Following an Empty Site in a Model Crystal

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A display models four positions in one row of a crystal. Negative ions stay fixed around the row. A positive ion can move one position right if the adjacent position is empty. During the two moves shown, the solid keeps its overall structure. The model compares a full row with a row that starts with an empty position.

State	Position 1	Position 2	Position 3	Position 4
Full row	Positive ion	Positive ion	Positive ion	Positive ion
Other row at start	Positive ion	Positive ion	Positive ion	Empty
Other row after one move	Positive ion	Positive ion	Empty	Positive ion

1 Which change accounts for the state after one move?

(1) An ion moves from position 3 to position 4.

(2) An ion moves from position 4 to position 3.

(3) An ion moves from position 1 to position 2.

(4) A negative ion moves from position 3 to position 4.

2 After one more allowed move in the same row, state where the empty position will be and which ion moves. [1]

Answer and work

3 Compare the direction in which the empty position appears to move with the direction of the positive ions. [1]

Answer and work

4 A student says positive charge cannot move through either model row because the crystal stays solid. Use the two starting arrangements to evaluate the claim. [1]

Answer and work