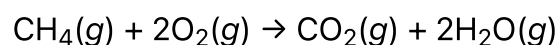


## Real AP Past Papers with Multiple-Choice Questions

1. A sample of a hydrate of  $\text{CuSO}_4$  with a mass of 250 grams was heated until all the water was removed. The sample was then weighed and found to have a mass of 160 grams. What is the formula for the hydrate?

- ☐ A.  $\text{CuSO}_4 \cdot 10\text{H}_2\text{O}$
- ☐ B.  $\text{CuSO}_4 \cdot 7\text{H}_2\text{O}$
- ☐ C.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- ☐ D.  $\text{CuSO}_4 \cdot 2\text{H}_2\text{O}$

2. A gaseous mixture at  $25^\circ\text{C}$  contained 1 mole of  $\text{CH}_4$  and 2 moles of  $\text{O}_2$  and the pressure was measured at 2 atm. The gases then underwent the reaction shown below.



What was the pressure in the container after the reaction had gone to completion and the temperature was allowed to return to  $25^\circ\text{C}$ ?

- ☐ A. 1 atm
- ☐ B. 2 atm
- ☐ C. 3 atm
- ☐ D. 4 atm

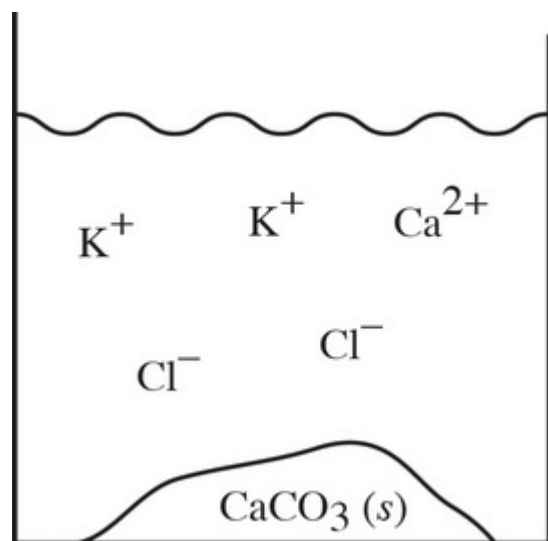
3. During a chemical reaction,  $\text{NO}(g)$  gets reduced and no nitrogen-containing compound is oxidized. Which of the following is a possible product of this reaction?

- ☐ A.  $\text{NO}_2(g)$
- ☐ B.  $\text{N}_2(g)$
- ☐ C.  $\text{NO}_3^-(aq)$
- ☐ D.  $\text{NO}_2^-(aq)$

4. Which expression below should be used to calculate the mass of copper that can be plated out of a  $1.0\text{ M Cu}(\text{NO}_3)_2$  solution using a current of 0.75 A for 5.0 minutes?

- ☐ A.  $\frac{(5.0)(60)(0.75)(63.55)}{(96500)(2)}$
- ☐ B.  $\frac{(5.0)(60)(63.55)(2)}{(0.75)(96500)}$
- ☐ C.  $\frac{(5.0)(60)(96500)(0.75)}{(63.55)(2)}$
- ☐ D.  $\frac{(5.0)(60)(96500)(63.55)}{(0.75)(2)}$

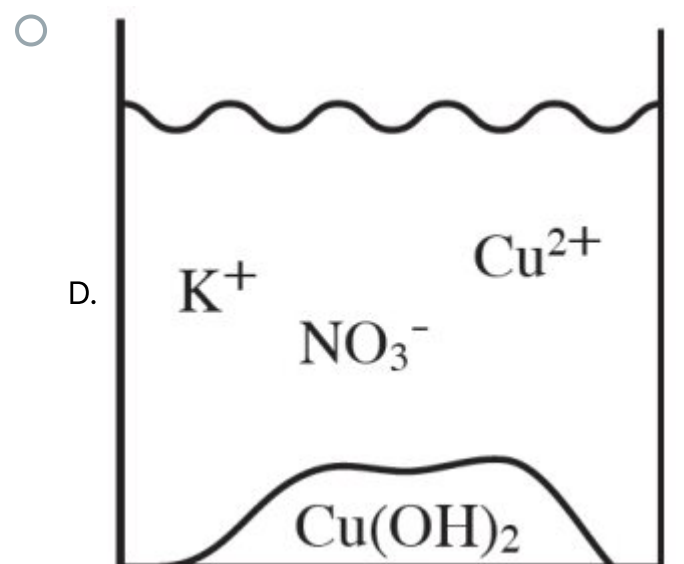
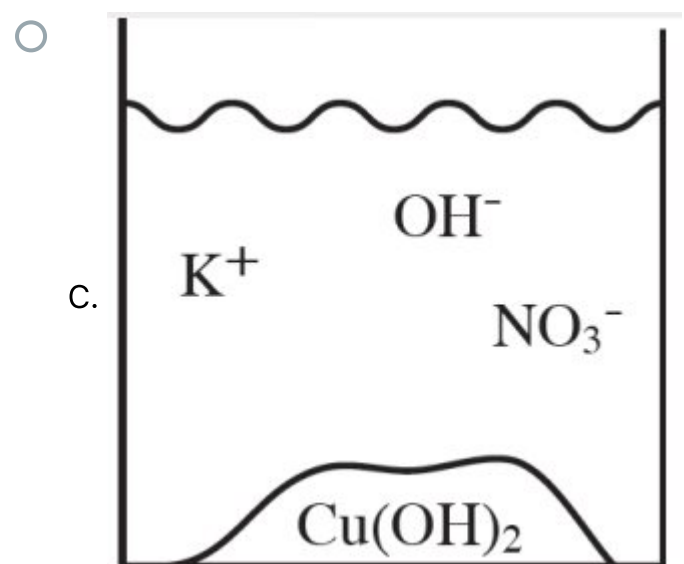
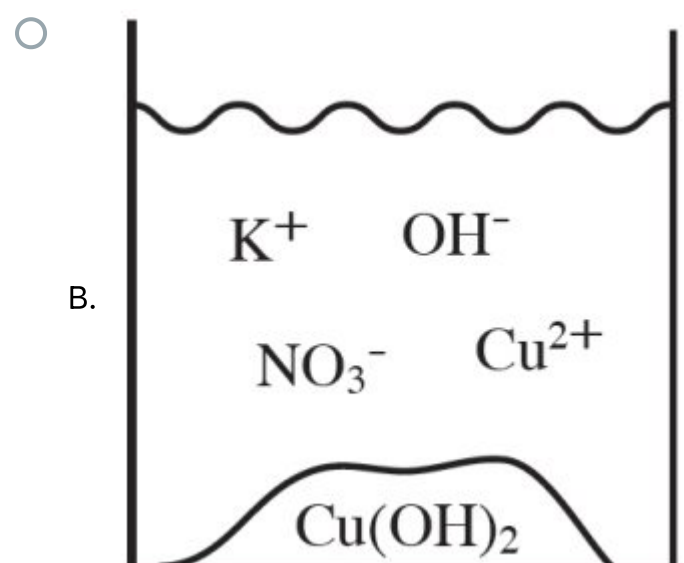
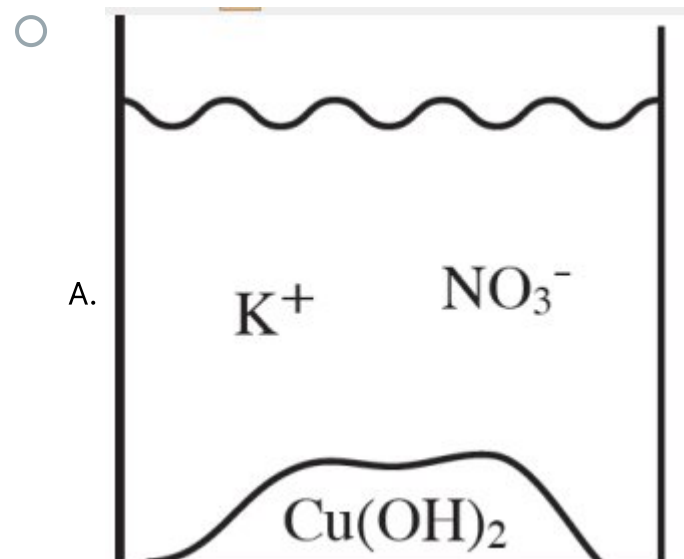
5. Solutions of potassium carbonate and calcium chloride are mixed, and the particulate representation below shows which are present in significant amounts after the reaction has gone to completion.



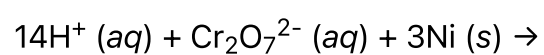
Which of the two original solutions is the limiting reagent and why?

- ☐ B. The potassium carbonate, because there is no carbonate left after the reaction
- ☐ C. The calcium chloride, because there is an excess of calcium ions post-reaction
- ☐ D. The calcium chloride, because the component ions are smaller than those in potassium carbonate

6. A student mixes equimolar amounts of KOH and  $\text{Cu}(\text{NO}_3)_2$  in a beaker. Which of the following particulate diagrams correctly shows all species present after the reaction occurs?



**Questions 7-9** refer to the following information.



In the above reaction, a piece of solid nickel is added to a solution of potassium dichromate.

7. Which species is being oxidized and which is being reduced?

**Oxidized      Reduced**

- ☐ A.  $\text{Cr}_2\text{O}_7^{2-} (aq)$      $\text{Ni} (s)$
- ☐ B.  $\text{Cr}^{3+} (aq)$      $\text{Ni}^{2+} (aq)$
- ☐ C.  $\text{Ni} (s)$      $\text{Cr}_2\text{O}_7^{2-} (aq)$
- ☐ D.  $\text{Ni}^{2+} (aq)$      $\text{Cr}^{3+} (aq)$

8. How many moles of electrons are transferred when 1 mole of potassium dichromate is mixed with 3 moles of nickel?

- ☐ A. 2 moles of electrons
- ☐ B. 3 moles of electrons
- ☐ C. 5 moles of electrons
- ☐ D. 6 moles of electrons

9. How does the pH of the solution change as the reaction progresses?

- ☐ A. It increases until the solution becomes basic.
- ☐ B. It increases, but the solution remains acidic.
- ☐ C. It decreases until the solution becomes basic.
- ☐ D. It decreases, but the solution remains acidic.

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