

NAME: \_\_\_\_\_

PERIOD: \_\_\_\_\_

DATE: \_\_\_\_\_

## NOVA: Hunting the Elements

1. There are \_\_\_\_\_ unique substances (elements) arranged on an amazing chart that reveals their hidden secrets to anyone who knows how to read it.
2. All the gold ever mined would fit into a single cube about \_\_\_\_\_ feet on a side.
3. Three-quarters of the elements are \_\_\_\_\_.
4. How an atom reacts chemically depends on how willing it is to share \_\_\_\_\_ with others.
5. How much would a 60 pound block of gold be worth in dollars? \$ \_\_\_\_\_
6. List two things copper is used for:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
7. When copper is combined with another element, \_\_\_\_\_, it makes bronze, the first manmade metal alloy.
8. The number of \_\_\_\_\_ determines what kind of element the atom is.
9. The number of protons is called the atomic \_\_\_\_\_ and it's the fundamental organizing principle of every table of the elements.
10. Metals are shiny, malleable materials that conduct \_\_\_\_\_.
11. Most people think of \_\_\_\_\_ as white and chalky, but it's actually a silver, shiny metal.
12. Fiesta® ware bowls, like this one from the 1930s, gets its orange color from \_\_\_\_\_, and it's actually dangerously radioactive.
13. The table organizes the elements by atomic number, that is, the number of protons in each atom, yet the table's creator – a 19<sup>th</sup>-century Russian chemistry professor, named Dmitri \_\_\_\_\_, knew nothing about protons or atomic numbers.
14. The group that fits neatly onto the end of the table, the \_\_\_\_\_, are unwilling to mix with the other elements, to react with them.

15. Protons may determine the identity of an element, but \_\_\_\_\_ rule its reactivity.
16. An atom with \_\_\_\_\_ electrons in its outer shell makes one happy, satisfied atom.
17. The column just before the stable noble gases are called the \_\_\_\_\_. They have an outer shell that needs just one more electron to be full.
18. The \_\_\_\_\_ metals are the first column. Each of them has full shells, plus one extra electron sitting in a new, outer shell.
19. The ion chromatograph looks for positively or negatively charged molecules, called \_\_\_\_\_, in the residue, fragments of the original chemical explosive.
20. Every time atoms form a new bond, the reaction releases \_\_\_\_\_.
21. How do you speed up a fire to create an explosion? You regulate the amount of \_\_\_\_\_ and how closely it's packed together with other elements.
22. The oxygen that powers all those explosions makes up \_\_\_\_\_% of our atmosphere. It's the most abundant element in the earth's crust.
23. What six elements make life possible?
24. List two ways that carbon is found in its pure form:
25. Your body composition is about \_\_\_\_\_% carbon and \_\_\_\_\_% nitrogen.
26. Hydrogen and oxygen can actually be separated from water using a little bit of \_\_\_\_\_.
27. In a person's body, there's \_\_\_\_\_% oxygen.
28. Phosphorus is actually involved in something really important called \_\_\_\_\_, which is the molecule that all cells use for energy.
29. Phosphorus makes up about \_\_\_\_\_% of the human body. It was the first element isolated from a living creature.
30. Altogether just those six CHNOPS elements make up 97% of the weight of his body, but what about the other 3%? Those are what's called the \_\_\_\_\_ elements.

31. \_\_\_\_\_ is important for energy metabolism.
32. \_\_\_\_\_ is an important part of nervous system function.
33. In total, the human body uses more than \_\_\_\_\_ elements in ways and quantities that are unique to us.
34. As the planet cooled, another ancient microorganism evolved and changed everything. They are called cyanobacteria, but we know them as \_\_\_\_\_. They found a way to get their energy from light and water, releasing oxygen as a byproduct, just like modern plants do.
35. Around 90% of all the atoms in the universe are \_\_\_\_\_, and they were all made by the Big Bang, more than 13 billion years ago.
36. Stars like our own sun are constantly turning hydrogen atoms into element number two: helium. It's a process called \_\_\_\_\_.
37. By the time it's fusing iron, a star is in its death throes. It begins to collapse, and if it's massive enough, that collapse leads to a powerful explosion called a \_\_\_\_\_.
38. This element, with 14 protons and 14 electrons, is the 2<sup>nd</sup> most abundant element in the earth's rocky crust and is a member of one of the smallest neighborhoods on the table: the semiconductors.  
\_\_\_\_\_
39. Glass all starts with ordinary \_\_\_\_\_, which is made of a combination of silicon and oxygen.
40. Glassmakers have learned how to precisely place minute amounts of \_\_\_\_\_ atoms like sodium, potassium, and aluminum among the silicon atoms. The result is hard, yet flexible and scratch-resistant.
41. Switches made out of semiconductors made computers possible, but lately when it comes to high tech, there's a new family on the block, the \_\_\_\_\_, 15 elements located near the bottom of the table.
42. List three uses of the rare earth metal neodymium.
43. Where do the majority (98%) of rare earth minerals come from in the world?
44. \_\_\_\_\_ makes magnets, but adding neodymium makes magnets on steroids.

45. They accidentally discovered that the strong neodymium magnets (and other rare earth elements) can actually repel \_\_\_\_\_.
46. Scientists now know that most elements come in more than one version. The different versions are called \_\_\_\_\_. The difference between them is the number of neutrons in the nucleus.
47. To determine how long ago droughts occurred, Scott is using \_\_\_\_\_ to date the trees because it is unstable and the atoms begin to deteriorate over time in a process called radioactive decay.
48. Carbon-14 can be used to date samples up to \_\_\_\_\_ years old.
49. At the bottom of the periodic table, beginning with number 84, polonium, all of the elements and their isotopes are \_\_\_\_\_.
50. Before the nuclear age, uranium was thought to be the end of the periodic table, but in the last 70 years, scientists have left nature behind and created \_\_\_\_\_ new elements.