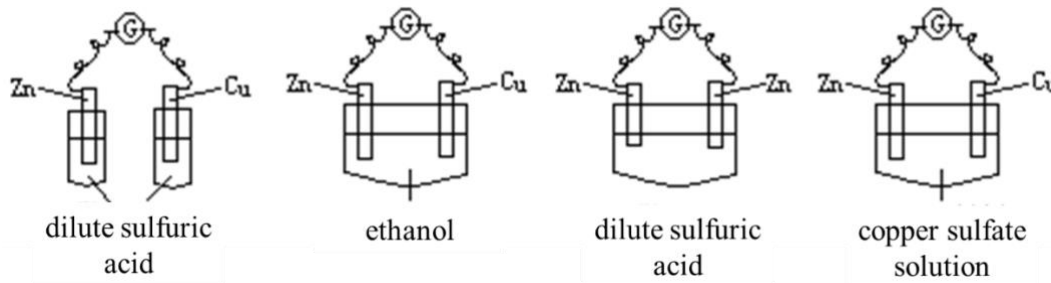


Learning performance test

Multiple-choice questions

Q1. In which of the following devices does current flow through the galvanometer?



A.

B.

C.

D.

Q2. The correct statement about positive and negative electrodes in galvanic cells is

- A. the two electrode materials must be metal
- B. the activity of the electrode materials must be different
- C. the electrode materials do not necessarily participate in the cell reaction
- D. the electrode materials must participate in the cell reaction

Q3. (multiple answers) Which can be used as a galvanic cell electrolyte solution?

- A. sodium chloride solution
- B. molten copper sulfate
- C. sucrose solution
- D. alcohol solution

Q4. (1) A chemical reaction that theoretically cannot be designed as a galvanic cell is

- A. $\text{CO}_2(\text{g}) + \text{C}(\text{s}) = 2\text{CO}(\text{g}); \Delta H > 0$
- B. $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) = \text{CO}_2 + 2\text{H}_2\text{O}(\text{g}); \Delta H < 0$
- C. $\text{Al}(\text{OH})_3(\text{s}) + \text{NaOH}(\text{aq}) = \text{Na}[\text{Al}(\text{OH})_4](\text{aq}); \Delta H < 0$

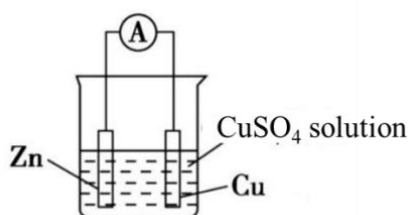
(2) The reason for the answer for (1) is that

- A. endothermic reactions cannot be designed as galvanic cells
- B. the reaction that needs to be ignited cannot be designed as a galvanic cell
- C. the redox reaction can be designed as a galvanic cell

Q5. For a galvanic cell consisting of zinc, copper and dilute sulfuric acid, which of the following statements is correct?

- A. The positive electrode is zinc.
- B. Current flows from zinc to copper.
- C. The zinc electrode undergoes a reduction reaction.
- D. H_2 escapes around the copper electrode.

Q6. As shown in the figure, which of the following statements of the galvanic cell is correct?

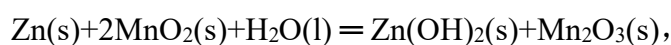


- A. electrons reach the copper electrode from the zinc electrode via the copper sulfate solution
- B. oxidation occurs on the Cu and reduction occurs on the Zn
- C. current flows from the copper electrode to the zinc electrode
- D. the reaction of the negative electrode of the battery is $\text{Cu}^{2+} + 2\text{e}^- = \text{Cu}$

Q7. In a certain galvanic cell, two metals X and Y are connected with wires and inserted into the corresponding electrolyte solution at the same time, and it is found that the mass of the Y electrode increases, which may occur in which of the following cases?

- A. Y is the negative electrode, and the electrolyte solution is a CuSO_4 solution.
- B. Y is the negative electrode, and the electrolyte solution is a dilute H_2SO_4 solution.
- C. Y is the positive electrode, and the electrolyte solution is a CuSO_4 solution.
- D. Y is the positive electrode, and the electrolyte solution is a dilute H_2SO_4 solution.

Q8. Alkaline batteries have a large capacity and a large discharge current and thus have been widely used. The zinc– manganese alkaline battery uses potassium hydroxide solution as the electrolyte, and the battery reaction is:

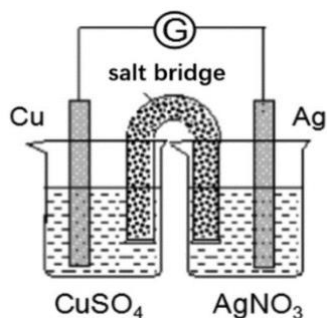


The mistake in the following statement is that

- A. when the battery is working, zinc loses electrons and zinc is negative
- B. the reaction of the positive electrode of the battery is $2\text{MnO}_2(\text{s}) + \text{H}_2\text{O(l)} + 2\text{e}^- = \text{Mn}_2\text{O}_3(\text{s}) + 2\text{OH}^-(\text{aq})$
- C. the alkalinity of the solution in the negative area is enhanced during the discharge of the battery
- D. the mass of zinc is theoretically reduced by 6.5 g for each pass of 0.2 mol electrons in the external circuit

Open questions

Q9. Please analyze the device shown and answer the following questions:



(a) Negative electrode: The electrode material is _____, and the electrode reactant is _____.

Positive electrode: The electrode material is _____, and the electrode reactant is _____.

(b) Please explain the direction of the movement of the ions (ions can move freely in the salt bridge).

Q10. The galvanic cell reaction is $\text{Fe} + 2\text{FeCl}_3 = 3\text{FeCl}_2$; please design and draw a galvanic cell diagram according to the generated cell reaction and indicate the positive and negative electrode materials, the electrolyte solution, the electron transfer direction and the movement direction of the anion and cation in the figure.