Tracking Bridge Ions as a Cell Runs

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

A cell model uses a zinc electrode in one compartment and a copper electrode in another. Electrons move through a wire. A bridge supplies positive and negative ions to the liquids. In the model the bridge offsets the liquid charge changes without adding zinc or copper ions.

$Zn \rightarrow Zn^{2+} + 2\ e^-$

$Cu^{2+} + 2\ e^- \rightarrow Cu$

Compartment record	**Count in one interval**
Zn^{2+} added to the zinc liquid	3
Cu^{2+} removed from the copper liquid	3

1 What charge change in the zinc liquid must the bridge offset?

(1) −6 charge units
(2) −3 charge units
(3) +3 charge units
(4) +6 charge units

2 Use the two liquid changes to explain which sign of bridge ion must enter each compartment. [1]

Answer and work

One bridge supplies +1 ions and −1 ions. A second bridge supplies +1 ions and −2 ions. Assume the liquid changes are the same in both runs and that the bridge ions do not react.

3 Compare how many negative bridge ions enter the zinc compartment with the two bridges. [1]

Answer and work

4 A student says the second bridge must allow fewer electrons through the wire because it sends fewer negative particles into the zinc liquid. Evaluate the claim. [1]

Answer and work