A Universe Without Supernovae
Supernovae may seem dangerous, but what would the universe be like if supernovae never happen?

About the Activity
Use this active game to illustrate the value of supernovae in the universe. Visitors discover that almost all elements that make up the Earth and all its living things were made inside stars that go supernova. Without supernovae to disperse these elements, the universe as we know it couldn’t exist.

Materials Needed
• Scissors to cut apart cards
• Provided below
  o 1 copy of the Element Cards
    (2-sided, in color)
  o 1 copy of the Object Cards
  o A copy of the "A Universe Without Supernovae" handout for each visitor (2-sided)
• Optional: Table of Elements (included below)
• Optional: Trash can
• Optional: Everyday objects as examples of items on the Object Cards
• Optional: Make up your own objects based on where you are (e.g. point to a nearby tree, a parked car, or a telescope)

Topics Covered
• The supernova explosion releases a lot of the elements that were created in the star during its lifetime and also generates new elements during the explosion, all in the matter of a few seconds.
• If these stars didn’t explode, all those elements would remain locked up inside the star.
• Almost all the elements except hydrogen were originally generated inside stars and without supernovae to disperse those elements, almost everything we see around us, including us, would not exist.

Participants
This activity is appropriate for families with older children, the general public, and school groups ages 10 and up. Plan on a minimum of 10 visitors, but you can easily involve up to about 40 people. See the Activity Description for more details.

Location and Timing
This fun activity can be used before or during Star Parties, with youth groups, in classrooms, and at meetings if there is room to interact. It takes about 10–15 minutes.
### Detailed Activity Description

**A Universe without Supernovae**

**Leader’s Role**

<table>
<thead>
<tr>
<th>Small Groups: At minimum you should hand out the following Element cards:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hydrogen, Helium, Carbon, Nitrogen, Calcium, Gold, Iron, Silicon, Sulfur, and Sodium. It’s OK for one person to have more than one Element card.</td>
</tr>
</tbody>
</table>

**Large Groups:** When you have more than about 30 people, you might want to print an extra set of Element Cards. It’s OK for two people to have the same element, especially the Hydrogen, Helium, Carbon, and Nitrogen.

**Participants’ Role (Anticipated)**

**Small Groups:**
- At minimum you should hand out the following Element cards:
  - It’s OK for one person to have more than one Element card.

**Large Groups:**
- When you have more than about 30 people, you might want to print an extra set of Element Cards. It’s OK for two people to have the same element, especially the Hydrogen, Helium, Carbon, and Nitrogen.

**Presentation Tip:**
To use this activity as it is, it is helpful for your audience to be a little familiar with:
- What an atom is and that it has protons in the nucleus.
- The number of protons in the atom’s nucleus determines what kind of element it is.
- The basic lifecycle of stars, specifically when a supernova occurs.
- It can be helpful to understand a little about the process of nuclear fusion inside stars.

Depending on the knowledge of your audience, you may want to introduce this activity by using one (or more) of the other activities about supernovae:
- Use the activity, The Lives of Stars, and review the lifecycle of Sun-like stars and of massive stars.
- The nuclear fusion demonstration with marshmallows.

These can be found by searching for Supernova here: [http://nightsky.jpl.nasa.gov/download-search.cfm](http://nightsky.jpl.nasa.gov/download-search.cfm)

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**To say:**
Who has heard of a supernova? What is it?

Supernovae might seem dangerous (and they are if you’re standing too close...), but they are very useful to the evolution of the universe. If no stars were massive enough to explode, and they just cooled off instead, the universe would be a very different place indeed.

The supernova explosion not only generates and ejects new elements, it also disperses all of the elements created during the life of the star.

If these stars never exploded, the elements they make would be locked inside the star and would not contribute to the making of new stars or planets.
<table>
<thead>
<tr>
<th>Leader's Role</th>
<th>Participants’ Role (Anticipated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lighter elements generated during the lives of small stars, like our Sun, are spread back into the galaxy in the nebula that expands away from the star as it ages. <strong>To do:</strong> Pass out “A Universe without Supernovae” handouts</td>
<td></td>
</tr>
<tr>
<td><strong>To say:</strong> Let’s take a look at this sheet. <strong>To do:</strong> Point to each area of the handout as you ask the question. <strong>To say:</strong> Where did a lot of the helium in the universe originate? And where can nitrogen come from? What about oxygen?</td>
<td>Big Bang Small stars Stars that go Supernova</td>
</tr>
<tr>
<td><strong>To do:</strong> Pass out element cards randomly to visitors.</td>
<td></td>
</tr>
<tr>
<td><strong>Variation:</strong> Have visitors group themselves into three groups, based on card color: Big Bang, Small Stars, Stars that go Supernova. <strong>Variation:</strong> Have visitors line up by number of protons in their element.</td>
<td></td>
</tr>
<tr>
<td><strong>Presentation Tip:</strong> At minimum you should hand out the following Element cards: <strong>Hydrogen, Helium, Carbon, Nitrogen, Calcium, Gold, Iron, Silicon, Sulfur, and Sodium.</strong> It’s OK for one person to have more than one Element card.</td>
<td></td>
</tr>
<tr>
<td><strong>To do:</strong> If you are using the Table of Elements banner or handouts, point to the location of each named element on the banner or handout.</td>
<td>Hands up with cards. Hydrogen. Helium.</td>
</tr>
<tr>
<td><strong>To say:</strong> Everyone will become an element in the universe. Note that these are color-coded. Who has a white card? Hold up your card. These elements were around at the beginning of the universe. (Point to each person) What’s your element?</td>
<td>Hands up with cards.</td>
</tr>
</tbody>
</table>
### Leader’s Role

<table>
<thead>
<tr>
<th>Participants’ Role (Anticipated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who has a yellow card? Elements on yellow cards can be made in stars more like our sun – smaller stars that don’t explode and only disperse some of the elements made in the star. Lighter elements, those with fewer protons, can be made inside small stars.</td>
</tr>
<tr>
<td>What’s your element?</td>
</tr>
<tr>
<td>Who has a blue card? Hold them up! The blue cards represent elements made primarily in those massive stars that go supernova, dispersing all those elements back into the galaxy.</td>
</tr>
<tr>
<td>To say: Look on the back of your card to see a number of things that your element can be found in.</td>
</tr>
<tr>
<td>Hold up “Diamond Ring” card.</td>
</tr>
<tr>
<td>Who has an element that might be found in diamond rings or necklaces? Hold your cards up! (Carbon, gold, silver, platinum) Look around. Are any of those cards blue?</td>
</tr>
<tr>
<td>Those are the elements that are generated in stars that go supernova. Diamonds are made of carbon, which can be generated in small stars, but jewelry also needs elements generated in stars that go supernovae, like gold or silver – the blue cards. So would we have rings or necklaces in a universe where supernovae didn’t happen – where stars didn’t explode to disperse these elements back into the galaxy?</td>
</tr>
<tr>
<td>So no jewelry in a universe without supernovae. Away it goes.</td>
</tr>
<tr>
<td>To do: Throw away the “Diamond Ring” card – for suggestions on disposing of Object cards, see “Presentation Tip” below.</td>
</tr>
<tr>
<td>Cards up. Yes – some of them.</td>
</tr>
<tr>
<td>No!</td>
</tr>
</tbody>
</table>
**Presentation Tip:**

Here are a few ways you can dispose of Objects that would not be in a universe without supernovae:

- Have a trash can next to you and throw the Object card in the trash can.
- In a large crowd, give the Object cards to people without Element cards and have the people stand on one side of you. The Objects that WOULD exist in a universe without supernovae could be held by people standing on the other side of you.
- Have a bulletin board behind you with “YES” and “NO” signs on it. Use push pins to secure the Object cards to the appropriate sides.

Someone may bring up that not all jewelry is made of gold, silver, or platinum, but elements like titanium and aluminum are also made primarily in supernovae.

<table>
<thead>
<tr>
<th>To do:</th>
<th>To Say:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold up the “Computer” card.</td>
<td>Cards up.</td>
</tr>
<tr>
<td><strong>To Say:</strong></td>
<td>Yes. Lots of them.</td>
</tr>
<tr>
<td>How about computers? Who has an element that’s in something found in computers, including cell phones? (Silicon, plastics come from oil which is made primarily of carbon, hydrogen, oxygen, and sulfur) Do you see any blue cards?</td>
<td></td>
</tr>
</tbody>
</table>

So computers require elements made in stars that go supernova. No electronics!

**To do:**

Throw “Computer” away.

Repeat this with a few more items (e.g. Dogs, Oak Trees, Office Building) then hold up “STARS”
**To Say:**
Well, are we going to have anything left in a universe without supernovae? How about stars – what elements are required for stars?

Any blue cards?

So could we have stars in a universe without supernovae?
OK. We’d still have stars.

**To do:**
Put “Stars” on the side with things we WOULD have.

Keep going with a few more items (e.g. Insects, Earth’s Atmosphere, Jupiter, Earth), ending with “YOU”

**To Say:**
Let’s look at what we’ve got. What would we still have in a universe without supernovae? Mostly we’d have stars and gas giant planets, like Jupiter. Jupiter & Saturn would not have any moons and Saturn wouldn’t have rings. But there would be no Earth and none of us would be here.

So aren’t you glad we live in this universe where stars explode as supernovae?

As you pass the cards back up here, look around you.

Almost all the atoms in the things around us and in your body were made billions of years ago inside stars. So for our age, we’re pretty well-preserved!

<table>
<thead>
<tr>
<th>Hydrogen &amp; Helium cards are held up.</th>
<th>YES!</th>
</tr>
</thead>
<tbody>
<tr>
<td>No! Only white cards.</td>
<td>YES!</td>
</tr>
<tr>
<td>Visitors pass cards back.</td>
<td>Wow.</td>
</tr>
</tbody>
</table>
Helpful Hints
The Element cards used in this activity are white, yellow, or blue.

The front of the card (example at left) names the element, where it originates, how many protons it has (also known as its “atomic number”), and its chemical symbol.

The back of the card (example at right) lists a number of things the element is found in.
The cards classify sources of some of the elements in the universe into these categories:

- “Originated in the Big Bang” (White cards): Hydrogen and helium were present in the early universe. Helium is also produced in all stars, small and large, where the core is hot enough to fuse hydrogen into helium. These cards are used to show what elements existed in our universe before stars formed.

- “Originates from small stars” (Yellow cards – for the yellow/white sun-like stars): These are elements that can form from fusion in small stars. (Carbon and nitrogen are also produced in large stars, but these cards are used to show what elements COULD exist in a universe where stars didn’t explode as supernovae.) A small star can contribute these elements to the interstellar medium as it loses its outer layers in the planetary nebula that forms around the aging star.

- “Primarily from stars that go supernova” (Blue cards – for massive, hot, bluish stars): These are elements that generally need the mass of large stars and/or the power of supernovae to be produced.

These classifications have been collected from research about the cosmic origin of the chemical elements and are presented as “What is your Cosmic Connection to the Elements?”, found here: http://imagine.gsfc.nasa.gov/docs/teachers/elements/elements.html

The classifications for the element cards are somewhat simplified from the detailed categories in that document. Note that the “large stars” and “supernovae” categories have been put together under “primarily from stars that go supernova”, since large stars are defined as those that will one day die in a supernova explosion. Elements whose primary source is fragmentation from cosmic rays, neutron capture, or from radioactive decay are not included or addressed in this activity.

The origin of the elements is not a simple story, so that makes it challenging, but also more interesting, to explain.

For a general summary, however, nuclear fusion in the core of small stars can generate elements up to carbon (with 6 protons) and nitrogen (with 7 protons). Nuclear fusion at the core of large stars can generate elements up to iron (with 26 protons). Elements heavier than iron are generated in the shock of the supernova explosion as well as through a much longer process called “neutron capture” in the cores of all stars (a process that occurs over thousands of years).
Please read the booklet “What is your Cosmic Connection to the Elements?” for the more complete story about element formation in stars and how the elements are dispersed into the interstellar medium. 

**Background Information**

**Website:**
Refer to NASA’s Imagine the Universe! website under the activity “What is your Cosmic Connection to the Elements?” for background information on this activity:

The introduction from this document summarizes the concepts:

> Chemical elements are all around us, and are part of us. The composition of the Earth, and the chemistry that governs the Earth and its biology are rooted in these elements.

> The elements have their ultimate origins in cosmic events. Further, different elements come from a variety of different events. So the elements that make up life itself reflect a variety of events that take place in the Universe. The hydrogen found in water and hydrocarbons was formed in the moments after the Big Bang. Carbon, the basis for all terrestrial life, was formed in small stars (as well as large stars). Elements of lower abundance in living organisms but essential to our biology, such as calcium and iron, were formed in large stars. Heavier elements important to our environment, such as gold, were formed in the explosive power of supernovae. And light elements used in our technology were formed via cosmic rays. The solar nebula, from which our solar system was formed, was seeded with these elements, and they were present at the Earth’s formation. Our very existence is connected to these elements, and to their cosmic origin.

> “Large” stars are defined as those that will one day die in a supernova explosion. These are the massive, hot, blue stars at least eight to ten times the mass of our star, the Sun.

**Why does our Sun have heavier elements in it?**

As you may know, our Sun is 99% hydrogen and helium, but it also contains small amounts of elements like silicon (with 14 protons), calcium (with 20 protons), and iron (with 26 protons). If our Sun cannot generate those elements through its own nuclear processes, where did
these elements come from? Our star, the Sun, is only a few billion years old. The universe is many billions of years old. The nebula of gas and dust from which our Sun and its planets formed was enriched with these heavy elements by early supernovae in our galaxy. Just as the planets contain heavy elements from that nebula, so does our Sun. Those heavy elements have been part of the Sun since its formation, even before nuclear fusion began at the Sun’s core.

Heavier elements CAN form inside a small star like our Sun through a process called neutron capture, but only if heavy elements were already present in the star at the time of the star’s formation. In addition, when a white dwarf experiences a nova, a few elements heavier than carbon and nitrogen can form. Once again, this is all more fully explained in “What is your Cosmic Connection to the Elements?”: http://imagine.gsfc.nasa.gov/docs/teachers/elements/elements.html.

Many elements are required to make YOU. All the blue cards are elements that are made from supernovae.
A Universe without Supernovae

If supernovae never occurred in our universe to disperse the elements made in stars, what would be left in the universe?

Basic Elements in the Universe
(originated in Big Bang)
Hydrogen, Helium

Common Elements that can be made in small stars
Nitrogen, Carbon

Common Elements whose primary source is from stars that go supernova
Aluminum, Calcium, Chlorine, Copper, Gold, Iron, Magnesium, Mercury, Nickel, Oxygen, Phosphorus, Platinum, Potassium, Silicon, Silver, Sodium, Sulfur, Uranium, Zinc

Some of the elements found in:

Diamond rings: Carbon, Gold
Computers & Cell Phones: Silicon (computer chips), Carbon, Hydrogen, Oxygen, Sulfur (plastics)
Buildings: Iron (in steel), Calcium, Silicon, Oxygen (in concrete)
Plants, Animals, and People: Carbon, Hydrogen, Nitrogen, Oxygen, Sodium, Magnesium, Phosphorus, Sulfur, Potassium, Calcium, Iron, Zinc
Atmosphere: Nitrogen, Oxygen
Earth: Iron, Oxygen, Silicon, Aluminum, Calcium
Sun: Hydrogen, Helium
SUPERNOVA!

What is a supernova?
One type of supernova is the explosion caused when a massive star (more than about 8 to 10 times the mass of our Sun) exhausts its fuel and collapses. During the explosion, the star will blow off most of its mass. The remaining core will form a neutron star or a black hole. Supernova explosions are among the most energetic events in the Universe, and they forge elements such as calcium, silver, iron, gold, and silicon. The supernova explosion scatters the elements out into space. These are the elements that make up stars, planets, and everything on Earth – including us!

Will our Sun go supernova?
No, smaller stars like our Sun end their lives as dense hot objects called white dwarfs. Only stars that contain more than about 8 to 10 times the mass of our Sun will go supernova.

Why do massive stars go supernova?
A star’s core is an element factory. It fuses atoms into heavier and heavier elements, all the while producing energy, until it reaches iron. Iron is the end of the line for fusion. When the core is finished producing iron it has no way to keep producing energy. This causes gravity to take over and the core begins to collapse. The atoms smash into each other, forming neutrons. The collapse stops when the neutrons can’t be packed together any more tightly. This sudden stop and, the energy released from forming neutrons, causes a shock wave to travel outward, blasting most of the star into space. If the star is very massive nothing can stop the collapse of the core and a black hole is created.

If a star goes supernova near us, is it dangerous?
Yes it would be. Fortunately, there are no stars likely to go supernova that are near enough to be any danger to Earth. Distance is important because the closer the supernova explosion, the more cosmic radiation would reach us. Even if Earth’s atmosphere and surrounding magnetic field protect us, an explosion closer than 30 light years would overwhelm this protection. The nearest stars likely to go supernova within the next few million years are Betelgeuse and Antares. Both are over 400 light years away, far more than the 30 light years at which the explosion could become dangerous. Another VERY massive star, Eta Carinae, visible in the southern hemisphere, could go even sooner. But it is 7,500 light years away.

What’s a GRB?
Gamma-ray bursts (GRBs for short) are bursts of very high-energy radiation in space. Thanks to NASA missions, astronomers know there are different kinds of GRBs. One kind is produced in supernova explosions where most of the gamma-ray energy is focused into narrow beams. Because the energy is concentrated in these beams, if one of the beams pointed in the direction of Earth, they appear brighter when we detect them (think of the difference between a 100-watt light bulb and the focused energy of a 100-watt metal cutting laser pointed at you!). GRBs have been detected in very distant galaxies, more than a billion light years away, too far away to harm us here on Earth. That distance is like that same laser placed more than twice the distance of the Moon away from you.

Some of the NASA missions that study supernovae and high-energy radiation from space:
GLAST: http://www.nasa.gov/glast
Swift: http://swift.gsfc.nasa.gov
Chandra: http://chandra.harvard.edu
Suzaku(with JAXA): http://suzaku-epo.gsfc.nasa.gov/
XMM-Newton(with ESA): http://xmm.sonoma.edu
For more information on supernovae and high-energy radiation: http://imagine.gsfc.nasa.gov/docs/science/
# Table of Elements

<table>
<thead>
<tr>
<th>Atomic Number</th>
<th>Chemical Symbol</th>
<th>Chemical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H</td>
<td>Hydrogen</td>
</tr>
<tr>
<td>2</td>
<td>He</td>
<td>Helium</td>
</tr>
<tr>
<td>3</td>
<td>Li</td>
<td>Lithium</td>
</tr>
<tr>
<td>4</td>
<td>Be</td>
<td>Beryllium</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>Boron</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td>Carbon</td>
</tr>
<tr>
<td>7</td>
<td>N</td>
<td>Nitrogen</td>
</tr>
<tr>
<td>8</td>
<td>O</td>
<td>Oxygen</td>
</tr>
<tr>
<td>9</td>
<td>F</td>
<td>Fluorine</td>
</tr>
<tr>
<td>10</td>
<td>Ne</td>
<td>Neon</td>
</tr>
<tr>
<td>11</td>
<td>Na</td>
<td>Sodium</td>
</tr>
<tr>
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<td>Mg</td>
<td>Magnesium</td>
</tr>
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<td>Al</td>
<td>Aluminum</td>
</tr>
<tr>
<td>14</td>
<td>Si</td>
<td>Silicon</td>
</tr>
<tr>
<td>15</td>
<td>P</td>
<td>Phosphorus</td>
</tr>
<tr>
<td>16</td>
<td>S</td>
<td>Sulfur</td>
</tr>
<tr>
<td>17</td>
<td>Cl</td>
<td>Chlorine</td>
</tr>
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<td>Ar</td>
<td>Argon</td>
</tr>
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<tr>
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</tr>
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</tr>
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</tr>
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<td>Fe</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>Ni</td>
<td>Nickel</td>
</tr>
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<td>Germanium</td>
</tr>
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<td>Br</td>
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<td>Kr</td>
<td>Krypton</td>
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<tr>
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<td>Rb</td>
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</tr>
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</tr>
<tr>
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</tr>
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<td>41</td>
<td>Nb</td>
<td>Niobium</td>
</tr>
<tr>
<td>42</td>
<td>Mo</td>
<td>Molybdenum</td>
</tr>
<tr>
<td>43</td>
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<td>Technetium</td>
</tr>
<tr>
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<td>Ru</td>
<td>Ruthenium</td>
</tr>
<tr>
<td>45</td>
<td>Rh</td>
<td>Rhodium</td>
</tr>
<tr>
<td>46</td>
<td>Pd</td>
<td>Palladium</td>
</tr>
<tr>
<td>47</td>
<td>Ag</td>
<td>Silver</td>
</tr>
<tr>
<td>48</td>
<td>Cd</td>
<td>Cadmium</td>
</tr>
<tr>
<td>49</td>
<td>In</td>
<td>Indium</td>
</tr>
<tr>
<td>50</td>
<td>Sn</td>
<td>Tin</td>
</tr>
<tr>
<td>51</td>
<td>Sb</td>
<td>Antimony</td>
</tr>
<tr>
<td>52</td>
<td>Te</td>
<td>Tellurium</td>
</tr>
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<td>I</td>
<td>Iodine</td>
</tr>
<tr>
<td>54</td>
<td>Xe</td>
<td>Xenon</td>
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<td>55</td>
<td>Cs</td>
<td>Cesium</td>
</tr>
<tr>
<td>56</td>
<td>Ba</td>
<td>Barium</td>
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<tr>
<td>57-71</td>
<td>La</td>
<td>Lanthanum</td>
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<tr>
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<td>Ce</td>
<td>Cerium</td>
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<tr>
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<td>Pr</td>
<td>Praseodymium</td>
</tr>
<tr>
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<td>Nd</td>
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<tr>
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<td>Pm</td>
<td>Promethium</td>
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<td>Gd</td>
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<tr>
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<tr>
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<tr>
<td>103</td>
<td>Lr</td>
<td>Lawrencium</td>
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</table>
OXYGEN
Primarily from stars that go SUPERNOVA!

Protons: 8  Symbol: O

COPPER
Primarily from stars that go SUPERNOVA!

Protons: 29  Symbol: Cu

GOLD
Primarily from stars that go SUPERNOVA!

Protons: 79  Symbol: Au

SILICON
Primarily from stars that go SUPERNOVA!

Protons: 14  Symbol: Si
**COPPER**

I am an element found in:
- Humans
- Animals
- Plumbing
- Electrical Wires
- Coins
- Electronics

**SILICON**

I am an element found in:
- Computers
- Concrete
- Glass
- Sand & Rocks

**OXYGEN**

I am an element found in:
- Plastics
- Concrete
- Humans
- Animals
- Plants
- Water
- Earth’s Atmosphere
- The Earth

**GOLD**

I am an element found in:
- Jewelry
- Coins
- Dentistry
SULFUR
Primarily from stars that go SUPERNOVA!
Protons: 16
Symbol: S

IRON
Primarily from stars that go SUPERNOVA!
Protons: 26
Symbol: Fe

SODIUM
Primarily from stars that go SUPERNOVA!
Protons: 11
Symbol: Na

MAGNESIUM
Primarily from stars that go SUPERNOVA!
Protons: 12
Symbol: Mg
IRON
I am an element found in:
   Steel
   Humans
   Animals
   Plants
   The Earth

SULFUR
I am an element found in:
   Plastics
   Humans
   Animals
   Plants

MAGNESIUM
I am an element found in:
   Humans
   Animals
   Plants

SODIUM
I am an element found in:
   Humans
   Animals
   Plants
PHOSPHORUS
Primarily from stars that go SUPERNOVA!

Protons: 15
Symbol: P

POTASSIUM
Primarily from stars that go SUPERNOVA!

Protons: 19
Symbol: K

CALCIUM
Primarily from stars that go SUPERNOVA!

Protons: 20
Symbol: Ca

ZINC
Primarily from stars that go SUPERNOVA!

Protons: 30
Symbol: Zn
POTASSIUM
I am an element found in:
- Humans
- Animals
- Plants

PHOSPHORUS
I am an element found in:
- Humans
- Animals
- Plants

ZINC
I am an element found in:
- Humans
- Animals
- Plants

CALCIUM
I am an element found in:
- Concrete
- Humans
- Animals
- Plants
- The Earth
CHLORINE
Primarily from stars that go SUPERNova!
Protons: 17  Symbol: Cl

ALUMINUM
Primarily from stars that go SUPERNova!
Protons: 13  Symbol: Al

PLATINUM
Primarily from stars that go SUPERNova!
Protons: 78  Symbol: Pt

SILVER
Primarily from stars that go SUPERNova!
Protons: 47  Symbol: Ag
ALUMINUM
I am an element found in:
   Food Packaging
   Aircraft
   The Earth

SILVER
I am an element found in:
   Jewelry
   Coins
   Photography
   Electrical Parts

CHLORINE
I am an element found in:
   Humans
   Animals
   Plants

PLATINUM
I am an element found in:
   Jewelry
   Medicine
   Cars
   Missiles
NITROGEN Originates from small stars

Protons: 7 Symbol: N

CARBON Originates from small stars

Protons: 6 Symbol: C

NITROGEN Originates from small stars

Protons: 7 Symbol: N

CARBON Originates from small stars

Protons: 6 Symbol: C
CARBON
I am an element found in:
- Plastics
- Diamonds
- Humans
- Animals
- Plants
- Earth

NITROGEN
I am an element found in:
- Humans
- Animals
- Plants
- Earth’s Atmosphere

CARBON
I am an element found in:
- Plastics
- Diamonds
- Humans
- Animals
- Plants
- Earth

NITROGEN
I am an element found in:
- Humans
- Animals
- Plants
- Earth’s Atmosphere
Hydrogen originated in the Big Bang. Protons: 1, Symbol: H.

Helium originated in the Big Bang. Protons: 2, Symbol: He.
HELIUM
I am an element found in:
  Gas Planets
  Stars

HYDROGEN
I am an element found in:
  Plastics
  Concrete
  Humans
  Animals
  Plants
  Water
  Gas Planets
  Stars
OAK TREES

EARTH

EARTH'S ATMOSPHERE

JUPITER
STARS

SUN

TELEVISION

COMPUTER
CREDIT CARDS

EAGLES

DIAMOND RING

SNAKES