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CAIE A LEVEL Chemistry Topic Questions / 9701

1.4.3-Factors-Influencing-Ionisation-Energy-2023-set-1-qp

Total Questions: 4

Note:

- For questions with answer choices as statements 1, 2 and 3, follow these instructions for selecting options A/B/C/D:
- A= 1, 2 and 3 are correct
- B=1 and 2 only are correct
- C=2 and 3 only are correct
- D=1 only is correct

Questions

Question 1:

The first ionisation energy of potassium, K, is $418\,kJ\,mol^{-1}$. The first ionisation energy of strontium, Sr, is $548\,kJ\,mol^{-1}$.

Which statement helps to explain why Sr has a greater first ionisation energy than K?

A The charge on a Sr nucleus is greater than the charge on a K nucleus.

B The outer electron in a Sr atom experiences greater shielding than the outer electron in a K atom.

C The outer electron in a Sr atom experiences spin-pair repulsion.

D The outer electron in a Sr atom is further from the nucleus than the outer electron in a K atom.

Question 2:

Why is the first ionisation energy of phosphorus greater than the first ionisation energy of silicon?

A A phosphorus atom has one more proton in its nucleus.

B The atomic radius of a phosphorus atom is greater.

C The outer electron in a phosphorus atom is more shielded.

D The outer electron in a phosphorus atom is paired.

Question 3:

Why is the first ionisation energy of oxygen less than that of nitrogen?

A The nitrogen atom has its outer electron in a different subshell.

B The nuclear charge on the oxygen atom is greater than that on the nitrogen atom.

C The oxygen atom has a pair of electrons in one p orbital that repel one another.

D There is more shielding in an oxygen atom

Questions (Continued)

Question 4:

Which property of an atom does **not** affect its first ionisation energy?

A the atomic radius

B the number of electron shells

C the number of neutrons

D the number of protons