NI · Net ionic equations

Student notes - follow the slides, fill the blanks, work the questions

Goals: Write a dissolved ionic compound as its ions. Write a net ionic equation and name the spectator ions. Check a net ionic equation for atoms and charge.

Name: _____ Date: _____

Slide 1 of 5 · Which substances are written as ions?

An ionic compound dissolved in water breaks into its ions. This is called _____.

Split only an ionic compound or a strong acid marked _____.

A solid, a liquid or a gas stays _____.

The subscript on an ion becomes its _____. A polyatomic ion such as SO_4^{2-} stays together.

Example. Given: $Na_2SO_4(aq)$. Write the ions in the water, with the number of each ion. Then say which of $AgCl(s)$, $KBr(aq)$ and $H_2O(l)$ is split into ions.

Work:

Answer: _____

Try it. Given: $Al_2(SO_4)_3(aq)$. Write the ions in the water, with the number of each ion. Then say which of $CaCl_2(aq)$, $Zn(s)$ and $CO_2(g)$ is split into ions.

Work:

Answer: _____

Slide 2 of 5 · From a full equation to a net ionic equation

The _____ shows every dissolved ionic compound as separate ions.

An ion that is the same on both sides did not change. It is a _____.

Cancel the spectator ions. What is left is the _____.

Check a net ionic equation for atoms and for _____.

Example. Given: $Mg(s) + 2AgNO_3(aq) \rightarrow Mg(NO_3)_2(aq) + 2Ag(s)$. Write the total ionic equation and the net ionic equation. Name the spectator ion.

Work:

Answer: _____

Try it. Given: $Zn(s) + Cu(NO_3)_2(aq) \rightarrow Zn(NO_3)_2(aq) + Cu(s)$. Write the total ionic equation and the net ionic equation. Name the spectator ion.

Work:

Answer: _____

Slide 3 of 5 · Method: how to write a net ionic equation

Step 1. Write the _____ equation with states.

Step 2. _____ every ionic compound or strong acid marked (aq) into its ions.

Step 3. _____ ions that are the same on both sides. They are spectator ions.

Step 4. Write what is left, with the lowest whole numbers.

Step 5. Check _____ and _____ on both sides.

Example. Magnesium metal is put in silver nitrate solution. Magnesium nitrate solution and silver metal form. Use the five steps to write the net ionic equation.

Work:

Answer: _____

Try it. Given: $Cu(s) + 2AgNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + 2Ag(s)$. Use the five steps to write the net ionic equation.

Work:

Answer: _____

Slide 4 of 5 · Your turn: aluminium in copper(II) chloride solution

To count an ion, multiply the _____ by the subscript.

$3CuCl_2(aq)$ gives $3Cu^{2+}(aq)$ and _____$Cl^-(aq)$.

Two chloride ions are written $2Cl^-$. Each one has a charge of _____.

The charge on each side of a net ionic equation must be _____.

Example. Given: $2Al(s) + 3CuCl_2(aq) \rightarrow 2AlCl_3(aq) + 3Cu(s)$. Write the total ionic equation and the net ionic equation. Name the spectator ion.

Work:

Answer: _____

Try it. Given: $2Al(s) + 3Pb(NO_3)_2(aq) \rightarrow 2Al(NO_3)_3(aq) + 3Pb(s)$. Write the total ionic equation and the net ionic equation. Name the spectator ion.

Work:

Answer: _____

Slide 5 of 5 · A net ionic equation is not always redox

A solid product is written _____. It is not split into ions.

A net ionic equation shows what _____.

A reaction is redox only if at least one _____ changes.

Ions can join into a solid with _____ electrons transferred.

Example. Given: $Pb(NO_3)_2(aq) + 2KI(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$. Write the net ionic equation. Is it a redox reaction? Explain.

Work:

Answer: _____

Try it. Given: $CaCl_2(aq) + Na_2CO_3(aq) \rightarrow CaCO_3(s) + 2NaCl(aq)$. Write the net ionic equation. Is it a redox reaction? Explain.

Work:

Answer: _____

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Net ionic equations | Questions 1-2 of 7

1. Given: $K_3PO_4(aq)$. Write the ions it forms in water, with the number of each ion.

Work:

Final answer (with unit): _____

2. Given: $Ni(s) + Pb(NO_3)_2(aq) \rightarrow Ni(NO_3)_2(aq) + Pb(s)$. Write the total ionic equation and the net ionic equation. Name the spectator ion.

Work:

Final answer (with unit): _____

NI · Practice

Net ionic equations | Questions 3-4 of 7

3. Given: $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$. HCl(aq) is a strong acid. Write the net ionic equation and name the spectator ion.

Work:

Final answer (with unit): _____

4. Given: $Cl_2(g) + 2KI(aq) \rightarrow 2KCl(aq) + I_2(s)$. Write the net ionic equation. Then say what is oxidized and what is reduced.

Work:

Final answer (with unit): _____

NI · Practice

Net ionic equations | Questions 5-6 of 7

5. Given: $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$. Write the net ionic equation. Is it a redox reaction? Explain.

Work:

Final answer (with unit): _____

6. A student writes this total ionic equation for $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$: $Ag^+(aq) + NO_3^-(aq) + Na^+(aq) + Cl^-(aq) \rightarrow Ag^+(aq) + Cl^-(aq) + Na^+(aq) + NO_3^-(aq)$. Then the student cancels everything. Find the mistake and write the correct net ionic equation.

Work:

Final answer (with unit): _____

NI · Practice

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7. Challenge: Given: $3Cu(s) + 8HNO_3(aq) \rightarrow 3Cu(NO_3)_2(aq) + 2NO(g) + 4H_2O(l)$. $HNO_3(aq)$ is a strong acid. Write the total ionic equation and the net ionic equation. How many nitrate ions are spectator ions?

Work:

Final answer (with unit): _____