

## CONCEPT: ATOMIC THEORY

- Democritus (400 B.C.) was the first to discuss the atom and John Dalton in 1803 modernized the **Atomic Theory**.

- ☐ *Atom* from the Greek *atomos*, which means \_\_\_\_\_.
- ☐ Dalton was able to take portions of Democritus and Lavoisier's ideas to fashion his theory.

### Dalton's Atomic Theory Postulates

1. All of matter is made of **atoms**, which are the **smallest particles of matter**.
2. **Atoms** are \_\_\_\_\_ and therefore **cannot be created or destroyed**.
3. All atoms of a given element are **identical** in \_\_\_\_\_, \_\_\_\_\_ & \_\_\_\_\_.
4. \_\_\_\_\_ are made of 2 or more different types of atoms in **fixed, simple, whole number ratios**.
5. A **chemical reaction** is a \_\_\_\_\_ of atoms.

### Modern Atomic Theory

1. All of matter is made of atoms, which can be further broken into 3 subatomic particles.
2. ---
3. Not all atoms of a given element are identical and exist in the same form.
  - ☐ The same atoms can have different masses and densities: \_\_\_\_\_.
  - ☐ The same atoms can connect in different ways to give rise to different compounds.
  - ☐ Different atoms can have identical \_\_\_\_\_, such as Argon-40 and Calcium-40.
4. Atoms don't always combine in fixed, simple, whole number ratios. They can be complex.
5. ---

**EXAMPLE:** Which of following statements are consistent with Dalton's atomic theory as it was originally stated?

- i. Nitrogen and phosphorus atoms have the same mass.
- ii. All lead atoms are identical.
- iii. Barium and chlorine atoms combine in a 1:2 ratio to form barium chloride,  $\text{BaCl}_2$ .
- iv. Uranium atoms undergo alpha decay to become thorium atoms.

- a) i only                      b) i and iii                      c) ii and iii                      d) ii, iii, iv                      e) ii and iv

**PRACTICE:** Which of the following is NOT a component of Dalton's Atomic Theory?

- a) A chemical reaction rearranges the grouping of atoms.
- b) Atoms are composed of protons, neutrons, and electrons.
- c) Atoms of a given element are chemical and physically identical.
- d) Atoms of different elements combine in simple, whole number ratios to form compounds.
- e) Matter is composed of atoms that are unable to divided any further.

**PRACTICE:** Dalton used the lightest element as his standard for atomic mass. What is this element?

- a) Helium                      b) Oxygen                      c) Carbon                      d) Hydrogen                      e) Nitrogen