

UNIT TWO

2.1 Early Thinking about the Composition of Matter

The earliest recorded discussion of the basic structure of matter comes from ancient Greek philosophers, the scientists of their day. Some of them argued that matter is continuous i.e., it could be divided endlessly into smaller pieces. Others believed that matter is discrete; i.e., it cannot be infinitely divided.

Democritus (460 - 370 B.C) expressed the belief that all matter consists of very small, indivisible particles, which he named atoms (meaning uncuttable or indivisible). He thought of atoms as moving particles that differed in shape and size which could join together. According to Democritus matter is discrete.

Aristotle (384 – 322 B.C) argued that matter is divided into smaller and smaller parts, the division continuous forever without any limit. He did not believe in microscopic building particles of matter. Therefore, according to Aristotle, matter is continuous and he believed that matter consisted of the combinations of fire, earth, air, and water.

Table 2.1 Comparison between the discrete and continuous theory of matter

Discreteness Theory	Continuous Theory
➤ Proposed by Democritus	Proposed by Aristotle
➤ There is a limit to which matter is broken	Matter is infinitely divisible
➤ Believed in the existence of atoms	Rejected the idea of atoms

Choose the correct answer for the following questions

1. According to Aristotle, matter can be divided:

- A) Only into atoms
- B) Into smaller and smaller parts without limit
- C) Into four fixed parts only
- D) Only once, then it becomes indivisible

2. Did Aristotle believe in microscopic building particles of matter?

- A) Yes, he believed in atoms
- B) No, he rejected the idea of microscopic particles
- C) Yes, but only in liquids
- D) No, he believed in tiny energy particles

3. According to Aristotle, matter is:

- A) Discrete and made of indivisible atoms
- B) Continuous and infinitely divisible
- C) Made only of fire and water
- D) Made of empty space and particles

4. Which four elements did Aristotle believe matter was made of?

- A) Earth, air, fire, and metal
- B) Water, air, ether, and fire
- C) Earth, air, fire, and water
- D) Fire, earth, water, and energy

5. Aristotle's idea of matter differed from atomic theory because he believed:

- A) Matter is made of small, indivisible particles
- B) Matter is continuous and has no smallest parts
- C) Matter is only composed of atoms and void
- D) Matter is made of energy only

6. Who first proposed that all matter is made of indivisible particles called atoms?

- A) Aristotle
- C) Plato

B) Democritus

D) Socrates

7. What did Aristotle believe matter was made of?

A) Atoms and void

C) Earth, water, air, and fire

B) Protons and electrons

D) Wood, fire, metal, and water

8. According to Democritus, what causes the changes we observe in matter?

A) The mixing of elements

B) The motion and rearrangement of atoms

C) The will of the gods

D) Temperature and pressure

9. Why did Aristotle reject Democritus' atomic theory?

A) He believed atoms were too small to see

B) He thought all matter was created by the gods

C) He denied the existence of empty space (void)

D) He preferred studying biology

10. Which of the following is NOT one of the four classical elements according to Aristotle?

A) Air

B) Fire

C) Metal

D) Water

11. According to Democritus, atoms differ in all of the following EXCEPT:

A) Size

C) Shape

B) Taste

D) Motion

12. What best describes Aristotle's view of matter?

- A) Matter is an illusion
- B) Matter consists of small, unchangeable particles
- C) Matter is continuous and shaped by form
- D) Matter exists only in the mind

13. Which thinker's ideas about matter were more widely accepted during ancient times?

- A) Democritus
- B) Anaxagoras
- C) Aristotle
- D) Thales

14. Which school of thought is Democritus associated with?

- A) Sophism
- B) Stoicism
- C) Atomism
- D) Idealism

15. What did Democritus believe existed between atoms?

- A) Fire
- B) Void (empty space)
- C) Water
- D) Ether

16. Which philosopher believed that matter had the *potential* to become something when given *form*?

- A) Epicurus
- B) Democritus
- C) Plato
- D) Aristotle

17. What is a major limitation of Democritus' atomic theory from a modern scientific perspective?

- A) It lacked experimental evidence
- B) It involved too much mathematics
- C) It only explained liquids
- D) It was written in Latin

18. Which of the following is true about continuous Theory ?

- A) It is proposed by Democritus
- B) Believed in the existence of atoms
- C) Proposed by Aristotle
- D) There is a limit to which matter is broken

19. Which Theory believes in the existence of atoms ?

- A) Kinetic Theory
- B) Quantum Theory
- C) Dalton's Atomic Theory
- D) Wave Theory

20. Which Theory was proposed by Aristotle ?

- A) Dalton's Atomic Theory
- B) Continuous Matter Theory
- C) Kinetic Molecular Theory
- D) Quantum Theory