



ELEMENTAL BIRTHDAYS

How to bring Science into Every Party!



***Secondary Edition Ages 11-20
Jon & Heather Cleland-Host***



***Elemental Birthdays:
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into Every Party***

(Secondary Edition Ages 11-20)

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Introduction



How to Elementally Transform Every Birthday!

Welcome to *Elemental Birthdays: Secondary Edition (Ages 11-20)*! In our previous editions, the aim of *Elemental Birthdays* was to provide parents with a resource for bringing science into everyday life for children through elementary school. With this edition, we invite the guest of honor to begin to make your *Elemental Birthday* your own. The first chapter is the same as the last of the *Elementary Edition*, but from there on, your options widen. We've increased the number of alternative themes in all chapters, and starting with your fourteenth birthday (*Silicon*), you have two parties outlined for every element.

Elemental Birthdays introduce science in a way that is fun for anyone: a party! An *Elemental Birthday* is a relatively simple idea to put into practice. The elements of the periodic table each have an atomic number (Z). We traditionally celebrate birthdays according to the number of years a person has lived. *Elemental Birthdays* take these two facts and celebrate birthdays with a theme matching the year to an element's atomic number. Bingo! Now you have an elementally fantastic party!

How it works: Curiosity and observation are the first principles of science. What we do with *elemental birthdays* is take advantage of a the fun that can be had exploring science and discovering the world. With each chapter, we include a theme that can be used for an age-appropriate birthday party.

Anybody can do it: One of the great things about *Elemental Birthdays* is that celebrating birthdays with elements is not only doable, it is easy and fun. Scientist or non-scientist, anyone can do it, and this book makes it even easier by outlining an entire party for each element.

Everyone can do it: Ideally, every family birthday is celebrated with an *Elemental Birthday* theme. This familiarizes children and family members with the broadest range of elements. The Periodic Table has over a hundred elements, so every birthday can have an element. Best of all, the connections between our lives and the elements go beyond a simple number association. The Periodic Table is by nature "periodic." So themes get revisited as we cycle through the elements. If you celebrate some aspect of every family member's *elemental birthday* (and those of your friend's) you will begin to see the patterns and connections between all the elements.

Elemental Birthdays connect us with the science of the Universe: If we look at the history of the elements, the life connections run even deeper. The first elements to come into existence were the smallest ones: hydrogen and helium. So the first birthday celebrations use the elements that were there at the birth of the universe. Higher numbered elements come from deep within the stars, the explosions of stars (*supernova*), and collisions with high speed particles projected from exploding stars (*cosmic rays*). So we can imagine the story of the Universe overlaying the story of our own lives. (See the *Infinity Appendix: Universe's Story* for a short summary of the Universe's 14 billion year history).

SPECIAL NOTE FOR TEACHERS: though we focused on birthdays, this book can be used to connect the elements by number to any series of numbers. A teacher might choose to have an "elemental week" and display the Element of the Day each morning (Hydrogen for Monday, Helium for Tuesday, etc). The ultimate objective is to introduce science to both young and old... but most of all, it is to have fun!

Phosphorus (Z=15): Lightbearer / Lifebearer (DNA)



Elementally Fun Phosphorus Facts

- **Phosphorus** forms in the fusion of oxygen in large stars.
- **Phosphorus** is named for being the "light bearer" because when first purified from urine, it was found to glow.
- White **Phosphorus** was originally used in matches, but replaced with red **Phosphorus** (which was far less dangerous than white **Phosphorus**).
- **Phosphorus** is a component of most light emitting diodes (LEDs).
- **Phosphorus** is also known for its "life bearing" properties.
- The "side rails" of the DNA "ladder" are made of sugar molecules and phosphates (A phosphate is a **Phosphorus** and oxygen compound).
- **Phosphorus** is important to energy transport in our bodies via adenosine triphosphate (ATP).
- **Phosphorus** has other uses in chemistry and electronics.

Phosphorus Party Time – DNA

Setting the Phosphorus Scene:

Locations, Decorations, & Invitations

The role of phosphorus in the “sides” of the DNA “ladder” makes a DNA theme a good choice for decorations, & invitations. Popular culture has made the DNA double helix instantly recognizable – yet another example of a image from science that just looks cool, whether one knows the scientific details or not. If you happen to be celebrating the birthday of a seven year old sibling or friend, then the nitrogen (the “rungs”) and phosphorus (the “sides”) work together well to make DNA (see Appendix A) for a combined birthday theme. For a theme color, pure phosphorus can be violet, black, red or white, so any of those work well.



Unwrapping Phosphorus: Cakes, Gifts, and Favors

Cake: Though DNA cakes may not be readily available, the image of DNA is well known enough to make it easy to either order or make a cake with that image.

Favors: If no DNA related favors are available, other phosphorus related favors could include small LED lights or small solar powered items. Actual samples of phosphorus could be given if small piece of a match head is laminated onto a card. Matches themselves are probably not a good idea to give out. Favor bags can be hidden, with locations given in DNA code (see Appendices D & E).

Birthday gifts: A phosphorus/DNA related gift for the birthday person could be a live pet if that fits the circumstances. Another phosphorus/DNA related gift could be a DNA test of

Ancestry, which are becoming cheaper and more available every year.

Elementally Phosphorus Event: Activities & Demos

- **Extracting DNA:** How many birthday parties give everyone the chance to twist some DNA around a toothpick!? See instructions below.
- **Secret Messages:** Use the DNA code in Appendix D (or E) for coded scavenger hunts, team competitions, coded team challenges, and more.
- **Decoding DNA - Ancestry Study .:** Because DNA encodes information from our Ancestral history, a personal family tree can be made as part of this birthday. DNA tests for Ancestry are available.

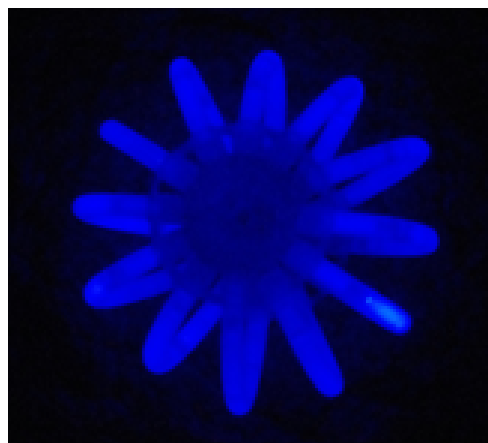
Did you know... your DNA encodes instructions as basic as how our cells can divide, information “learned” by our Ancestors over 3 billion years ago.

Phosphorus Party Time – The Lightbearer

Setting the Phosphorus Scene:

Locations, Decorations, & Invitations

When phosphorus was first identified as an element, one of its most distinctive properties that was immediately noted was that it glowed. Red and white phosphorus have both been used in matches (white phosphorus to very deadly effect until the advent of the more stable red phosphorus matches). So the name "lightbearer" is indeed a fitting name for this element. Add to this, phosphorus continues to play a role in glowing things: LEDs.



Unwrapping Phosphorus: Cakes, Gifts, and Favors

Each chapter starting with Silicon (Z=14) has two Party Time Entries for you to help you make your elemental party your very own!

ACTIVITIES: Extract DNA from a Banana!

Have you ever seen or touched pure DNA? You can! You and your friends are old enough to extract DNA, which will appear as a white, stringy material (you won't be able to see the double helix of DNA, that's way, way too small to see without an electron microscope).

SUPPLIES NEEDED:

1. A blender (1 for the whole party)
2. Plant or Animal material (banana, or other fruit works well - 1 tablespoon per guest, or 1 banana per four guests)
3. Salt - 1/4 teaspoon per banana
4. Paper plates & butter knives – 1 per guest + some extra
5. Warm water – 2/3 cup per banana
6. Coffee filters (1 per guest, + several extra)
7. Small Cups (two per guest)
8. Liquid Detergent (you'll need a few tablespoons total)
9. Test tubes (two per guest)
10. Meat tenderizer - a dash per guest
11. Spoons (two per guest)
12. Cold



Each chapter has our favorite activities & suggestions for more...

More Elementally Fun Facts About Phosphorus

1	2											3	4	5	6	7	8	9											
H	He											B	C	N	O	F	Ne												
Li	Be											Al	Si	P	S	Cl	Ar												
Na	Mg											K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr												
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe												
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn												
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn																		

Phosphorus is both essential to life and has many technological applications. White phosphorus is a

yellow waxy substance that glows in the dark and burns spontaneously if the temperature rises above 30°C. (86°F).

Another form of phosphorus is made by heating white phosphorus to transform it into a non-poisonous, non-glowing, and non-spontaneously-combusting substance. In biology, however, phosphorus is found most often as a phosphate.

DNA, which carries the very instructions of life, is built on a phosphate backbone (the "sides" of



Each chapter has an additional section with detailed fun information about each element, so you can impress your friends!

For more elemental party fun, get ELEMENTAL BIRTHDAYS!!