

Configuration confusion – answers

Education in Chemistry

September 2021

<https://rsc.li/2WHSi4F>

The Bohr model, or solar system model, is used for drawing electron configuration diagrams that depict the position of electrons as they orbit the nucleus of an atom.

This model is a suitable representation of the first 20 elements, but if you go on to study chemistry post-16, it will be expanded with the addition of sub-shells and electron clouds or orbitals.

To draw an accurate Bohr model of an atom, follow these easy steps for any of the first 20 elements:

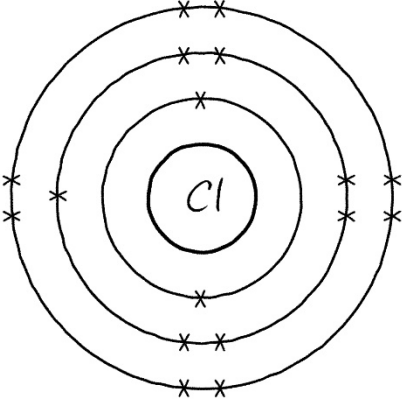
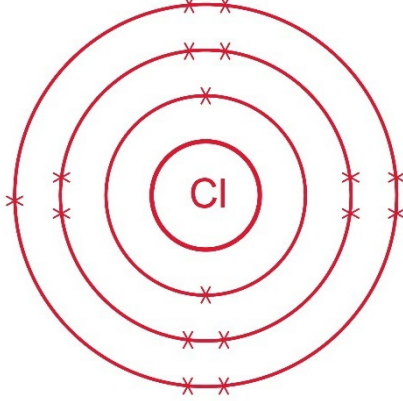
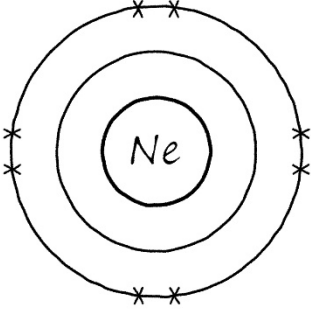
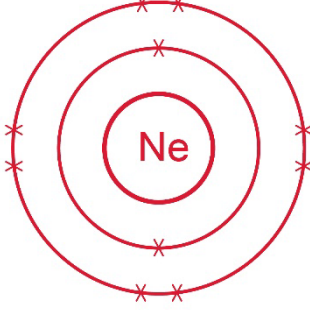
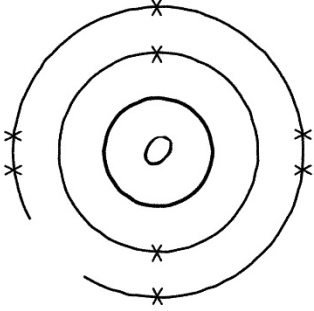
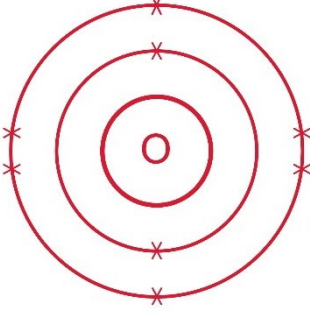
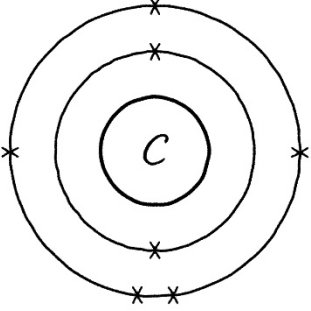
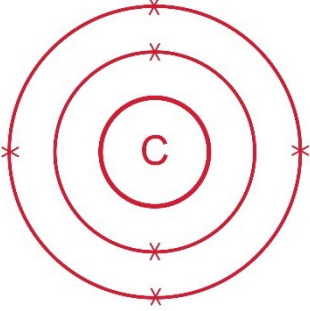
- Find the element on the periodic table. The **atomic number** tells you how many electrons to draw in total.
- **Electrons** must occupy the lowest available **energy level** first. This is the shell closest to the **nucleus**.
- The maximum number of electrons that can fill each shell is:
 - **two in the first shell,**
 - **eight in the second shell,**
 - **eight in the third shell.**
- **Potassium** and **calcium** have further electrons that go in the **fourth shell**.

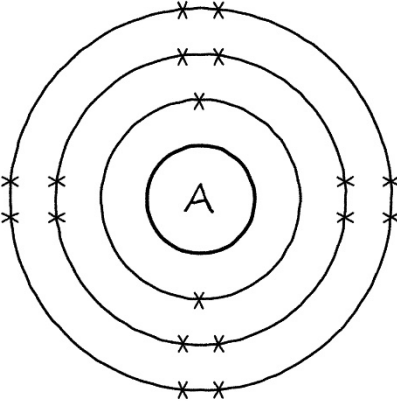
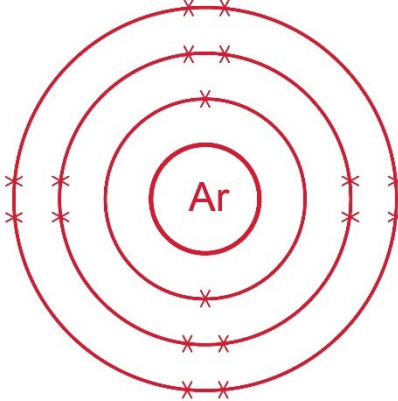
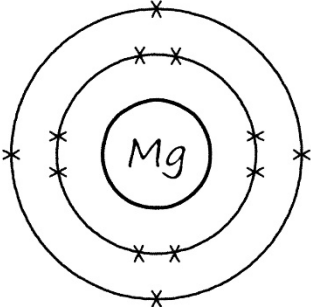
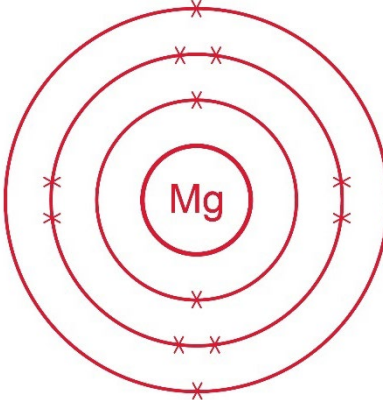
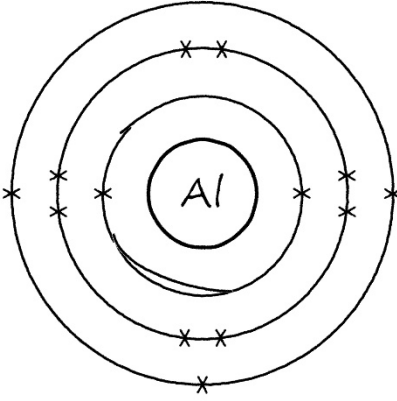
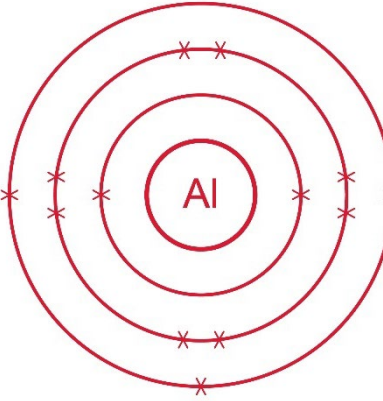
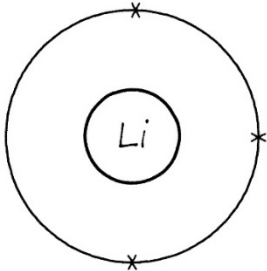
Task

You've been asked to peer-assess a classmate's homework.

The homework task was to draw eight electron configuration diagrams for any of the first 20 elements on the periodic table. For each electron configuration diagram that your classmate has drawn you need to draw the corrected diagram and write a brief explanation of what they have done wrong.

Refer to the bullet points above to help you check the accuracy of the diagrams and to give advice for improving their work.

Electron configuration diagram	Peer assessment (draw the correct diagram and briefly explain)
	 <p><i>Electrons should occupy the lowest available energy level.</i></p> <p><i>There is space in the second shell for an eighth electron.</i></p> <p><i>There should be eight electrons in the second shell and seven in the third shell.</i></p>
	 <p><i>There are no electrons in the first shell.</i></p> <p><i>The first shell can hold two electrons.</i></p>
	 <p><i>Energy levels, or shells, need to be complete.</i></p> <p><i>The second shell has a gap that needs to be closed.</i></p>
	 <p><i>Carbon has an atomic number of six. This means it will have six electrons.</i></p> <p><i>The homework answer has seven electrons. There needs to be one fewer electron in the outer shell.</i></p>

Electron configuration diagram	Peer assessment (draw a correct diagram and briefly explain)
	<p><i>There is no element on the periodic table with the symbol 'A'.</i></p> <p><i>There is an element with this electron configuration (2.8.8.2) and it has the symbol Ar.</i></p> 
	<p><i>The diagram contains the correct number of electrons, but they are not in the correct arrangement.</i></p> <p><i>The maximum number of electrons in the first shell is two. There is room for four more electrons in the second shell. The last two electrons need to go into the third shell.</i></p> 
	<p><i>Electron shells should be single, complete circles.</i></p> <p><i>There should be no gaps, crossovers or doubling of the lines.</i></p> 
	<p><i>The maximum number of electrons that the first shell can hold is two.</i></p> <p><i>The third electron needs to go into the second shell.</i></p> 