



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
 - 1 copy of the Element Cards (2-sided, in color)
 - 1 copy of the Object Cards
 - 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.

<u>Included in This Packet</u>	<u>Page</u>
Detailed Activity Description	2
Helpful Hints	7
Background Information	9
Handout: Universe Without SN (With FAQs on the back)	11
Table of Elements	13
Elements Cards	14
Object Cards	26



Detailed Activity Description

A Universe without Supernovae

Leader's Role	Participants' Role (Anticipated)
<p>Small Groups: At minimum you should hand out the following Element cards:</p> <ul style="list-style-type: none"> Hydrogen, Helium, Carbon, Nitrogen, Calcium, Gold, Iron, Silicon, Sulfur, and Sodium. It's OK for one person to have more than one Element card. <p>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.</p>	
<p>Presentation Tip:</p> <p>To use this activity as it is, it is helpful for your audience to be a little familiar with:</p> <ul style="list-style-type: none"> 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. <p>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:</p> <ul style="list-style-type: none"> 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. <p>These can be found by searching for Supernova here: http://nightsky.jpl.nasa.gov/download-search.cfm</p>	
<p><i>To say:</i></p> <p>Who has heard of a supernova? What is it?</p> <p>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.</p> <p>The supernova explosion not only generates and ejects new elements, it also disperses all of the elements created during the life of the star.</p> <p>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.</p>	<p>An exploding star</p>



Leader's Role	Participants' Role (Anticipated)
<p>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.</p> <p><u>To do:</u> Pass out "A Universe without Supernovae" handouts</p> <p><u>To say:</u> Let's take a look at this sheet.</p> <p><u>To do:</u> Point to each area of the handout as you ask the question.</p> <p><u>To say:</u> Where did a lot of the helium in the universe originate? And where can nitrogen come from? What about oxygen?</p>	<p>Big Bang Small stars Stars that go Supernova</p>
<p><u>To do:</u> Pass out element cards randomly to visitors.</p> <p>Variation: Have visitors group themselves into three groups, based on card color: Big Bang, Small Stars, Stars that go Supernova.</p> <p>Variation: Have visitors line up by number of protons in their element.</p>	
<p>Presentation Tip: At minimum you should hand out the following Element cards: Hydrogen, Helium, Carbon, Nitrogen, Calcium, Gold, Iron, Silicon, Sulfur, and Sodium. It's OK for one person to have more than one Element card.</p>	
<p><u>To do:</u> If you are using the Table of Elements banner or handouts, point to the location of each named element on the banner or handout.</p> <p><u>To say:</u> Everyone will become an element in the universe.</p> <p>Note that these are color-coded.</p> <p>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?</p>	<p>Hands up with cards. Hydrogen. Helium.</p> <p>Hands up with cards.</p>

Leader's Role	Participants' Role (Anticipated)
<p>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.</p> <p>What's your element?</p> <p>Who has a blue card? Hold them up!</p> <p>The blue cards represent elements made primarily in those massive stars that go supernova, dispersing all those elements back into the galaxy.</p>	<p>Carbon. Nitrogen.</p> <p>Hands up with cards.</p>
<p><u>To say:</u> Look on the back of your card to see a number of things that your element can be found in.</p> <p>Hold up "Diamond Ring" card.</p> <p>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?</p> <p>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?</p> <p>So no jewelry in a universe without supernovae. Away it goes.</p> <p><u>To do:</u> Throw away the "Diamond Ring" card – for suggestions on disposing of Object cards, see "Presentation Tip" below.</p>	<p>Cards up.</p> <p>Yes – some of them.</p> <p>No!</p>

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.

To do:

Hold up the “Computer” card.

To Say:

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?

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”

Cards up.

Yes. Lots of them.

<p><u>To Say:</u> Well, are we going to have anything left in a universe without supernovae? How about stars – what elements are required for stars?</p> <p>Any blue cards?</p> <p>So could we have stars in a universe without supernovae? OK. We'd still have stars.</p>	<p>Hydrogen & Helium cards are held up.</p> <p>No! Only white cards.</p> <p>YES!</p>
<p><u>To do:</u> Put "Stars" on the side with things we WOULD have.</p> <p>Keep going with a few more items (e.g. Insects, Earth's Atmosphere, Jupiter, Earth), ending with "YOU"</p> <p><u>To Say:</u> 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.</p> <p>So aren't you glad we live in this universe where stars explode as supernovae?</p> <p>As you pass the cards back up here, look around you.</p> <p>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!</p>	<p>YES!</p> <p>Visitors pass cards back.</p> <p>Wow.</p>



Visitors at an astronomy event holding up Element Cards for “TELEVISION.”

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.
<http://imagine.gsfc.nasa.gov/docs/teachers/elements/elements.html>

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:

<http://imagine.gsfc.nasa.gov/docs/teachers/elements/elements.html>

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.

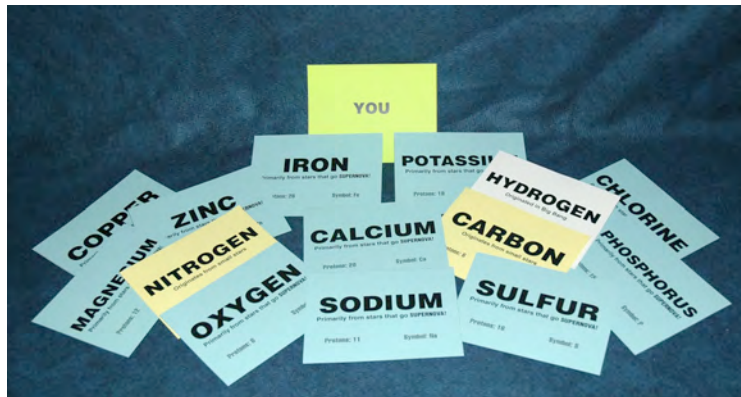
Why does our Sun have heavier elements in it?

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.

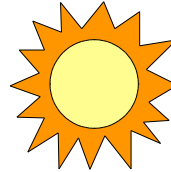
A Universe without Supernovae

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
Titanium
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

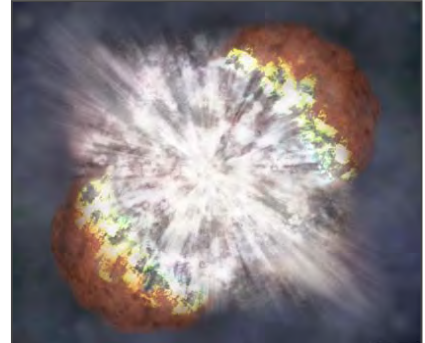
Sun: Hydrogen, Helium



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

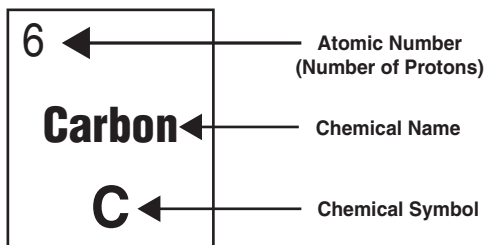
billion light years away, too far away to harm us here on Earth. That distance is like that same laser placed more than twice the distance of the Moon away from you.

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

1 Hydrogen H																	2 Helium He				
3 Lithium Li	4 Beryllium Be															5 Boron B	6 Carbon C	7 Nitrogen N	8 Oxygen O	9 Fluorine F	10 Neon Ne
11 Sodium Na	12 Magnesium Mg															13 Aluminum Al	14 Silicon Si	15 Phosphorus P	16 Sulfur S	17 Chlorine Cl	18 Argon Ar
19 Potassium K	20 Calcium Ca	21 Scandium Sc	22 Titanium Ti	23 Vanadium V	24 Chromium Cr	25 <small>Manganese</small> Mn	26 Iron Fe	27 Cobalt Co	28 Nickel Ni	29 Copper Cu	30 Zinc Zn	31 Gallium Ga	32 Germanium Ge	33 Arsenic As	34 Selenium Se	35 Bromine Br	36 Krypton Kr				
37 Rubidium Rb	38 Strontium Sr	39 Yttrium Y	40 Zirconium Zr	41 Niobium Nb	42 <small>Molybdenum</small> Mo	43 <small>Technetium</small> Tc	44 Ruthenium Ru	45 Rhodium Rh	46 Palladium Pd	47 Silver Ag	48 Cadmium Cd	49 Indium In	50 Tin Sn	51 Antimony Sb	52 Tellurium Te	53 Iodine I	54 Xenon Xe				
55 Cesium Cs	56 Barium Ba	57-71 *	72 Hafnium Hf	73 Tantalum Ta	74 Tungsten W	75 Rhenium Re	76 Osmium Os	77 Iridium Ir	78 Platinum Pt	79 Gold Au	80 Mercury Hg	81 Thallium Tl	82 Lead Pb	83 Bismuth Bi	84 Polonium Po	85 Astatine At	86 Radon Rn				
87 Francium Fr	88 Radium Ra	89-103 **	104 <small>Rutherfordium</small> Rf	105 Dubnium Db	106 <small>Seaborgium</small> Sg	107 Bohrium Bh	108 Hassium Hs	109 <small>Meitnerium</small> Mt	110 <small>Darmstadtium</small> Ds	111 <small>Roentgenium</small> Rg	112 Ununbium Uub	113 Ununtrium Uut	114 <small>Ununquadium</small> Uuq	115 <small>Ununpentium</small> Uup	116 <small>Ununhexium</small> Uuh	117 <small>Ununseptium</small> Uus	118 <small>Ununoctium</small> Uuo				



*	57 Lanthanum La	58 Cerium Ce	59 <small>Praseodymium</small> Pr	60 <small>Neodymium</small> Nd	61 <small>Promethium</small> Pm	62 Samarium Sm	63 Europium Eu	64 <small>Gadolinium</small> Gd	65 Terbium Tb	66 <small>Dysprosium</small> Dy	67 Holmium Ho	68 Erbium Er	69 Thulium Tm	70 Ytterbium Yb	71 Lutetium Lu
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**	89 Actinium Ac	90 Thorium Th	91 <small>Protactinium</small> Pa	92 Uranium U	93 Neptunium Np	94 Plutonium Pu	95 Americium Am	96 Curium Cm	97 Berkelium Bk	98 <small>Californium</small> Cf	99 <small>Einsteinium</small> Es	100 Fermium Fm	101 <small>Mendelevium</small> Md	102 Nobelium No	103 Lawrencium Lr
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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

OXYGEN

I am an element found in:

Plastics
Concrete
Humans
Animals
Plants
Water
Earth's Atmosphere
The Earth

SILICON

I am an element found in:

Computers
Concrete
Glass
Sand & Rocks

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

CHLORINE

I am an element found in:

Humans

Animals

Plants

SILVER

I am an element found in:

Jewelry

Coins

Photography

Electrical Parts

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 Big Bang

Protons: 1

Symbol: H

HELIUM

Originated in Big Bang

Protons: 2

Symbol: He

HYDROGEN

Originated in Big Bang

Protons: 1

Symbol: H

HELIUM

Originated in 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

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

**SILVER
NECKLACE**

**PLASTIC
BAGS**

YOU

DOGS

OAK TREES

EARTH

**EARTH'S
ATMOSPHERE**

JUPITER

STARS

SUN

TELEVISION

COMPUTER

**OFFICE
BUILDING**

LIONS

INSECTS

SHARKS

**CREDIT
CARDS**

EAGLES

**DIAMOND
RING**

SNAKES