Your Name

Period __ Chemistry Lab

"Candied Bohr Model"

Teacher's Name

Date

Question/Problem

During this lab, a bag of candy is presented to the group which contains a specific number of chocolate chips, marshmallows, and skittles. It also contains some "Pull-off" Twislers. The chocolate chips represent protons, the marshmallows represent neutrons, and the skittles represent electrons. Using the number of protons, neutrons, and electrons, the question to be answered is "What element does the candy represent?" The atomic mass, atomic number, charge, electron configuration, inner shell electrons, and valence electrons need to be determined.

Data

Bag #10

Candy	Part of Atom	Sym	#
Chocolate Chips	Proton	p^+	47
Marshmallows	Neutron	n^0	55
Skittles	Electron	e^-	46

Hypothesis

The 47 p^+ tell the atomic number of the element. The element with an atomic number of 47 is Silver (Ag). Atomic mass is calculated by adding the p^+ and n^0: (47+55=102). To determine the charge, the number of e^- must be subtracted from the p^+: (47-46=1). Using this information, a chemical symbol for the atom can be determined:

$$^{102}_{47}Ag^{+}$$

An electron configuration can also be derived from the information:

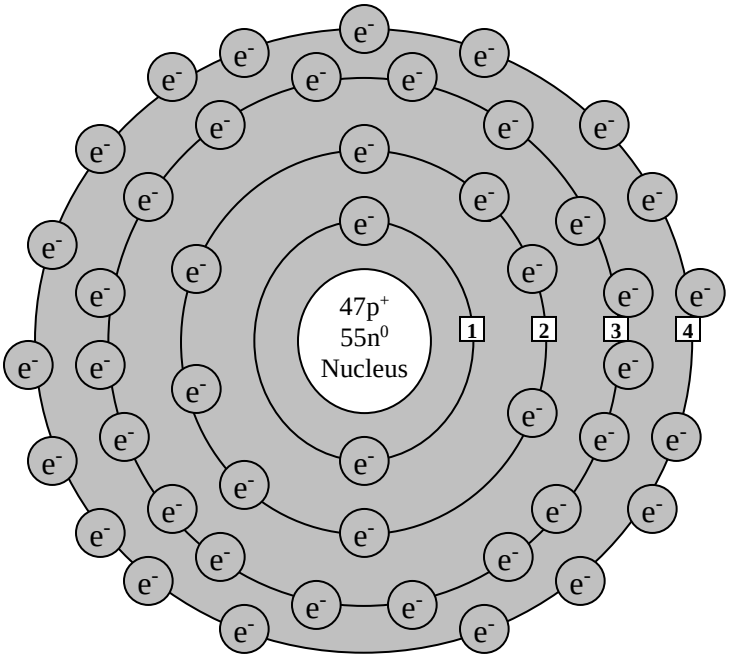
$$^{102}_{47}Ag^{+} = 1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^{10}\,4p^6\,4d^{10}$$

$$^{102}_{47}Ag^{+} = [Kr]4d^{10}$$

According to the electron configuration, Ag should have an inner-shell of 36 e^- ([Kr]), and 0 valence electrons ($4d^{10}$ is moved down into the 4^{th} energy level). This shows that the atom should have four energy levels with e^- occupying them.

Experimental Procedure

Aluminum Foil is spread out on the table in a large square. The p^+ and n^0 are placed in the center of the large square and a ring of the Twislers are placed around them to signify the nucleus. Next, four separate rings are placed around the nucleus with the Twislers, which signify the four energy levels that the e^- will be placed in. The appropriate number of e^- are then placed in each energy level until all 46 are in the model.



Inner Shell
Valence
Energy Level

Conclusion

The information from the Bohr Model matches the predicted information from the Hypothesis. The model has two electrons in the first energy level, eight electrons in the second energy level, 18 electrons in the third energy level, and 18 electrons in the fourth energy level. This completes the fourth energy level at Kr and moves the ten electrons in the 4d orbital down into the 4^{th} energy level.

The number of electrons surrounding the nucleus is one less than the number of protons inside the nucleus. This makes the atom have a positive one charge. By counting the number of protons and neutrons inside the nucleus, the atomic mass of this atom is 102, and the number of protons gives the atomic number of 47, which represents Silver (Ag).