Name: Date: Period:

# NOVA: Hunting the Elements

Part 1: Basic Chemistry

## Gold – Au Beginning – 10 minutes

1. Write the number of subatomic particles in gold:
   1. Protons:
   2. Neutrons:
   3. Electrons:
2. Give one property of gold.
3. How much gold is in one ton of the mined rock?
4. How much is each truckload of ore worth, once the gold is extracted?

## Electron Microscope 25? - 36

1. How much would you have to zoom in on a map of the United States to replicate the power of an electron microscope?
2. Why is the microscope wrapped in acoustic blankets?
3. What part of the atom is actually visible under the microscope?
4. What do protons determine about an element?
5. What is the number of protons called?
6. Label the atomic number, symbol, and atomic mass of calcium below:



1. Give an example of a real-life object made from each of the following elements:
   1. Calcium –

**b.** Bismuth –

c. Bromine –

1. What is a family of elements?
2. Where did the noble gases get their name?
3. What do electrons determine?

# NOVA: Hunting the Elements

Part 2: Chemistry of Life, Rare Earth Elements, and Radioactivity

## Elements of Life 57 minutes – 1:18

1. List the six most common elements of life, a common object they are found in, and an important property.

|  |  |  |  |
| --- | --- | --- | --- |
| **Element Symbol** | **Element Name** | **Common Object** | **Important Property** |
| C |  |  |  |
| H |  |  |  |
| N |  |  |  |
| O |  |  |  |
| P |  |  |  |
| S |  |  |  |

1. What can happen when excessive trace elements are lost from the body?
2. Describe a body function or part that utilizes each of these trace elements:
   1. Calcium –
   2. Iron –
   3. Potassium –
   4. Zinc –
   5. Magnesium –
   6. Sodium –
3. What conditions did the earliest bacteria need for energy production?
4. What do cyanobacteria use for energy production? What do they release as waste?
5. In the core sample collected from Yellowstone, which layer is the cyanobacteria?

## Origin of the Elements 1:18-1:50 (end)

1. What is the origin of hydrogen, the smallest element?
2. Describe the process of fusion and how it produces helium.
3. What happens when a star runs low on hydrogen fuel?
4. What is created in supernova explosion?

## Silicon and Glass

1. What elements is sand made of?
2. What is added to Gorilla Glass to make it stronger than normal glass?

## Rare Earth Elements

1. Where do most of the rare earth elements come from?
2. How are the fifteen rare earth elements chemically similar?
3. What elements are rare earth magnets usually made of?
4. Why are rare earth elements in such short supply?
5. How do sharks react to rare earth metals?
6. Describe the following parts of the lemon shark experiment: Independent Variable –

Dependent Variable – Experimental Group – Control Group –

## Carbon Isotopes

1. What is the difference between the compositions of these carbon isotopes?

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Protons** | **Electrons** | **Neutrons** |
| **Carbon-12** |  |  |  |
| **Carbon-13** |  |  |  |
| **Carbon-14** |  |  |  |

1. What happens to Carbon-14 over time?
2. Define radioactive half-life:
3. Based on carbon dating, how long ago did the tree die?