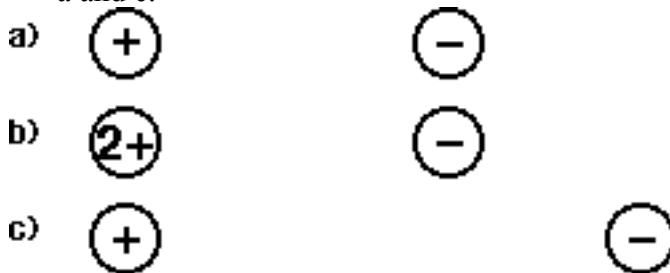


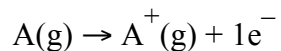
Question: How are electrons 'arranged' in an atom?

1. What is the nature of the interaction between protons and electrons in an atom? Consider using some or all of the following terms in your description: attraction, repulsion, neutral, positive, negative, charge, distance, nucleus, force, energy.

2. Compare the relative energy necessary to separate positive and negative electrical charges in the following situations? Compare a and b, then compare a and c.



The ionization energy is defined as the minimum energy necessary to remove an electron from an atom. This definition can be represented in the following chemical equation;



3. The values for the first ionization energy for a hydrogen and helium atom are provided in the table below.

Atom	H	He	Li
Ionization Energy (kJ mol ⁻¹)	1312	2373	

Based on comparisons you made in Q2 how would you explain their relative values for the first ionization energy?

4. Predict a value for the first ionization energy for lithium. Justify your prediction based on Q2.

5. The value of the ionization energy of lithium is 520 kJ mol^{-1} . Based on comparisons you made in Q2 how would you explain the ionization energy for lithium compared to the ionization energy for helium? Compared to hydrogen?
6. Predict the relative value of the energy necessary to remove a second electron (called the second ionization energy) from lithium. Support your prediction with an explanation.
7. The first ionization energies for selected elements from the second period of the periodic table follows;

Atom	${}_3\text{Li}$	${}_4\text{Be}$	${}_6\text{C}$	${}_7\text{N}$	${}_9\text{F}$	${}_{10}\text{Ne}$
Ionization Energy (kJ mol^{-1})	520	899	1086	1302	1681	2081

Explain the trend in ionization energies in terms of the relative location of the electrons and the charge of the nucleus.

8. The first ionization energy for the element sodium is given in the following table. Predict the other values for the selected third period elements;

Atom	$_{11}\text{Na}$	$_{12}\text{Mg}$	$_{14}\text{Si}$	$_{15}\text{P}$	$_{17}\text{Cl}$	$_{18}\text{Ar}$
Ionization Energy (kJ mol^{-1})	495					

How did you arrive at your predictions?

9. Describe the electron structure (location of the electron) of the atom. Consider using some or all of the following terms in your description; nucleus, electron, energy, distance, level, proton, shell, arrangement, attraction, repulsion, positive, negative, charge, location.