Activity 3: Z_{eff}: How strongly do electrons feel the charge of the nucleus (an interpretive demonstration)?

Directions: Please read over and understand what is being asked in each of the 5 prompts regarding Z_{eff} before class on Wednesday. In class, each team will be assigned to one of the 5 prompts (team 1s: prompts 1, team 2s: prompt 2, etc)—your team assignment is to **come up with an explanation and a novel demonstration in order to create a memorable teaching moment.** Examples might be a Q&A interview or "enactment" that will make the concept 'memorable' to your classmates. You will have about 15 minutes to work on your explanation in class and about 15 minutes to work on your explanation in next week's section before presenting them in front of an audience of peer teams in section. Please keep them simple and **under two minutes**. Each member of your group should participate in the dialogue and demonstration.

1. Define Z_{actual} and explain why the two electrons in a helium atom experience a Z_{eff} charge, rather than Z_{actual}.

2. Explain the concept of penetration and how it changes Z_{eff}. Do 2s or 2p orbital electrons have a higher probability of penetration? Why? Explain why the 2s electrons are lower in energy relative to the 2p in boron.

3. Explain the general concept of shielding of a valence electron in a polyelectronic atom. What are the requirements for shielding to occur (for a given electron, will ALL of the other electrons provide shielding)?

4. Which is larger: Z_{eff} for a valence electron in carbon or one in oxygen? Explain why Z_{eff} for the 2p electrons in oxygen and carbon are different.

5. How does an atom's radius and ionization potential relate to Z_{eff}? Portray the effect of Z_{eff} on r_{avg} and IE for carbon and oxygen.