Name(s) with Lab section in Group

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1. How many electrons, protons and neutrons in the following atoms?

Atom	Nuclear Charge	#protons	#neutrons	# electrons
H	**+1**	**1**	**0**	**1**
He	**+2**	**2**	**2**	**2**
Ne	**+10**	**10**	**10**	**10**

2. How would we remove an electron from a hydrogen atom? How would we excite an electron in a hydrogen atom?

By adding enough energy to ionize the atom (remove an electron). To excite an electron in an atom we need to add an amount of energy that is exactly equal to the energy separation between two energy level. (See the Bohr Model DCI to calculate the energy required to excite an electron from n = 1 to n = 4 level.)

3. Write a chemical equation that describes the first ionization energy for

a) a hydrogen atom

$$\text{energy} + \text{H(g)} \rightarrow \text{H}^+\text{(g)} + 1\text{e}^-$$

d) a helium atom

$$\text{energy} + \text{He(g)} \rightarrow \text{He}^+\text{(g)} + 1\text{e}^-$$

e) a neon atom

$$\text{energy} + \text{Ne(g)} \rightarrow \text{Ne}^+\text{(g)} + 1\text{e}^-$$

4. For each of the following atoms what 'core' charge are the electrons in the outer shell attracted by?

a) **Hydrogen Z = +1 there are no inner core electrons so the core charge is +1.**

b) **Lithium Z = +3. The electron configuration for lithium is $1s^2 2s^1$. There are two inner core electrons shielding the valence electron from some of the nuclear charge so the core charge for the valence electron in lithium is +1.**

c) **Beryllium Z = +4. The electron configuration for beryllium is $1s^2 2s^2$. There are two inner core electrons shielding the valence electron from some of the nuclear charge so the core charge for the valence electron in beryllium is +2.**

d) **Fluorine Z = +9. The electron configuration for fluorine is $1s^2 2s^2 2p^5$. There are two inner core electrons shielding the valence electron from some of the nuclear charge so the core charge for the valence electron in fluorine is +9.**

e) sulfur **Z = +16. The electron configuration for sulfur is $1s^22s^22p^63s^23p^4$. There are ten inner core electrons shielding the valence electron from some of the nuclear charge so the core charge for the valence electron in sulfur is +6.**

5. What does the term 'shield' mean when describing the attraction experienced by an electron in an outer shell?

  Shielding is what the inner core electrons do to part of the nuclear charge experienced by the valence electrons. Consider carbon in the Table in DCI25.1. There are 2 inner core electrons (electrons in the n = 1 level), 4 valence electrons and 6 protons in the nucleus. The 2 inner core electrons are shielding the 4 valence electrons from the nucleus. The result is that each of the valence electrons experience an effective nuclear charge of +4.

6. Complete the following table

Element	Nuclear Charge (**same** the atomic number)	Total # of electrons (**same as the atomic numb**	# of inner core electrons	# of valence Electrons (**Outer most** electrons)	Effective Nuclear Charge (**Z – IC electrons**)
hydrogen	+1	1	0	1	+1
lithium	+3	3	2	1	+1
Beryllium	+4	4	2	2	+2
Boron	+5	5	2	3	+3
Carbon	+6	6	2	4	+4
Nitrogen	+7	7	2	5	+5
Oxygen	+8	8	2	6	+6
Fluorine	+9	9	2	7	+7
Sulfur	+16	16	10	6	+6
Potassium	+19	19	18	1	+1
Bromine	+35	35	28	7	+7