

Room 1

You and your friends have suddenly materialized into a room made entirely of a shiny metallic solid. A wooden door is set into one wall. A shimmering holograph appears before you. It is an old man with long brown hair and a full beard streaked with grey hairs. Wearing a full-length nineteenth-century topcoat it is Dmitri Mendeleev himself. In a crisp, intelligent voice, the scientist says, "This room has been constructed of a strong, lightweight, corrosion-resistant metal composed of atoms containing 3 valence electrons and 13 protons. It is the most abundant metal in the Earth's crust." What element is this room made of? Carve its symbol into the wooden door to escape to the next room.

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding.

Room 2

The next room you find yourselves in is made of a clear life-giving gas. Suddenly Mendeleev appears again, saying, "This element is a nonmetal, diatomic gas that comprises about 20% of normal air. It combines with most other elements to form oxides" and has 6 valence electrons. What symbol will you carve into the door of this room?

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding.

Room 3

Next, you and your friends are transported to a room made from a green-yellow gas which immediately begins to burn your nostrils and your throat. You reach into your packs for gas masks to protect yourselves from these noxious fumes. For the third time a holograph of Mendeleev speaks to you through the shifting gas.

“This diatomic gas is a halogen.” This toxic gas is commonly found in table salt (NaCl) and is a halogen. What element surrounds you?

Halogens: nonmetal elements that combine to form salts; are located near the far-right side of the periodic table.

Diatomic: molecule of two identical element atoms combined. (Ex: O₂, H₂)

Room 4

In the next room you find yourselves surrounded by bright yellow crystals. As you remove the gas masks, the old chemist, tinted yellow by light reflecting off the crystals, appears yet again. “The atoms of this element have 6 valence electrons.” This element smells like rotten eggs and has 3 energy levels. Carve the symbol of the correct element in the room’s door.

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding.

Room 5

You are now in a room made of a clear gas, located in one of the towers of the Castle Mendeleev.

Trying to talk to your friends, your voice sounds high-pitched and squeaky, like Mickey Mouse. The holograph tells you, "The atoms of this element are also molecules." What element is this room made of?

Molecule: smallest part of a compound (2 or more different elements)

Room 6

The sixth room you are transported to, on the second floor of the building, is made of a silver-grey metallic solid. Taking a knife out of your backpack, you can cut a piece of it off with the blade because the substance is very soft. A portion of the element touches your hand, burning your skin. Filling a small glass beaker with water from your canteen, you drop the substance in to observe its reaction with water. It momentarily floats on the water before causing a small explosion, has 1 valence electron and 11 protons. What element is this?

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding.

Room 7

Next you are transported to a room with bright white, waxy walls. When you turn off the lights, the entire room glows in the dark! The holograph tells you, "This element occurs in teeth and bones as calcium phosphate" and has 5 valence electrons. What element is this room comprised of?

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding.

Room 8

You are now in a room made of a shiny, silver metal. The image of Mendeleev reappears to say, "This element appears here in its pure form. If combined with traces of other elements, it becomes a semiconductor that is used in circuits of electronic devices such as calculators. It and oxygen are the two elements that make sand (SiO_2) but not diamonds." What element is he speaking of?

Room 9

The ninth room is composed of a gas that has no color, taste, or odor. A transparent image of the chemist tells you, "An atom of this element has 2 electrons in its first shell and 5 electrons in its second shell. This element makes up approximately 80% of normal air and can be used to make laughing gas (nitrous oxide NO_2).\" What is the element?

Electron shell: orbit of electrons around the nucleus of an atom; equal to its period number.

Room 10

The next room you are transported to is made of a soft white material. The nineteenth-century chemist states, "The atoms of this element like to take the place of other elements and will replace hydrogen atoms when placed into water. This room is on the second floor of my castle.\" This element has 1 valence electron and 3 total electrons. Which element is this?

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding.

Room 11

Next, you are transported to a room in the corner of the Castle Mendeleev. The room is made of a thick, inert gas (Noble gas). Mendeleev flickers into view to tell you, "This element is used to fill light bulbs. The atoms of this element have 8 electrons on their third energy level/shell and 18 protons in its nucleus." Carve the correct symbol into the door.

Noble Gas: inactive element; do not actively combine with other elements.

Room 12

After escaping from room thirteen you materialize into a room made of a solid substance. Mendeleev's image appears in front of you and says, "This element is the basic unit for all living things. Without it, jewelers would go broke, gas stations would go out of business, and every breath you exhale would be incomplete. The element has two isotopes, one has 6 neutrons, and the other has 8 neutrons." This element determines if a compound is organic or inorganic. What element is this room constructed of?

Isotope: atoms of an element that have a different than normal number of neutrons.

Room 13

The next room you enter is filled with an inert (Noble gas) gas. Mendeleev appears, telling you, "This gas emits a brilliant orange-red light when contained in a discharge tube. Las Vegas wouldn't be the same without this element." This element is used in bright lights around the world. What is this element?

Noble Gas: inactive element; do not actively combine with other elements.

Room 14

This room is made of a light grey metal. Again, the image of Mendeleev speaks. This element is so strong, hard, and elastic that it is used in alloys to reinforce other metals. Its melting point is nearly 1300°Celsius." This element has 5 neutrons and 2 valence electrons. What element is this room made of?

Alloy: a metal made by mixing two or more metals; Ex. Copper + zinc = brass.

Valence electrons: electrons in the outer orbit/level of an atom that will either be gained, lost, or shared during bonding

Room 15

The next room is made of a hard, black, shiny material, and then suddenly it changes to a brown powder. The holograph of the chemist tells you the atoms of this element have 2 electron shells, and it conducts electricity and heat very poorly. But because it readily absorbs neutrons, it is used in control rods for atomic reactors. This element is a metalloid. What element built these walls?

Room 16

The sixteenth room you enter is made of a greenish-yellow gas. The image tells you, "The atoms of this element have a high attraction for electrons. When one combines it with sodium, it can help reduce tooth decay. It also reacts with hydrocarbons to form Teflon and Freon." This element is a halogen with 2 energy levels. What element is he speaking of?

Room 17

Next, you have been transported to a room on the first floor of the Castle Mendeleev that is made of a white solid. The holograph of Dmitri Mendeleev reappears, shifting before you like a milky ghost, speaking to you once more. "This element is widely used in aerospace industries in alloys with other metals. It burns brilliantly in air. The atoms of this element form positive ions. One of its atoms will combine with one oxygen atom to form a compound." This element has 2 valence electrons. The walls of this room are comprised of what element?

Alloy: a metal made by mixing two or more metals; ex. Copper + zinc = brass

Ion: a charged particle; the result of an atom either gaining (-) or losing (+) electrons

Room 18

You finally find yourself in the second tower of the Castle Mendeleev. The room is made of a transparent gas. This element is the simplest and lightest of all the elements. It is the most abundant element in the universe. What element is it?