

## THE ATOM

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### Lesson Description

In this lesson we:

- Discuss the structure of the atom.
- Draw electron configurations.
- Calculate the relative atomic mass of a sample.



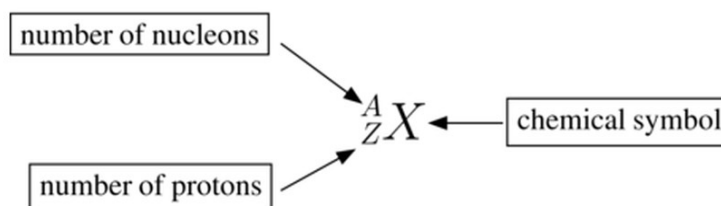
### Summary

#### Theory of the Atom

##### Atomic Structure

Nucleus with protons and neutrons

##### Standard notation:



Picture: [www.everythingscience.co.za](http://www.everythingscience.co.za)

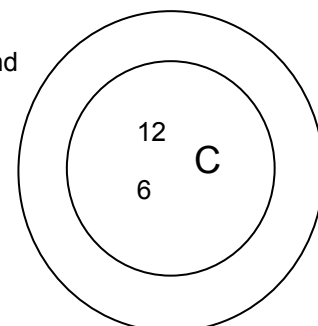
##### Electron Arrangement

Electrons are found in energy levels, moving in regions of space called orbitals around the nucleus.

Consider the concentric circle model:

Circles represent energy levels, electrons found in each level.

- First: 2 electrons  
Second: 8 electrons  
Third: 8 electrons

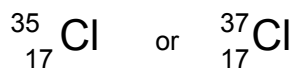


##### Valence electrons:

Electrons in the outermost energy level

##### Isotopes

Isotopes of an element contain the same number of protons (Z), but a different number of neutrons i.e. different atomic mass (A).





## Test Yourself

(Adapted from [www.everythingscience.co.za](http://www.everythingscience.co.za))

### Question 1

Write down only the word/term for each of the following descriptions.

- The total number of nucleons in an atom
- The region of space around an atom's nucleus, where an electron is most likely to be found

### Question 2

The charge of an atom is:

- neutral
- ionic
- negative
- positive

### Question 3

If Rutherford had used neutrons instead of alpha particles in his scattering experiment, the neutrons would:

- have deflected more often
- not deflect because they have no charge
- have been attracted to the nucleus easily
- have given the same results

### Question 4

The electron configuration of an atom of chlorine can be represented using the following notation:

- $1s^2 2s^8 3s^7$
- $1s^2 2s^2 2p^6 3s^2 3p^6$
- $1s^2 2s^2 2p^5$
- $1s^2 2s^2 2p^6 3s^2 3p^5$

### Question 5

Give the standard notation for the following elements:

- beryllium
- carbon-12
- titanium-48
- fluorine

### Question 6

The isotope



Its nucleus contains...

- A 14 protons and 13 neutrons
- B 13 protons and 14 electrons
- C 13 protons and 14 neutrons
- D 13 protons and 23 neutrons



### Improve your Skills

#### Question 1

Consider the following atom and answer the questions that follow.



- a.) How many protons does this atom have?
- b.) How many neutrons does this atom have?
- c.) Write the chemical name of this element.
- d.) Draw an aufbau diagram showing the electron arrangement of this atom.
- e.) Would this atom form a positive ion or a negative ion when this atom bonds. Provide a reason for your answer.

#### Question 2

Give the electron configurations and Aufbau diagrams for the following elements:

- a.) aluminium
- b.) oxygen ion



### Links

- [www.everythingscience.co.za](http://www.everythingscience.co.za)