

## CHEM1611 Worksheet 1 – Answers to Critical Thinking Questions

The worksheets are available in the tutorials and form an integral part of the learning outcomes and experience for this unit.

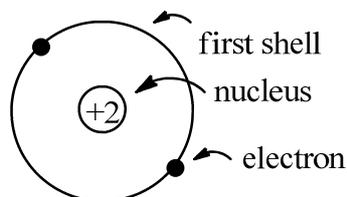
### Model 1: Bohr's Atomic Model

1. In the Bohr model, the atom is made up of a small positively charged nucleus with electrons that travel around it in circular orbits. It is often described as have the structure of the solar system with the nucleus replacing the Sun and the electrons replacing the planets.

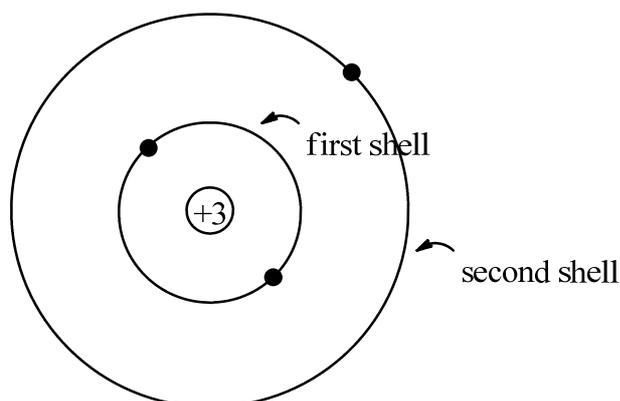
In this model, the speed of the electrons is sufficient to prevent them from being pulled into the nucleus by the attraction to it but insufficient to allow them to escape.

The electrons can only have certain speeds which means that only discrete orbits are possible. Each orbit can only hold a certain number of electrons. After an orbit is full, the next level is used. These orbits correspond to *shells*. The first shell can hold 2 electrons. The second shell can hold 8 electrons. The third shell can hold 18 electrons. The fourth shell can hold 32 electrons.

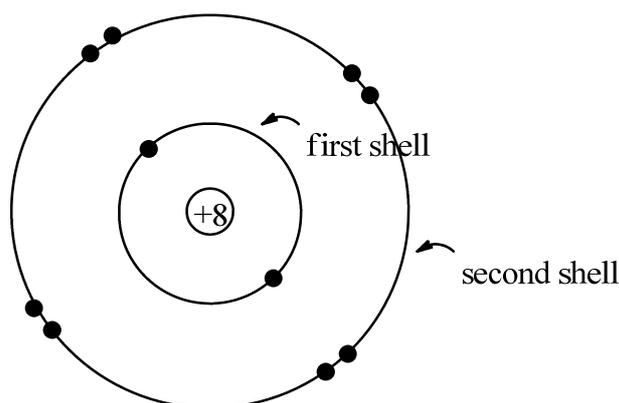
2. (a) He



- (b) Li



- (c) Ne



- (d) Depends on your choice

3. The first shell ( $n = 1$ ) can contain 2 electrons.  
The second shell ( $n = 2$ ) can contain 8 electrons.  
The third shell ( $n = 3$ ) can contain 18 electrons.  
The fourth shell ( $n = 4$ ) can contain 32 electrons.

$$\text{Number of electrons in a shell} = 2n^2.$$

### Model 2: The Periodic Table

