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SUMMARY OF TERMS (KNOWLEDGE)

Atom The smallest particle of an element that has all of the element's chemical properties.

Brownian motion The haphazard movement of tiny particles suspended in a gas or liquid that results from their bombardment by the fast-moving atoms or molecules of the gas or liquid.

Electron A negatively charged particle that whizzes about within an atom.

Atomic nucleus The core of an atom, consisting of two basic subatomic particles—protons and neutrons.

Neutron An electrically neutral particle in the nucleus of an atom.

Proton A positively charged particle in the nucleus of an atom.

Element A pure substance that consists of only one kind of atom.

Atomic number The number that designates the identity of an element, which is the number of protons in the nucleus of an atom; in a neutral atom, the atomic number is also the number of electrons in the atom.

Periodic table of the elements A chart that lists the elements in horizontal rows by their atomic number and in vertical columns by their similar electron arrangements and chemical properties. (See Figure 11.9.)

Ion An electrically charged atom; an atom with an excess or deficiency of electrons.

Isotopes Atoms of the same element that contain different numbers of neutrons.

Atomic mass unit (amu) The standard unit of atomic mass, which is equal to 1/12 the mass of the most common atom of carbon. One amu has a mass of 1.661×10^{-27} kg.

Compound A material in which atoms of different elements are chemically bonded to one another.

Mixture A substance whose components are mixed together without combining chemically.

Molecule Two or more atoms that bond together by a sharing of electrons. Atoms combine to become molecules.

Antimatter A "complementary" form of matter composed of atoms that have negative nuclei and positive electrons.

Dark matter Unseen and unidentified matter that is evidenced by its gravitational pull on stars in the galaxies. Dark matter along with dark energy constitutes perhaps 96% of the stuff of the universe.

READING CHECK QUESTIONS (COMPREHENSION)

11.1 The Atomic Hypothesis

1. Who advanced the idea of atoms in the early 1800s?
2. What causes dust particles and tiny grains of soot to move with Brownian motion?
3. Who first explained Brownian motion and made a convincing case for the existence of atoms?

11.2 Characteristics of Atoms

4. How does the approximate number of atoms in the air in your lungs compare with the number of breaths of air in Earth's atmosphere?
5. Are most of the atoms around us younger or older than the Sun?

11.3 Atomic Imagery

6. Why can't atoms be seen with a powerful optical microscope?
7. Why can atoms be seen with an electron beam?
8. What is the purpose of a model in science?

11.4 Atomic Structure

9. Where in the atom is most of its mass concentrated?
10. What is meant by the term *nucleon*?
11. How does the electric charge of a proton compare with the electric charge of an electron?
12. Since atoms are mostly empty space, why don't we fall through a floor we stand on?
13. What element has the lightest atoms?
14. What is the most abundant element in the known universe?
15. How are elements with nuclei heavier than those of hydrogen and helium formed?
16. Where did the heaviest elements originate?
17. What are the five most common elements in humans?

11.5 The Periodic Table of the Elements

18. What does the atomic number of an element tell you about the element?
19. How many shells are represented in the presently known periodic table?
20. What kind of attraction pulls electrons close to the atomic nucleus?
21. Why aren't heavier elements much larger than lighter elements?

11.6 Isotopes

22. How does one isotope differ from another?
23. Distinguish between mass number and atomic mass.

11.7 Compounds and Mixtures

24. What is a compound? Cite two examples.
25. What is a mixture? Cite two examples.