**Checking Reaction Contacts in Divided Cells**

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

A reaction display has two equal compartments separated by a wall. Particles cannot cross the wall. One A and one B must meet in the same compartment for a reaction. In the model, the initial contact index in a compartment equals its A count times its B count. The whole display adds the two local indices.

| Run | Left counts (A, B) | Right counts (A, B) |
|---|---|---|
| P | 4, 4 | 4, 4 |
| Q | 8, 0 | 0, 8 |
| R | 6, 2 | 2, 6 |

**1** Which run has no initial A–B contact in either compartment?

(1) P

(2) Q

(3) R

(4) All three

**2** Calculate and compare the whole-display contact indices for P and R. [1]

Answer and work

**3** A student calculates $8 \times 8 = 64$ for all three runs. Explain what contacts this counts incorrectly. [1]

Answer and work

The display opens the wall in Q and quickly mixes the particles evenly across the same combined volume before measuring.

**4** Predict which earlier local count pattern now fits Q if the display divides the mixed space into two equal halves. [1]

Answer and work