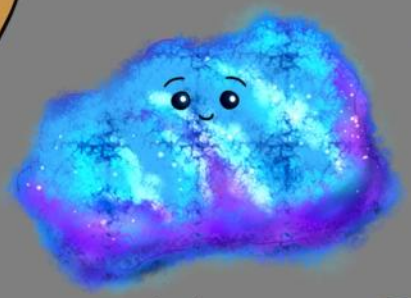
Actinium

Element 89

Actinium, Presented By Acamus
From The Magical Elements of the
Periodic Table Book Series



Actinium

By Sybrina Durant with Illustrations by Pranavva et al.

Acamus The Actinide Knight Presents Actinium

This Element 89 book features the periodic table element, Actinium. It is presented by Acamus, a member of the Actinide Knights. Each knight has a magical sword or other medieval weapon tipped with an element that gives them unique powers. Their powers are based on the properties of its periodic table element.

Acamus 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.

Acamus introduces Actinium in his book.

The Actinide Knights 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".

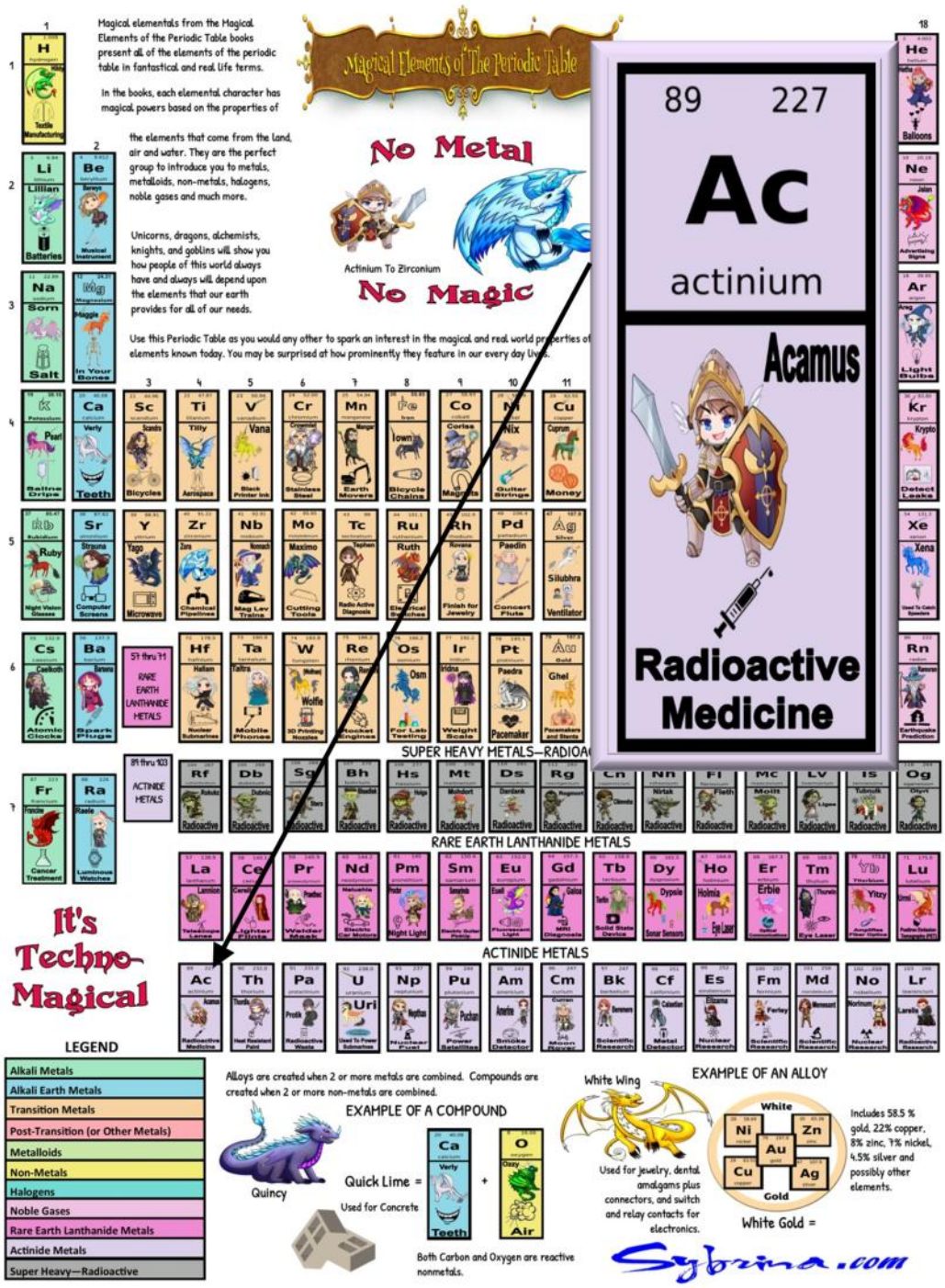
It's Techo-Magical.

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, Sybrina_SPT on Twitter; and Sybrina Durant on LinkedIn.

Acamus The Knight With The Actinium Sword

Symbol: Ac Atomic Number: 89 Atomic Mass: 227

Actinium resides in Group 03, Period 7 on the Periodic Table.



Actinium is a Actinide Metal

Actinium was discovered in 1899 by Andrew Debierne in Paris. It was first extracted from a rock called pitchblende, which contains uranium.

Actinium is a soft, shiny white metal that gives off radiation. It quickly reacts with oxygen and moisture in the air, creating a white layer called actinium oxide that stops it from reacting further.

Actinium is very radioactive, which makes it shine in the dark with a pale blue light. This light comes from the air around it, which is charged by the tiny particles it gives off.

Actinium is a good conductor of electricity and heat though its extreme radioactivity limits practical electrical uses.

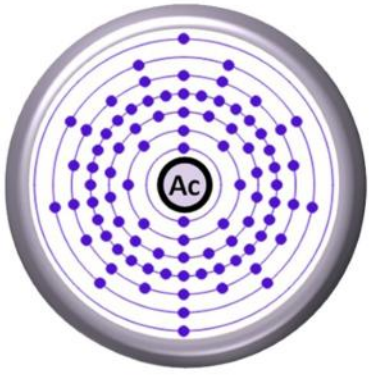
Actinium is paramagnetic. Paramagnetism happens because some electrons in an atom or ion are unpaired. These unpaired electrons make a magnetic force that lines up with an outside magnetic field.

Actinium is an Actinide Metal. It is the first element of the Actinide Series.

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

Actinium Element



Atomic Structure

Actinide Metals—Any of a series of chemically similar metallic elements with atomic numbers ranging from 89 (actinium) to 103 (lawrencium). All of these elements are radioactive, and two of the elements, uranium and plutonium, are used to generate nuclear energy. The lanthanides and actinides are sometimes called the inner transition metals, referring to their properties and position on the table. They are actinium, thorium, protactinium, uranium, neptunium, plutonium, americium, curium, berkelium, californium, einsteinium, fermium, mendelevium, nobelium, and lawrencium.

Actinium is a special element found on the periodic table. It has the symbol "Ac" and is number 89 in the list. It was discovered over a hundred years ago, in 1899, by a scientist named Friedrich Oskar Giesel, a chemist from France. He extracted it from leftover materials called pitchblende, which were left behind when Marie and Pierre Curie discovered radium. Actinium is part of a group called the actinides, which includes other elements like uranium and plutonium. These elements are important because they can be used in things like nuclear power and weapons.

Many scientists have studied actinium and learned a lot about it. One interesting fact is that actinium is a silvery-white metal and shines brightly. However, it is not something that people see often because it is rare and not found freely in nature. Instead, it is usually found in small amounts combined with other minerals.

One of the coolest things about actinium is that it is radioactive. This means that it gives off energy in the form of radiation as it breaks down over time. Being radioactive allows scientists to use actinium in medicine, especially in a type of treatment called targeted alpha therapy. This therapy can help treat certain cancers by targeting and destroying cancer cells while aiming to keep healthy cells safe.

Actinium exists in different forms called isotopes, which are versions of the same element but with different weights. The most common isotope of actinium is actinium-227. Researchers are particularly interested in this isotope because of its properties and potential uses.

Due to its radioactivity, working with actinium requires special care. Scientists use special equipment to keep themselves safe from radiation. Even though it can be dangerous, when used correctly, actinium can also have many benefits, especially in medicine.

Actinium is important in many fields. For instance, in the world of science and research, it has sparked interest due to its fascinating properties. At the same time, some industrial uses have emerged that utilize actinium's radioactive qualities.

There are ongoing studies trying to understand more about actinium and how it can be used safely and effectively. Scientists are exploring new ways to use it in treatments for diseases, which gives hope to many people looking for cures. Researchers are also looking into how actinium is formed in nature and its role in the Earth's geology.

To sum it up, actinium is a unique element with both valuable properties and potential dangers. Its shiny metallic appearance, combined with its radioactivity, adds to its allure. In medicine, science, and industry, actinium plays an essential role, providing tools and treatments that can help improve lives. As science continues to advance, we can expect to learn even more about actinium and how to use it in exciting new ways in the future!

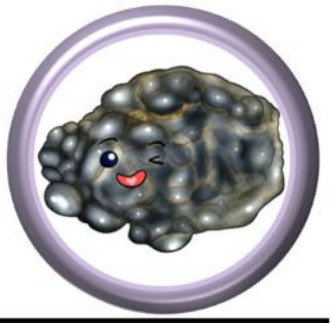
Uses For Actinium

There are very few current uses for Actinium but as the first element in the actinide series, it shares many chemical properties with the lanthanides, particularly lanthanum. Forward thinkers propose some interesting commercial potentials for its use in the future.

In the future, cars could be very different from the ones we drive today. They might use special materials called Actinium isotopes to help clean the air inside the car. These cars could have big, advanced air filters that keep the air safe and fresh. This way, passengers can enjoy a cleaner and healthier ride in their futuristic vehicles.

Actinium-powered energy sources could be used in places that are not connected to the main power grid. This means they can provide electricity in remote areas where people need power for things like lights, refrigerators, or phones. These energy sources are helpful for homes, farms, and other locations that want to be self-sufficient and independent from traditional electricity supplies.

The Source of Actinium



Actinium is not found in large quantities in nature but some common ores are Uraninite and Thorite. It is primarily produced through the neutron bombardment of radium in nuclear reactors. The radium absorbs a neutron and undergoes beta decay to form actinium.

Actinium is a rare and somewhat mysterious element that belongs to a group known as the actinides in the periodic table. It has the symbol Ac and atomic number 89. Actinium is classified as a radioactive metal and is not something that you will find easily in nature. Because of its specific properties, it is primarily produced through artificial means, particularly in nuclear reactors and particle accelerators where high-energy processes can take place.

To understand how actinium is obtained, we first need to look at uranium and thorium, the two elements that are crucial to the process. Both uranium and thorium are naturally occurring radioactive elements found in small amounts in the Earth's crust. These elements go through a series of decay processes, slowly breaking down into different elements and isotopes over time. During this decay process, actinium is formed as a byproduct. This means that actinium does not exist on its own in significant quantities in nature, but rather, it is created as uranium and thorium decay.

Most commonly, actinium is produced by bombarding radium, which is another radioactive element, with neutrons in a nuclear reactor. This process is called neutron bombardment. When radium is hit with enough neutrons, it absorbs one and undergoes a change through a process known as beta decay. During beta decay, the radium transforms into actinium. This reaction occurs in highly controlled environments in nuclear facilities that can handle such radioactive materials safely.

After actinium is formed in these reactors, it is not immediately ready for use. The next step involves separating it from the other radioactive materials that were created during the decay process. This is where chemical separation and purification come into play. The nuclear reactor

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.

Acamus Presents Actinium

Did You Know?

Actinium isotopes could be used in autonomous military robots for long-range missions.

Magical Elements of The Periodic Table

- Actinium is the very first element in a group called the actinide series. The name "actinide" comes from the word "Actinium," its name and the reason for the group.
- Actinium was first discovered in 1899 by André-Louis Debierne, a French chemist. In 1902, a scientist named Friedrich Otto Giesel also independently discovered it. He named it emanium but that name did not stick since it had already been named by Debierne. Giesel can rightfully be credited with the first preparation of radiochemically pure actinium and with the identification of its atomic number 89.
- The word "actinium" comes from the Greek word "aktis," which means "sunbeam." This name was chosen because actinium is very radioactive, like how a bright sunbeam can be strong and powerful.
- Actinium-227 emits beta particles with so much energy that it lights up the surrounding environment with a blue glow. In a sense, due to its high levels of radioactivity, it is vibrating faster than the speed of light and the blue glow is like a sonic boom.
- The only naturally occurring isotope of actinium is 227Ac. Thirty-six radioisotopes of actinium have been identified, all with half-lives ranging from 69 nano seconds at the shortest (for 217Ac) to 21.77 years at the longest (227 Ac).
- Actinium-225, is being used in a new type of cancer treatment called targeted alpha therapy. As the atom decays, it releases particles that destroy the nearby cancer cells, but don't travel far enough to damage the rest of the body.

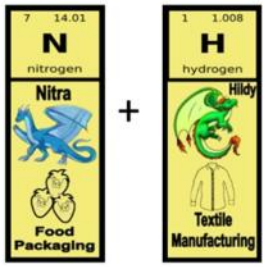
Polyatomic Ions

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.

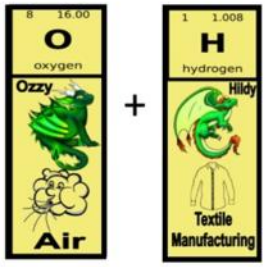


Ammonium is widely used in agriculture as a fertilizer and in industrial applications for cleaning, refrigeration, and chemical manufacturing.

Hydroxide =

(OH-)

Contains one oxygen and one hydrogen atom.

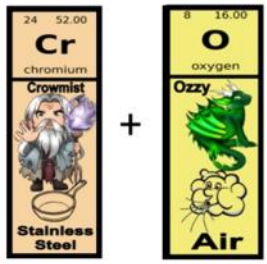


Hydroxide is commonly used for cleaning, paper production, water treatment, food processing, and as a component in pharmaceuticals and various industrial processes

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.

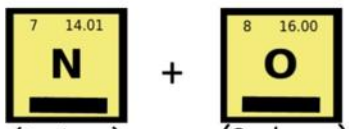
Sulfate =

(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?



= ??????

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 Acamus, The Knight With The Actinium Tipped Sword

In the land of MarBryn, where the skies glimmered with stars and the air buzzed with magic, there lived a knight named Acamus. Standing small but bold, he was a plucky bundle of courage wrapped in shining armor. His armor glinted under the sun, a sight that inspired hope in the hearts of the people. A gleaming helm adorned with a curved crest framed his determined blue eyes, and a confident, mischievous grin danced on his lips, hinting at the playful spirit tucked beneath the steel exterior.

Acamus gripped his sword, a magnificent weapon forged from a rare metal known as Actinium. The sword sparkled and shimmered, its broad blade gleaming like the morning sun. The guard curled like a crescent moon, and the hilt felt sturdy in his hand. Beside him, a sturdy shield bore a red-and-blue emblem with shiny gold accents, showcasing a bold cross in its center—a symbol of bravery and protection.

Though Acamus was small compared to other knights, he wore lightweight plate armor fitted with leather straps that allowed him to move quickly while still providing protection. What made him stand out even more were the feathered wings tucked at the sides of his helmet, ethereal and whimsical, just like the knight himself. He stood ready, vigilant, and heroic.

One fine morning, the kingdom awoke with whispers of danger. A powerful sorcerer had arisen from the dark corners of the land, his name sending shivers down spines. Magh, the shadowy sorcerer, sought to plunge MarBryn into darkness, tapping into the dark energies that roamed the woods. The people were terrified, and rumors spread that Magh had uncovered a way to harness the dark powers of Actinium for his own wicked benefits.

Hearing the distress of the townsfolk, Acamus straightened his back and tightened his grip on his sword. "Fear not!" he declared, his voice strong yet warm. "I will stop Magh and protect our home!" With that, determination surged through him. It was time for an adventure.

His journey began in the Whispering Woods, where ancient trees whispered secrets to the wind, and shadows lurked behind every corner. Acamus, fueled by the magic of his Actinium sword, pressed forward, sensing the way energy pulsed around him. With each step, he felt the sword's power amplify his own courage, filling him with an irresistible force.

Suddenly, a gust of wind rustled the branches above, revealing, not Magh but one of his minions, Zorath, ahead, cloaked in black robes that swallowed the light. His eyes gleamed, filled with malice. "Ah, the brave knight thinks he can stop me!" he laughed, a chilling sound that echoed through the trees. "With the power of Actinium, I shall help Magh unleash an army of shadows upon your kingdom!"

Enjoy This Coloring Page Featuring

Acamus The Knight With The Actinium Tipped Sword

Magical Elements of The Periodic Table

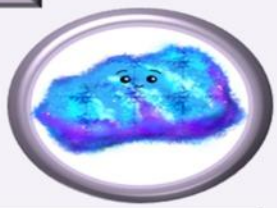
Create Your Own Magical Actinide Knight Elemental

Acamus The Knight With The Actinium Sword

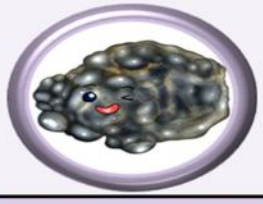
Symbol: Ac Atomic Number: 89 Atomic Mass: 227

Magical Elemental Symbol

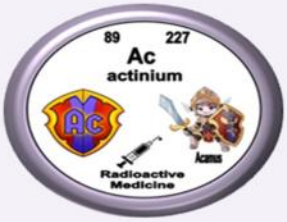
89 227
Ac
actinium



Actinium is a Actinide Metal



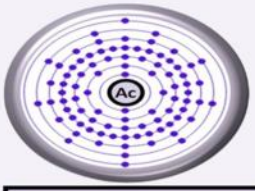
Found in some common ores like Uraninite and Thorite but mainly produced in nuclear reactors



Actinium Periodic Symbol

Acamus's Magical Abilities

Acamus uses his sword to create icy winds to stop bad guys or to shoot lightning that hits targets perfectly.



Atomic Structure

Symbol: Atomic Number: Atomic Mass:

Magical Elemental Symbol

Actinium Periodic Symbol

Magical Abilities

Atomic Structure

Uses For

Magical Knight Elemental Research Sheet

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

Name of Magical Knight:	
Knight's Magic Power Based on the Element's Properties:	
Magical Elemental 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 knight elemental. Based on the information obtained from research of your chosen element, how did you determine your knight's name? What are your knight's magic powers? What are their likes/dislikes, strengths/weaknesses, personality traits? What color are your knight's armor and clothing and why did you pick that/those colors? What is your knight's Magical Elemental Symbol?

I hope you enjoyed this sample

The book is available in PDF and Soft Cover Formats.

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.