

Quiz.

1. What mathematical sign is the charge of an atomic nucleus?
 - a) positive
 - b) neutral
 - c) negative
2. An isotope contains a different number of protons and _____, and an ion has a different number of protons and _____.
 - a) electrons, neutrons
 - b) neutrons, electrons
3. What is the difference between a compound and a mixture?
 - a) number of elements
 - b) number of atoms
 - c) ratio of atoms
 - d) chemical bonds
4. Which atom of the same element would weigh more?
 - a) a positively-charged ion
 - b) a neutral atom
 - c) a negatively-charged ion
5. What is the most abundant element in the universe?
 - a) carbon
 - b) oxygen
 - c) nitrogen
 - d) hydrogen
 - e) helium
6. How do we know our sun is not the oldest star in the universe?
 - a) It contains elements heavier than (with more protons) than iron.
 - b) It contains hydrogen and helium.
 - c) Other stars are much farther away from us than the sun.
7. If matter is composed of atoms, then why can we pick up objects and not walk through walls?
 - a) Atoms are mostly solid.
 - b) Electrons and protons create powerful force fields.
 - c) The gravity between atoms is strong enough to prevent us from passing through.
8. How many elements are in methane (CH₄)?
 - a) 1
 - b) 2
 - c) 4
 - d) 5

9. How many atoms are in one molecule of methane (CH_4)?
- a) 1
 - b) 2
 - c) 4
 - d) 5

Answer Key.

1. a)

The nucleons consist of positive protons and neutral neutrons. Because of this, only the protons contribute to the overall charge of the nucleus. *There is a hypothetical type of atom with a neutral nucleus called neutronium. The nucleus of neutronium would only contain neutrons. A neutron star is also composed of mostly neutrons.

2. b)

This is easier to remember if you think about the fact that ions can have different charges.

3. d)

The defining difference between compounds and mixtures is that all of the atoms in compounds are chemically bonded, while a mixture may contain loose atoms or molecules.

4. c)

Elements are classified by their number of protons, so for the same element a negative ion would weigh more than a positive or neutral atom because it would contain more mass. A neutral atom would have one (or more) less electron(s), and a positive ion would have even less electrons.

5. d)

After the Big Bang 92% of the universe was hydrogen, almost 8% was helium, and a trace amount was Li. All the other elements hadn't been created yet! Now, hydrogen and helium still account for about 75% of all of the elements in the Universe, and hydrogen is still the most abundant.

6. a)

The first stars would have contained hydrogen and helium, and all stars contain hydrogen and helium. However, the first stars would not have been able to synthesize elements heavier than iron without going supernova, therefore since we know our sun contains these heavier elements we know that we had to get those elements from the remnants of a star after its death.

7. b)

Atoms are mostly (99.999%) empty! Gravity is an extremely weak force and would not be strong enough to create solid matter from subatomic particles and atoms or even molecules. Electric forces acting on the charged particles of matter create force fields allow us to form "solid" matter.

8. b)

There are two elements in methane. Each chemical symbol represents a different element: C stands for carbon, and H stands for hydrogen.

9. d)

The subscripts of a chemical symbol tell us how many atoms are present in a molecule. When no subscript is present it is implied that there is only one atom present. CH_4 has one atom of carbon and 4 atoms of hydrogen, resulting in 5 atoms in total.