

# Brain POP<sup>®</sup> ATOMIC MODEL

1 How do scientists know how atoms are structured?

- A By looking at them under a microscope
- B By running experiments that expose their properties
- C By examining only the largest atoms
- D By splitting them apart

2 What can you conclude from the fact that scientists continue to update the atomic model?

- A New information about atoms continues to be discovered
- B Old information about atoms is completely useless
- C Scientists did not have any information about atoms until a few years ago
- D Scientists still have no idea what atoms look like

3  What contribution did John Dalton make to atomic theory?

- A He discovered that every atom was positively charged
- B He discovered that every element consisted of one type of atom
- C He discovered that atoms had nuclei
- D He discovered that atoms could be divided into smaller parts

4 Place the following scientists in order, from earliest to latest: A) Ernest Rutherford; B) J.J. Thomson; C) John Dalton

- A B, C, A
- B C, A, B
- C A, C, B
- D C, B, A

5 The majority of an atom's mass exists where?


- A In the nucleus
- B In the electron cloud
- C In the space between the nucleus and the electrons
- D In the neutrons

6 What are electrons?

- A Positively charged particles
- B Neutrally charged particles
- C Negatively charged particles
- D Uncharged particles

7 Ernest Rutherford discovered that atoms were mostly:

- A Negatively charged
- B Positively charged
- C Electrons
- D Empty space

8  What does the nucleus of an atom contain?

- A Electrons and neutrons
- B Protons and neutrons
- C Neutrinos and positrons
- D DNA and RNA


9 How are neutrons different from protons and electrons?

- A They are more massive than protons and electrons
- B They have no electrical charge
- C They are less massive than protons and electrons
- D Protons and electrons exist in atomic nuclei; neutrons orbit the nucleus in a "cloud"

10 How are electrons arranged in an atom?

- A In groups of five
- B In energy levels
- C By color
- D By shape

# Brain POP<sup>®</sup> ATOMS

1  What is the significance of the periodic table of elements? Choose the best answer.

- A It lists all the different metals known to humans
- B It predicts and lists all the chemical elements in the universe
- C It explains where different atoms can be found
- D It proves that atoms are the building blocks of matter

2 What do electrons in the same shell have in common?


- A They have the same amount of energy
- B They are all positively charged
- C They are all made up of atoms
- D They all have neutral charges

3 Which of the following is an example of a subatomic particle?

- A Carbon
- B Oxygen
- C Electron
- D Hydrogen

4 What might happen if the strong force didn't exist?

- A Electrons would have positive charges
- B Atomic nuclei would fly apart
- C It would be more difficult to split atoms
- D Neutrons would not exist

5  What two types of particles exist within an atomic nucleus?

- A Protons and neutrons
- B Neutrons and electrons
- C Protons and neutrinos
- D Positrons and neutrons

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6 Oxygen has an atomic number of 8. What can you conclude from this fact?

- A An atom of oxygen weighs 8 grams
- B An atom of oxygen has 4 protons and 4 electrons
- C An atom of oxygen has 8 positrons
- D An atom of oxygen has 8 protons

7 The word "atom" comes from a Greek word for "indivisible." In what way are atoms indivisible?


- A They cannot be separated once they've bonded with other atoms
- B They cannot be broken apart without losing their chemical properties
- C They cannot form bonds with other atoms
- D They cannot gain or lose electrons

8 How are molecules different from atoms?

- A They consist of several atoms bonded together
- B They do not contain neutrons
- C They do not have nuclei
- D Their particles do not have electrical charges

9 What can you conclude from the fact that electrons orbit far away from atomic nuclei?

- A Electrons are extremely small
- B Atoms are comprised mostly of empty space
- C Protons have a positive charge
- D Atoms consist of subatomic particles

10  In the following diagram, what does the number 12 represent?

- A An atomic number
- B A number of electrons
- C An atomic mass
- D A chemical symbol


# Brain POP<sup>®</sup> ISOTOPES

1  Fluorine has an atomic number of 9. What can you conclude about an atom of fluorine from this fact?

- A It has nine protons
- B It weighs nine grams
- C It has nine electron shells
- D It has a boiling point of 9 degrees Celsius

2 In what part of an atom can protons be found?

- A Inside the electrons
- B Inside the neutrons
- C Inside the atomic nucleus
- D Inside the electron shells

3  Since atoms are very small, what can you infer about atomic mass units?

- A One atomic mass unit is equivalent to a gram
- B One atomic mass unit is much lighter than a gram
- C One atomic mass unit is much heavier than a gram
- D Atomic mass units and grams measure different properties

4 An atom of fluorine has an atomic mass of 19 u. Keeping in mind that its atomic number is 9, what can you infer about this atom?

- A It has nine neutrons
- B It has ten electrons
- C It has ten neutrons
- D It has ten protons

5 If a sulfur atom has 16 protons, 16 electrons, and 16 neutrons, its atomic mass is:

- A 16
- B 32
- C 48
- D 64

6 If a hydrogen atom has 1 proton, 1 electron, and 1 neutron, its atomic number is:

- A 1
- B 2
- C 3
- D 4

7 On the periodic table, how is atomic mass represented?

- A As an average of the mass of different isotopes
- B As the exact mass of every atom
- C As the mass of the most common isotope
- D As the masses of all the protons added together

8 What do carbon-12 and carbon-14 have in common?

- A They have the same number of protons
- B They have the same number of neutrons
- C They have the same atomic mass
- D They have the same atomic weight

9 How is carbon-12 different from carbon-14?

- A They have a different number of protons
- B They have a different number of electrons
- C They have a different number of neutrons
- D They are different elements

10 What can you conclude about carbon-14 from its name?

- A It has 14 electrons
- B It has 14 neutrons
- C It has 14 protons
- D It has an atomic mass of 14 u

# Brain POP<sup>®</sup> PERIODIC TABLE OF ELEMENTS

1 What characteristics are shared by all alkali metals and alkaline earth metals?


- A They conduct electricity very well
- B They are strong and shiny
- C They form alkaline solutions when mixed with water
- D They do not react with water at all

2 Carbon has an atomic number of 6. What can you conclude about carbon from this fact?

- A It has six protons
- B It has six neutrons
- C It has six electrons
- D It has six positrons

3 Noble gases are sometimes called "inert gases." What can you infer about the meaning of the word "inert" in chemistry?

- A It refers to substances that easily lose electrons
- B It refers to substances that do not react with other substances
- C It refers to substances that have strong electrochemical charges
- D It refers to gases

4  What do the orange and yellow spheres represent in this model of an atomic nucleus?

- A Gluons and leptons
- B Protons and neutrons
- C Positrons and electrons
- D Atoms and molecules

5  What do the elements highlighted in red have in common?

- A The same number of protons
- B The same number of electrons
- C The same number of neutrons
- D The same number of electron shells

6 Which of the following is a true statement?

- A Periods form horizontal rows; groups form vertical columns
- B Groups form horizontal rows; periods form vertical columns
- C Categories form horizontal rows; gases form vertical columns
- D Gases form horizontal rows; categories form vertical columns

7 What is true of all molecules?

- A They have electrochemical charges
- B They lack electrochemical charges
- C They have full outer electron shells
- D They contain at least one proton

8 What is one key physical difference between transition metals and poor metals?

- A Atomic mass
- B Hardness
- C Reactivity
- D Charge

9 If you wanted to find a sample of fermium, which has an atomic number of 100, where would you look?

- A Deep within the Earth
- B In the Earth's atmosphere
- C In outer space
- D In a science lab

10 To become positively charged, an atom must:

- A Gain a proton
- B Lose a proton
- C Gain an electron
- D Lose an electron