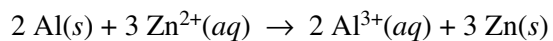


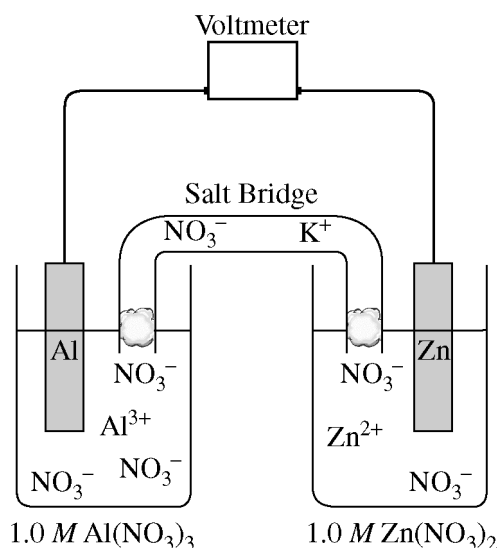
2010 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS



6. Respond to the following statements and questions that relate to the species and the reaction represented above.

- (a) Write the complete electron configuration (e.g., $1s^2 2s^2 \dots$) for Zn^{2+} .
- (b) Which species, Zn or Zn^{2+} , has the greater ionization energy? Justify your answer.
- (c) Identify the species that is oxidized in the reaction.

The diagram below shows a galvanic cell based on the reaction. Assume that the temperature is 25°C .



- (d) The diagram includes a salt bridge that is filled with a saturated solution of KNO_3 . Describe what happens in the salt bridge as the cell operates.
- (e) Determine the value of the standard voltage, E° , for the cell.
- (f) Indicate whether the value of the standard free-energy change, ΔG° , for the cell reaction is positive, negative, or zero. Justify your answer.
- (g) If the concentration of $\text{Al}(\text{NO}_3)_3$ in the $\text{Al}(s)/\text{Al}^{3+}(aq)$ half-cell is lowered from 1.0 M to 0.01 M at 25°C , does the cell voltage increase, decrease, or remain the same? Justify your answer.

STOP

END OF EXAM