

## 1.3 Atomic Theory

Name \_\_\_\_\_

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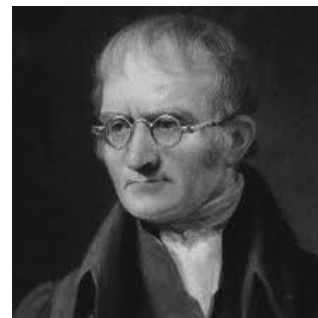


### Early ideas about matter

- The early Chinese believed matter was based on 5 elements \_\_\_\_\_ and \_\_\_\_\_ which restrained and promoted each other.
- Greek philosophers believed that matter was made of \_\_\_\_\_ (atom) that were the smallest pieces of matter.
- Aristotle (the most respected philosopher) believed that matter was made from 4 elements – \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_. This view was held for 2000 years.
- Alchemists experimented with matter and tried to turn common metals into \_\_\_\_\_.  
- Their activities marked the beginning of our understanding of matter.

### Development of Atomic Theory I

- John Dalton (1766 - 1844)
  - Credited with developing a theory that was a new way of explaining matter.
  - He studied gases that make up \_\_\_\_\_. Based on his studies, he suggested that:
    - matter is made of small, hard \_\_\_\_\_ that are different for different elements
    - the smallest particle of an element is called an \_\_\_\_\_.
  - This is the basis for \_\_\_\_\_.



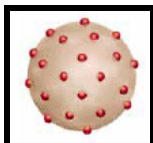
### Dalton's Atomic Theory

- All matter is made of small \_\_\_\_\_ called \_\_\_\_\_.
- Atoms cannot be created, destroyed, or divided into smaller particles.
- All atoms of the same element are identical in \_\_\_\_\_ and \_\_\_\_\_, but they are different in mass and size from the atoms of other \_\_\_\_\_.
- Compounds are created when atoms of different elements link together in definite \_\_\_\_\_ proportions – for example, 2 parts \_\_\_\_\_ and one part \_\_\_\_\_ will give you \_\_\_\_\_.

## Atomic Theory II

- J. J. Thomson (1856 - 1940)

- Thomson studied electric currents in gas discharge tubes (like today's fluorescent lights). From his studies, he determined that the currents were streams of \_\_\_\_\_ . These were later called \_\_\_\_\_. He found these particles in all substances, so he reasoned that all atoms contain these particles.
- He hypothesized that atoms are made of smaller particles. He proposed the “\_\_\_\_\_” model of the atom. (also known as ‘\_\_\_\_\_’)
- This model is best visualized as a positively charged \_\_\_\_\_ with \_\_\_\_\_ charged particles spread out in it like \_\_\_\_\_.



## Atomic Theory III

- Ernest Rutherford (1871 - 1937) – Thomson's student.

- Conducted a very famous experiment where he fired a stream of very heavy, positively charged (alpha) particles at a very thin sheet of \_\_\_\_\_.
- He found that some particles were deflected in directions not originally predicted. Most would go through, as expected, but occasionally, one would bounce back – very surprising.
- He suggested that the deflection of the charged particles was because the atom contained a tiny dense centre called a \_\_\_\_\_, and \_\_\_\_\_ moved around the nucleus.
- He also established that the nucleus is made of 2 particles, the \_\_\_\_\_ (positive charge) and \_\_\_\_\_ (neutral charge)

## Atomic Theory IV

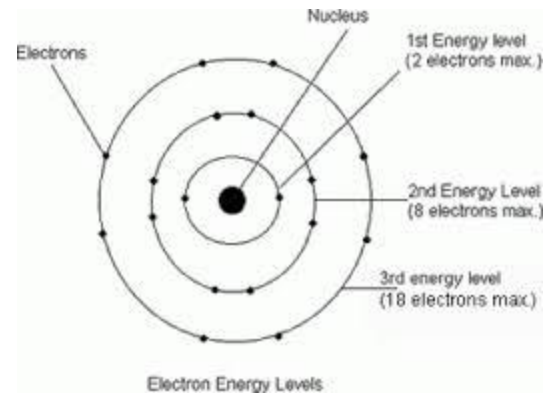
- Niels Bohr (1885 - 1962) – Rutherford's student.

- He studied gaseous samples of atoms, which were made to glow by passing an \_\_\_\_\_ through them – eg. The glow of a neon light is created by passing electricity through Neon gas.
- Based on his observations, Bohr proposed that electrons surround the nucleus in specific “\_\_\_\_\_” and when the electrons are given energy, they jump to the next level and give off light as they fall back.
- This is the \_\_\_\_\_ that he won a nobel prize for.



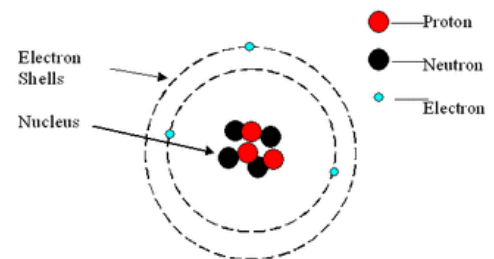
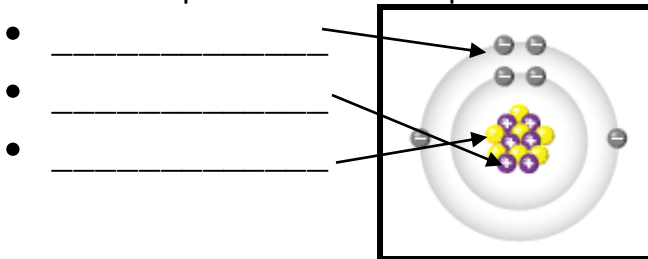
## Bohr Model

- The electron shells can be thought of as a '\_\_\_\_\_', with rows that must be filled before the next row is started.
- The \_\_\_\_\_ holds \_\_\_\_\_ electrons or 'seats',
- The \_\_\_\_\_ hold \_\_\_\_\_ electrons each
- The \_\_\_\_\_ row holds \_\_\_\_\_ electrons
- After that it gets a bit messy, so don't worry about it for now.
- When the electrons gain energy, they temporarily jump to the next level and fall back again. When they fall back, they give off \_\_\_\_\_.



## Inside the Atom

- An atom is the smallest particle of an element that retains the \_\_\_\_\_ of the element.
- All atoms are made up of three kinds of particles called subatomic particles. These particles are:



## Subatomic Particles

- Protons – \_\_\_\_\_ charge, \_\_\_\_\_ AMU (atomic mass unit)
- Neutrons – \_\_\_\_\_ charge, \_\_\_\_\_ AMU
- Electrons – \_\_\_\_\_ charge, \_\_\_\_\_ AMU (not significant for our purposes).

Name	Symbol	Relative Mass	Electric Charge	Location in the Atom
Proton	p	1836	+	Nucleus
Neutron	n	1837	0	Nucleus
Electron	e	1	-	Surrounding the nucleus