**Answer Key: Identifying Chemical Reactions**

**Part 1:** Determine if there is a chemical reaction

<table>
<thead>
<tr>
<th>Reactants</th>
<th>Appearance of reactant(s)</th>
<th>Rxn (Yes/No)</th>
<th>Proof (List all that apply): Appearance of Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Copper metal + hydrochloric acid</td>
<td>Cu: solid chunks, shiny, orange-red color HCl: colorless, liquid</td>
<td>No</td>
<td>No reaction (NR) or no Rxn</td>
</tr>
<tr>
<td>2. Zinc metal + hydrochloric acid</td>
<td>Zn: sliver chunk, with rugged edges HCl: colorless, liquid</td>
<td>Yes</td>
<td>Gas produced – bubbles are produced in the test tube and zinc color changes and becomes darker/black.</td>
</tr>
<tr>
<td>3. Potassium iodide + lead (II) nitrate</td>
<td>KI: liquid and pale-yellow color Pb(NO₃)₂: liquid and colorless</td>
<td>Yes</td>
<td>Change in color and production of a precipitate (ppt). when liquids are mixed a bright yellow solid substance is produced.</td>
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<tr>
<td>4. Potassium thiocyanate + iron (III) nitrate</td>
<td>KSCN: colorless liquid Fe(NO₃)₃: orange-yellow liquid</td>
<td>Yes</td>
<td>Change in color – when mixed the solution becomes dark red color and resembles fake blood.</td>
</tr>
<tr>
<td>5. Potassium iodide + aluminum nitrate</td>
<td>KI: liquid and pale-yellow color Al(NO₃)₃:</td>
<td>No</td>
<td>No reaction (NR) or no Rxn</td>
</tr>
<tr>
<td>6. Ammonium dichromate</td>
<td>(NH₄)₂Cr₂O₇: bright orange fine solid crystals</td>
<td>Yes</td>
<td>Change in color, formation of gases (reactions resemble eruption of a volcano) – sparks of light are produced, dark green fluffy solid is produced, water vapor is produced. Nitrogen gas is produced but is not seen. Larger quantity of dark green product compared to original solid.</td>
</tr>
</tbody>
</table>
#### Part 2: If there is a chemical reaction then complete the word equation

1. Copper metal + hydrochloric acid $\rightarrow$ No reaction
2. Zinc metal + hydrochloric acid $\rightarrow$ zinc chloride + hydrogen gas
3. Potassium iodide + lead (II) nitrate $\rightarrow$ potassium nitrate + lead (II) iodide
4. Potassium thiocyanate + iron (III) nitrate $\rightarrow$ potassium nitrate + iron (III) thiocyanate
5. Potassium iodide + aluminum nitrate $\rightarrow$ No reaction
6. Ammonium dichromate $\rightarrow$ chromium (III)oxide + nitrogen gas + water vapors
7. Magnesium + oxygen $\rightarrow$ magnesium oxide

#### Part 3: Convert complete word equations to balanced chemical equations

1. No reaction = No balanced chemical equations

2. Formula Equation: $\text{Zn(s)} + \text{HCl (aq)} \rightarrow \text{ZnCl}_2 (aq) + \text{H}_2(g)$
   Balanced equation: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2 (aq) + \text{H}_2(g)$

3. Formula Equation: $\text{KI(aq)} + \text{Pb(NO}_3)_2 (aq) \rightarrow \text{KNO}_3 (aq) + \text{PbI}_2 (s)$
   Balanced Equation: $2\text{KI(aq)} + \text{Pb(NO}_3)_2 (aq) \rightarrow 2\text{KNO}_3 (aq) + \text{PbI}_2 (s)$

4. Formula Equation: $\text{KSCN(aq)} + \text{Fe(NO}_3)_3 (aq) \rightarrow \text{KNO}_3 (aq) + \text{Fe(SCN)}_3 (aq)$
   Balanced Equation: $3\text{KSCN(aq)} + \text{Fe(NO}_3)_3 (aq) \rightarrow 3\text{KNO}_3 (aq) + \text{Fe(SCN)}_3 (aq)$

5. No reaction = No balanced chemical equations

6. Formula Equation: $(\text{NH}_4)_2\text{Cr}_2\text{O}_7(s) \rightarrow \text{Cr}_2\text{O}_3(g) + \text{N}_2 (g) + \text{H}_2\text{O(g)}$
   Balanced Equation: $(\text{NH}_4)_2\text{Cr}_2\text{O}_7(s) \rightarrow \text{Cr}_2\text{O}_3(g) + \text{N}_2 (g) + 4\text{H}_2\text{O(g)}$

7. Formula Equation: $\text{Mg(s)} + \text{O}_2 (g) \rightarrow \text{MgO(s)}$
   Balanced Equation: $2\text{Mg(s)} + \text{O}_2(g) \rightarrow 2\text{MgO(s)}$