragon and why did you pick that color? What is your dragon's Clan Crest Symbol?

I hope you enjoyed this sample

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Learn more about it at magicalptelements.com

Sybrina Publishing

If you love the book,

please spread the word to teachers,

home schoolers and anyone else who might enjoy it.