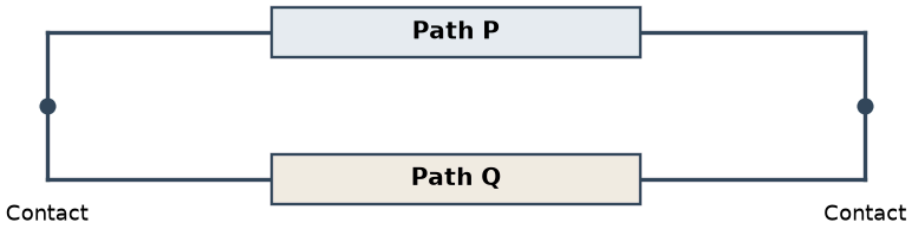
Checking Two Solid Paths to One Current Meter

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

A display gives charge two separate paths between the same pair of contacts. P is copper. Q is a material that the display can replace. Each path sees the same fixed voltage. The total current is the sum of the branch currents. One branch keeps its reading when the other is opened.



The two independently measured paths share the same contacts.

Condition	Current through path P (mA)	Current through path Q (mA)	Total current (mA)
Both paths connected	6	2	8
Only P connected	6	0	6
Only Q connected	0	2	2

1 Which result shows that path Q can carry charge without path P?

(1) Both paths give a total of 8 mA.

(2) Only P gives a total of 6 mA.

(3) Only Q gives a total of 2 mA.

(4) P has a greater current than Q.

2 Calculate the current carried by Q with both original paths connected using only the two total readings with P present. Check the result against the separate Q reading. [1]

Answer and work

The display replaces Q with an ionic material. At first the replacement is solid, with ions fixed in place. Then the display melts only the replacement so its ions can move. P stays solid. The total current after melting is 10 mA.

3 Predict the total current while the ionic replacement is still solid and calculate the replacement branch current after it melts. [1]

Answer and work

4 Compare the particles that carry current in copper P and in the molten replacement. [1]

Answer and work