Finding Which Step Delays a Color Change

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

A color display changes a colorless model particle A into blue particle B, then changes B into colorless particle C. Each step converts one particle to one particle. Trials P and Q both start with ten A particles and no B or C. Q contains an added material. All other conditions match.

Trial	A at the early check	B at the early check	C at the early check
P	6	1	3
Q	2	5	3

1 Which early observation shows more buildup of the blue intermediate?

(1) P has one B particle while Q has five.

(2) P has six A particles while Q has two.

(3) Both trials have three C particles.

(4) Both trials began with ten A particles.

2 Calculate how many particles passed through the first step in each trial by the early check. Use the A counts. [1]

Answer and work

Two matched follow-up trials start with ten B particles and no A or C. With or without the added material, the measured B and C records match over the entire observation period.

3 Explain how starting with B helps test whether the added material changes the second step. [1]

Answer and work

4 At the final check both original trials contain ten C particles. Use the early and final records to evaluate the claim that the added material increases final product yield. [1]

Answer and work