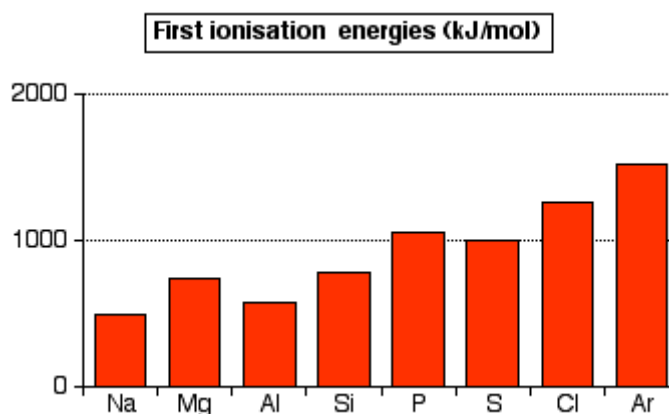


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PERIOD 3: ATOMIC AND PHYSICAL PROPERTIES

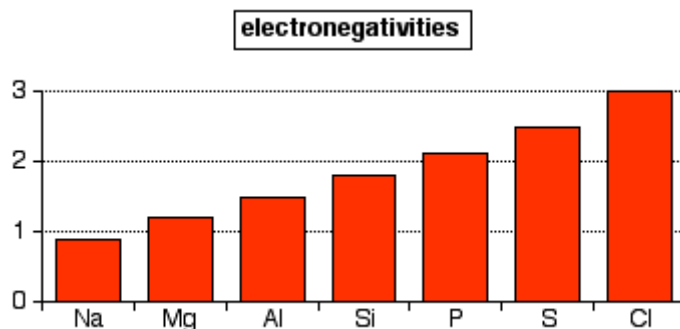
1. Write the full electronic structures for a) silicon, b) sulphur. You can condense p electrons in inner orbitals as $2p^6$, but should show the details for the outer orbitals.
2. The first ionisation energies of the Period 3 elements are shown in the bar chart below.



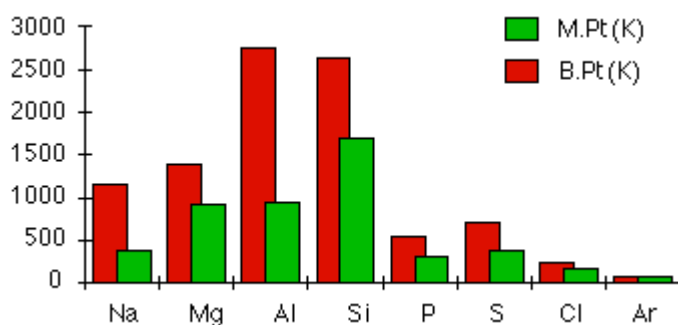
- a) Define *first ionisation energy*.
 - b) The general trend across the period is for first ionisation energy to increase. Explain why that is.
 - c) There is a break in this trend between magnesium and aluminium. Explain why the first ionisation energy of aluminium is less than that of magnesium.
 - d) There is also a break in the trend between phosphorus and sulphur. Explain why the first ionisation energy of sulphur is less than that of phosphorus.
3. Excepting argon, the atomic radii of the Period 3 elements fall as you go across the period.
 - a) Why is it necessary to except argon?
 - b) Explain why the atomic radii fall across the period.

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4. The bar chart below shows the electronegativities of the Period 3 elements on the Pauling scale.



- a) Define electronegativity and explain why the chart doesn't include argon.
- b) Why does electronegativity increase across the period?
5. This question is about the way the structure of the elements changes across the period.
- a) Types of structure include ionic, giant covalent, metallic and molecular. Assign each of the elements to one of these structure types.
- b) Draw diagrams to show how the atoms are arranged in the basic structures which make up silicon, white phosphorus, crystalline sulphur, chlorine and argon.
6. Briefly, how does the pattern of electrical conductivity of the elements vary as you go across the period?
7. The melting and boiling points of the elements are shown in the following bar chart:



- a) Why do the boiling points of the elements from sodium to aluminium increase across the period?
- b) Explain why silicon has a high melting point.
- c) Explain the pattern in melting points of the elements from phosphorus to argon. The phosphorus melting point given is for white phosphorus, and the sulphur one for crystalline sulphur.