Stuck on You

Presentation for 19th BCCE, by
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ABSTRACT: By using students as models for atoms and joining them with Velcro® into molecules, the basics of formula writing are made visible for students.

Stuck On You

(A Demonstration Requiring Audience Participation)

Concepts addressed in this activity include: atomic structure, valence electrons, electron transfer, ion formation, ion charge, ionic bonding, and chemical formulas for simple ionic substances.

By having students actively participate in learning new concepts, it is hoped they will understand the concepts better and have fewer misconceptions.

Have two students volunteer to come forward and place on them the Bohr-Rutherford model of a sodium atom and a fluorine atom respectively (see description below). There is a spot on the valence orbit of the fluorine atom to place an "added electron" with Velcro®. The valence electron on the sodium model is removable.

Have the student depicting a "sodium atom" pass the valence electron to the "fluorine atom" and have each student determine the resulting ion charge. The fluorine atom now has one additional electron resulting in an overall charge of -1. The sodium atom has one more proton than the total number of electrons so has a +1 charge. The charges can be emphasized by asking the sodium atom, "Do you have a charge?" and continuing, "Are you positive?"

Students associate the positive and negative charges (signifying opposite charges) with the plus sign of addition and minus sign of subtraction. In their minds they believe adding an electron should be associated with plus or positive, and subtracting an electron with the negative sign. Students must make tangible counts of total positive and negative charges to get over this misconception.

The models of the atoms are on T-shirts with Velcro® strips on the sleeves, one Velcro® strip for one charge, opposite Velcro® strips for opposite charges. Since

opposite charges attract the students can attract and now bond through the Velcro®. Hence the title “Stuck on You.” The formula for sodium fluoride, NaF can be shown and determined. The nucleus with its nuclear charge and the Bohr electron arrangement are depicted on each shirt. Valence electrons are attached with Velcro® so that they may be transferred.

The process can be repeated with an “oxygen atom” and a “magnesium atom.” This time use two Velcro® strips on one sleeve. Have the students join and demonstrate a model of a magnesium oxide ion pair, MgO.

Repeat with one “oxygen atom” and two sodium atoms. This oxygen T-shirt requires one Velcro® strip on each sleeve. Oxygen needs to add two electrons, how many sodium atoms are required? The sodium oxide formula of Na_2O can be derived.

In the same manner derive the formula for magnesium fluoride, MgF_2, aluminum fluoride, AlF_3, and aluminum oxide, Al_2O_3.