3.2A Periodic Trends

Past Exam Questions (Paper 1, 2)

1. *[1 mark]*

Which is the best definition of *electronegativity*?

A. Electronegativity is the energy required for a gaseous atom to gain an electron.

B. Electronegativity is the attraction of an atom for a bonding pair of electrons.

C. Electronegativity is the attraction between the nucleus and the valence electrons of an atom.

D. Electronegativity is the ability of an atom to attract electrons from another atom.

2. *[1 mark]*

Which statement describes the trends of electronegativity values in the periodic table?

A. Values increase from left to right across a period and increase down a group.

B. Values increase from left to right across a period and decrease down a group.

C. Values decrease from left to right across a period and increase down a group.

D. Values decrease from left to right across a period and decrease down a group.

3. *[1 mark]*

Which property generally **decreases** across period 3?

A. Atomic number

B. Electronegativity

C. Atomic radius

D. First ionization energy

4. *[1 mark]*

Which property **increases** down group 1?

A. First ionization energy

B. Melting point

C. Reactivity

D. Electronegativity

5. *[1 mark]*

Which pair of elements has the greatest difference in electronegativity?

A. Cs and F

B. Cs and Cl

C. Cs and Br

D. Cs and I

6. *[1 mark]*

Which series is correctly arranged in order of **decreasing** radius?

A. $Al^{3+} > Mg^{2+} > Na^{+} > F^{-}$

B. $F^{-} > Na^{+} > Mg^{2+} > Al^{3+}$

C. $F^{-} > Al^{3+} > Mg^{2+} > Na^{+}$

D. $Na^{+} > Mg^{2+} > Al^{3+} > F^{-}$

7. *[1 mark]*

Which series is arranged in order of **increasing** radius?

A. $F < Cl^{-} < Cl$

B. $Rb < K < Na$

C. $Al^{3+} < Mg^{2+} < Na^{+}$

D. $I^{-} < Br^{-} < Cl^{-}$

8. *[1 mark]*

Which statement concerning electronegativity is correct?

A. Electronegativity increases from left to right across a period.

B. Metals generally have higher electronegativity values than non-metals.

C. Electronegativity increases on descending a group.

D. Noble gases have the highest electronegativity values.

9. *[1 mark]*

The electronegativities of four elements are given in the table.

Element	W	X	Y	Z
Electronegativity	0.9	1.1	3.4	4.0

Which statement is correct?

A. W and X form an ionic compound.

B. W and X form a covalent compound.

C. Y and Z form an ionic compound.

D. Y and Z form a covalent compound.

10. *[1 mark]*

Which properties **decrease** down group 1?

I. Melting point

II. Atomic radius

III. First ionization energy

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

11. *[1 mark]*

Which pair of elements shows the greatest difference in electronegativity?

A. Mg and O

B. Li and F

C. K and F

D. Li and I

12. *[1 mark]*

What is the definition of the term *first ionization energy*?

A. The energy released when one mole of electrons is removed from one mole of gaseous atoms.

B. The energy required to remove one mole of electrons from one mole of gaseous atoms.

C. The energy released when one mole of gaseous atoms gains one mole of electrons.

D. The energy required to add one mole of electrons to one mole of gaseous atoms.

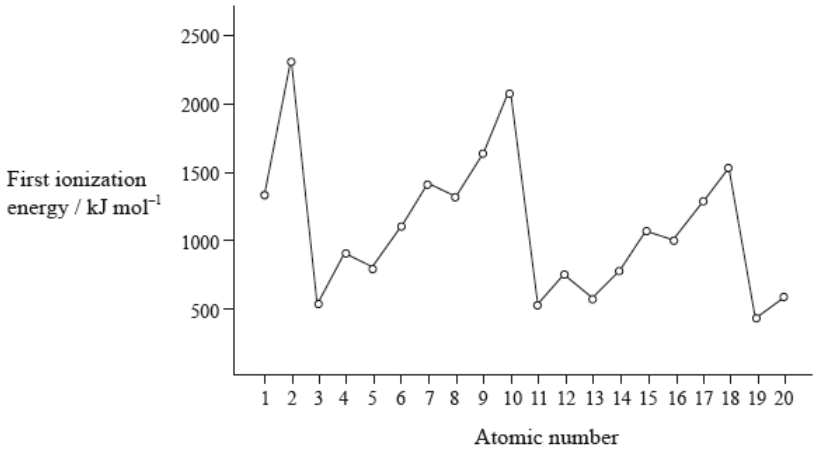
13a. *[2 marks]*

Strontium exists as four naturally-occurring isotopes. Calculate the relative atomic mass of strontium to two decimal places from the following data.

Isotope	Percentage abundance
Sr-84	0.56
Sr-86	9.90
Sr-87	7.00
Sr-88	82.54

13b. *[2 marks]*

The graph of the first ionization energy plotted against atomic number for the first twenty elements shows periodicity.



Define the term *first ionization energy* and state what is meant by the term *periodicity*.

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13c. *[3 marks]*

State the electron arrangement of argon and explain why the noble gases, helium, neon and argon show the highest first ionization energies for their respective periods.

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13d. *[1 mark]*

A graph of atomic radius plotted against atomic number shows that the atomic radius decreases across a period. Explain why chlorine has a smaller atomic radius than sodium.

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13e. *[1 mark]*

Explain why a sulfide ion, S^{2-}, is larger than a chloride ion, Cl^{-}.

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14a. *[2 marks]*

Define the term *first ionization energy*.

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14b. *[2 marks]*

Explain why the first ionization energy of magnesium is higher than that of sodium.

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15. *[3 marks]*

Data Booklet shows the atomic and ionic radii of the elements.

Describe and explain the trend in atomic radius across period 3.

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