

1.7 Periodic Trends

Name: _____ Class: _____ Date: _____

Total: 13 marks**KEY WORDS** atomic radius 原子半径 • ionization energy 电离能 • electronegativity 电负性

Objective

Build the skills to answer exam questions on **periodic trends**.**You must be able to:**

- describe the trend in **atomic radius** 原子半径 (shrinks across a period, grows down a group)
- describe the trend in **ionization energy** 电离能 (rises across, falls down)
- describe the trend in **electronegativity** 电负性 (highest at the top right)
- explain the trends using nuclear charge and shielding

1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

■ Atomic radius

Across a period, more protons pull the same shell in, so the radius shrinks. Down a group, each new shell sits farther out, so the radius grows.

■ Ionization energy

The energy to remove an electron rises across a period (stronger pull) and falls down a group (electrons farther out and shielded) – the opposite trend to radius.

■ Electronegativity

An atom's pull on shared electrons is highest at the top right (fluorine, ignoring noble gases) and lowest at the bottom left.

2 Practice

Now apply the methods above.

2.1 State how atomic radius changes across a period from left to right. [1]**2.2** Which element is more electronegative, fluorine or sodium? [1]**2.3** State how ionization energy changes down a group. [1]**2.4** Order Na, Si, and Cl (period 3) from largest to smallest atomic radius. [2]

3 Exam-style questions

3.1 Across a period from left to right, the atomic radius [1]

A	B
C	D

- A** increases
B decreases
C stays the same
D doubles

3.2 Which element has the highest electronegativity? [1]

A	B
C	D

- A** fluorine
B sodium
C helium
D caesium

3.3 Compare sodium (Na) and chlorine (Cl), both in period 3.

(a) State which has the larger atomic radius. [1]

(b) Explain your answer in terms of nuclear charge. [2]

3.4 Consider ionization energy down group 1 (Li, Na, K).

(a) State the trend.

[1]

(b) Explain it in terms of shielding and distance.

[2]