

Determining States of Matter

All chemical species have a phase or state – either solid (s), liquid (l), gas (g) or in solution (aq). There are rules to determine which state the species is in, within the reaction.

1. Elements – check the periodic table
2. If you know you have a solution, write (aq)
3. All ionic compounds, unless they are in solution, are solids (s)
4. All acids are in solution (aq)
5. All molecular oxides are gases (g).

If there is any species that doesn't fit these rules, you would have to be given the state.

The tricky part is determining if an ionic compound is going to be solid (s) or in solution (aq). **If there is water in any equation, either as a reactant or product or any chemical species is in solution, you must look up the solubility table to determine if any ionic compounds in the reaction will dissolve to make a solution (aq).**

Ions	Group 1A NH ₄ ⁺ H ⁺	ClO ₃ ⁻ NO ₃ ⁻ ClO ₄ ⁻	Cl ⁻ Br ⁻ I ⁻	CH ₃ COO ⁻	SO ₄ ²⁻	S ²⁻	OH ⁻	PO ₄ ³⁻ SO ₃ ²⁻ CO ₃ ²⁻
(aq) high solubility	all	all	most	most	most	Group IA, Group IIA, NH ₄ ⁺	Group IA, NH ₄ ⁺ Sr ²⁺ , Ba ²⁺ Tl ⁺	Group IA, NH ₄ ⁺
(s) low solubility	none	none	Ag ⁺ Tl ⁺ Hg ⁺ Cu ⁺ Pb ²⁺	Ag ⁺ Pb ²⁺ Hg ⁺ Cu ⁺ Tl ⁺	Ca ²⁺ Sr ²⁺ Ba ²⁺ Ra ²⁺ Pb ²⁺ Ag ⁺	most	most	most

Find the anion (negative ion) in your compound along the top. Look for the cation with it down below. If it's not listed, it falls into the all or most category. Follow the row back to the far left to see what to write, either (aq) for high solubility or (s) for low solubility.

Try this one:

