The materials included in these files are intended for use by AP teachers for course and exam preparation; permission for any other use must be sought from the Advanced Placement Program®. Teachers may reproduce them, in whole or in part, in limited quantities for noncommercial, face-to-face teaching purposes. This permission does not apply to any third-party copyrights contained herein. This material may not be mass distributed, electronically or otherwise. These materials and any copies made of them may not be resold, and the copyright notices must be retained as they appear here.
USE THIS PAGE FOR ANSWERING QUESTION 4.
PLEASE WRITE THE LETTER FOR THE REACTION IN THE SQUARE AT THE LEFT END OF EACH BOX. ONLY THE ANSWERS IN THE BOXES WILL BE SCORED.

**a**  \[ \text{H}_2 + \text{CuO} \rightarrow \text{H}_2\text{O} + \text{Cu} \]

**d**  \[ \text{Pb}^{2+} + \text{SO}_4^{2-} \rightarrow \text{PbSO}_4 \]

**e**  \[ \text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl} \]

**f**  \[ \text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 \rightarrow \text{H}^+ + \text{HSO}_4^- \]

**h**  \[ \text{CH}_3\text{COONa} + \text{H}^+ \rightarrow \text{CH}_3\text{COOH} + \text{Na}^+ \]
USE THIS PAGE FOR ANSWERING QUESTION 4.
PLEASE WRITE THE LETTER FOR THE REACTION IN THE SQUARE AT THE
LEFT END OF EACH BOX. ONLY THE ANSWERS IN THE BOXES WILL BE SCORED.

(c) \[
\text{CH}_3-\overset{\text{O}}{\text{C-CH}_3} + 4\text{O}_2 (g) \xrightarrow{\Delta} 3 \text{CO}_2 (g) + 3 \text{H}_2\text{O} (g)
\]

(d) \[
\text{Pb}^{2+} + \text{SO}_4^- \rightarrow \text{PbSO}_4 (s)
\]

(e) \[
\text{NH}_3 (g) + \text{HCl} (g) \rightarrow \text{NH}_4\text{Cl} (s)
\]

(f) \[
\text{SO}_3 (g) + \text{H}_2\text{O} (g) \rightarrow \text{H}_2\text{SO}_4 (aq)
\]

(h) \[
\text{CH}_3\text{COO}^- (aq) + \text{H}^+ (aq) \rightarrow \text{CH}_3\text{COOH} (aq)
\]

GO ON TO THE NEXT PAGE.
USE THIS PAGE FOR ANSWERING QUESTION 4.
PLEASE WRITE THE LETTER FOR THE REACTION IN THE SQUARE AT THE
LEFT END OF EACH BOX. ONLY THE ANSWERS IN THE BOXES WILL BE SCORED.

A \[ \text{H}_2 + \text{CuO} \rightarrow \text{Cu}^{+2} + \text{OH}^- \]

B \[ \text{NaH} + \text{HOH} \rightarrow \text{Na}^+ + \text{OH}^- + \text{H}_2 \]

F \[ \text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}^+ + \text{SO}_4^- \]

G \[ \text{OH}^- + \text{Ni}^{12} \rightarrow \text{Ni(OH)}_2 \]

H \[ \text{C}_2\text{H}_3\text{O}_2^- + \text{H}^+ + \text{Br}^- \rightarrow \text{HC}_2\text{H}_3\text{O}_2 + \text{Br}_2 \]