# Compound Clue Hunt

Use ions and composition to compare acids, bases, and salts.

**SC.8.P.8.8** "Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline every chemical formula. Then write A, B, or S beside each named compound, using the nearby ion or composition clue to classify it as an acid, base, or salt.

### Clues in a Water Lab

1. Compounds are pure substances made when elements join in fixed ratios. Their properties depend on the particles and bonds present. In a water-testing lab, scientists classify some compounds as acids, bases, or salts. They use more than one clue, including chemical formula, ions made in water, and reactions. Safety matters: never taste or touch an unknown solution. Indicators and pH readings can describe a solution, but those observations alone do not always identify the compound class.

2. An acid increases hydronium ions, $H_3O^+$, when it dissolves in water. Hydrochloric acid, HCl, is an example. Acids often react with certain metals and carbonates, and many have pH values below 7. A base can produce hydroxide ions, $OH^-$, in water or accept hydrogen ions. Sodium hydroxide, NaOH, and calcium hydroxide, $Ca(OH)_2$, are bases. Bases often have pH values above 7. These properties help compare acids and bases, but safe testing requires proper tools and careful procedures.

3. A salt is an ionic compound made of cations and anions, with a cation other than $H^+$ and an anion other than $OH^-$. It is not defined simply by a pH reading. Sodium chloride, NaCl, contains $Na^+$ and $Cl^-$ ions, while calcium chloride, $CaCl_2$, contains $Ca^{2+}$ and $Cl^-$ ions. Both are salts. When salts dissolve, their ions can make a solution neutral, acidic, or basic. For example, ammonium chloride, $NH_4Cl$, is a salt whose solution can be acidic. Classification depends on composition and ions, not one indicator result.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. What ion does hydrochloric acid increase when it dissolves in water?

2. What ion can sodium hydroxide and calcium hydroxide produce in water, and what class of compounds are they?

3. Why is calcium chloride, $CaCl_2$, classified as a salt? Use the ions it contains and the passage's salt rule.

4. Why is a pH reading alone not enough to identify a compound as an acid, base, or salt?

## 3 YOUR TURN

Your own words

Complete the table with one acid, one base, and one salt that are not named in the passage. Include a formula and an ion or composition clue for each, not a pH reading alone.

| CLASS | COMPOUND AND FORMULA | ION OR COMPOSITION CLUE |
|---|---|---|
| | | |
| | | |
| | | |

**ANSWER KEY**

# Compound Clue Hunt

**GRADE 8 · SC.8.P.8.8**

## PART 1 · READ AND MARK

Underline every chemical formula. Then write A, B, or S beside each named compound, using the nearby ion or composition clue to classify it as an acid, base, or salt. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | What ion does hydrochloric acid increase when it dissolves in water? | **Hydronium ions, $H_3O^+$.** |
| 2 | What ion can sodium hydroxide and calcium hydroxide produce in water, and what class of compounds are they? | **They can produce hydroxide ions, $OH^-$. They are bases.** |
| 3 | Why is calcium chloride, $CaCl_2$, classified as a salt? Use the ions it contains and the passage's salt rule. | **It contains $Ca^{2+}$ and $Cl^-$ ions. Its cation is not $H^+$, and its anion is not $OH^-$, so it is a salt.** |
| 4 | Why is a pH reading alone not enough to identify a compound as an acid, base, or salt? | **A salt solution can be neutral, acidic, or basic. Classification should also use composition and ions.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

| CLASS | COMPOUND AND FORMULA | ION OR COMPOSITION CLUE |
|---|---|---|
| Acid | Nitric acid, $HNO_3$ | In water, it increases $H_3O^+$ ions. |
| Base | Potassium hydroxide, KOH | In water, it releases $OH^-$ ions. |
| Salt | Potassium nitrate, $KNO_3$ | It contains $K^+$ and $NO_3^-$ ions, not $H^+$ as its cation or $OH^-$ as its anion. |

Accept other correct examples if the formula, class, and ion or composition clue agree. Do not require students to predict solution pH for salts, since salt solutions may be acidic, basic, or neutral.