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# Net ionic equations worksheet pdf with answers

Page ID160061 From the statement "nitrogen and hydrogen react to produce ammonia," identify the reactants and the products. From the statement "sodium metal reacts with water to produce sodium hydroxide and hydrogen," identify the reactants and the products. From the statement "magnesium hydroxide reacts with nitric acid to produce magnesium nitrate and water," identify the reactants and the products. From the statement "propane reacts with oxygen to produce carbon dioxide and water," identify the reactants and the products. Write and balance the chemical equation described by Exercise 1. Write and balance the chemical equation described by Exercise 2. Write and balance the chemical equation described by Exercise 3. Write and balance the chemical equation described by Exercise 4. The formula for propane is C3H8. Balance:  $\underline{\hspace{1cm}} \text{NaClO}_3 \rightarrow \underline{\hspace{1cm}} \text{NaCl} + \underline{\hspace{1cm}} \text{O}_2$  Balance:  $\underline{\hspace{1cm}} \text{N}_2 + \underline{\hspace{1cm}} \text{H}_2 \rightarrow \underline{\hspace{1cm}} \text{N}_2\text{H}_4$  Balance:  $\underline{\hspace{1cm}} \text{Al} + \underline{\hspace{1cm}} \text{O}_2 \rightarrow \underline{\hspace{1cm}} \text{Al}_2\text{O}_3$  Balance:  $\underline{\hspace{1cm}} \text{C}_2\text{H}_4 + \underline{\hspace{1cm}} \text{O}_2 \rightarrow \underline{\hspace{1cm}} \text{CO}_2 + \underline{\hspace{1cm}} \text{H}_2\text{O}$  How would you write the balanced chemical equation in Exercise 10 if all substances were gases? How would you write the balanced chemical equation in Exercise 12 if all the substances except water were gases and water itself were a liquid? Answers reactants: nitrogen and hydrogen; product: ammonia reactants: magnesium hydroxide and nitric acid; products: magnesium nitrate and water Mg(OH)2 + 2HNO3 → Mg(NO3)2 + 2H2O What are the general characteristics that help you recognize single-replacement reactions? What are the general characteristics that help you recognize double-replacement reactions? Assuming that each single-replacement reaction occurs, predict the products and write each balanced chemical equation. Zn + Fe(NO3)2 → ? F2 + FeI3 → ? Assuming that each single-replacement reaction occurs, predict the products and write each balanced chemical equation. Sn + H2SO4 → ? Al + NiBr2 → ? Assuming that each single-replacement reaction occurs, predict the products and write each balanced chemical equation. Mg + HCl → ? HI + Br2 → ? Use the periodic table or the activity series to predict if each single-replacement reaction will occur and, if so, write a balanced chemical equation. FeCl2 + Br2 → ? Fe(NO3)3 + Al → ? Use the periodic table or the activity series to predict if each single-replacement reaction will occur and, if so, write a balanced chemical equation. Zn + Fe3(PO4)2 → ? Ag + HNO3 → ? Use the periodic table or the activity series to predict if each single-replacement reaction will occur and, if so, write a balanced chemical equation. NaI + Cl2 → ? AgCl + Au → ? Use the periodic table or the activity series to predict if each single-replacement reaction will occur and, if so, write a balanced chemical equation. Pt + H3PO4 → ? Li + H2O → ? (Hint: treat H2O as if it were composed of H+ and OH- ions.) Assuming that each double-replacement reaction occurs, predict the products and write each balanced chemical equation. Zn(NO3)2 + NaOH → ? HCl + Na2S → ? Assuming that each double-replacement reaction occurs, predict the products and write each balanced chemical equation. Ca(C2H3O2)2 + HNO3 → ? Na2CO3 + Sr(NO2)2 → ? Assuming that each double-replacement reaction occurs, predict the products and write each balanced chemical equation. Pb(NO3)2 + KBr → ? K2O + MgCO3 → ? Assuming that each double-replacement reaction occurs, predict the products and write each balanced chemical equation. Sn(OH)2 + FeBr3 → ? CsNO3 + KCl → ? Use the solubility rules to predict if each double-replacement reaction will occur and, if so, write a balanced chemical equation. Pb(NO3)2 + KBr → ? K2O + Na2CO3 → ? Use the solubility rules to predict if each double-replacement reaction will occur and, if so, write a balanced chemical equation. Na2CO3 + Sr(NO2)2 → ? (NH4)2SO4 + Ba(NO3)2 → ? Use the solubility rules to predict if each double-replacement reaction will occur and, if so, write a balanced chemical equation. K3PO4 + SrCl2 → ? NaOH + MgCl2 → ? Use the solubility rules to predict if each double-replacement reaction will occur and, if so, write a balanced chemical equation. KC2H3O2 + Li2CO3 → ? KOH + AgNO3 → ? Answers One element replaces another element in a compound. Zn + Fe(NO3)2 → Zn(NO3)2 + Fe 3F2 + 2FeI3 → 3I2 + 2FeF3 Sn + H2SO4 → SnSO4 + H2 2Al + 3NiBr2 → 2AlBr3 + 3Ni No reaction occurs. Fe(NO3)3 + Al → Al(NO3)3 + Fe 2NaI + Cl2 → 2NaCl + I2 No reaction occurs. Zn(NO3)2 + 2NaOH → Zn(OH)2 + 2NaNO3 2HCl + Na2S → 2NaCl + H2S Pb(NO3)2 + 2KBr → PbBr2 + 2KNO3 K2O + MgCO3 → K2CO3 + MgO Pb(NO3)2 + 2KBr → PbBr2(s) + 2KNO3 No reaction occurs. 2K3PO4 + 3SrCl2 → Sr3(PO4)2(s) + 6KCl 2NaOH + MgCl2 → 2NaCl + Mg(OH)2(s) Write a chemical equation that represents NaBr(s) dissociating in water. Write a chemical equation that represents SrCl2(s) dissociating in water. Write a chemical equation that represents (NH4)3PO4(s) dissociating in water. Write a chemical equation that represents Fe(C2H3O2)3(s) dissociating in water. Write the complete ionic equation for the reaction of FeCl2(aq) and AgNO3(aq). You may have to consult the solubility rules. Write the complete ionic equation for the reaction of BaCl2(aq) and Na2SO4(aq). You may have to consult the solubility rules. Write the complete ionic equation for the reaction of Fe2(SO4)3(aq) and Sr(NO3)2(aq). You may have to consult the solubility rules. Write the net ionic equation for the reaction of BaCl2(aq) and Na2SO4(aq). You may have to consult the solubility rules. Write the net ionic equation for the reaction of KCl(aq) and NaC2H3O2(aq). You may have to consult the solubility rules. Write the net ionic equation for the reaction of Fe2(SO4)3(aq) and Sr(NO3)2(aq). You may have to consult the solubility rules. Identify the spectator ions in Exercises 9 and 10. Identify the spectator ions in Exercises 11 and 12. Answers NaBr(s) → H2O + H2O Na+(aq) + Br-(aq) (NH4)3PO4(s) → H2O + H2O 3NH4+(aq) + PO43-(aq) Fe2+(aq) + 2Cl-(aq) + 2Ag+(aq) + 2NO3-(aq) → Fe2+(aq) + 2NO3-(aq) + 2AgCl(s) K+(aq) + Cl-(aq) + Na+(aq) + C2H3O2-(aq) → Na+(aq) + Cl-(aq) + K+(aq) + C2H3O2-(aq) 2Cl-(aq) + 2Ag+(aq) → 2AgCl(s) There is no overall reaction. In Exercise 9, Fe2+(aq) and NO3-(aq) are spectator ions; in Exercise 10, Na+(aq) and Cl-(aq) are spectator ions. Which is a composition reaction and which is not? NaCl + AgNO3 → AgCl + NaNO3 CaO + CO2 → CaCO3 Which is a composition reaction and which is not? H2 + Cl2 → 2HCl 2HBr + Cl2 → 2HCl + Br2 Which is a composition reaction and which is not? 2SO2 + O2 → 2SO3 6C + 3H2 → C6H6 Which is a composition reaction and which is not? 4Na + 2C + 3O2 → 2Na2CO3 Na2CO3 → Na2O + CO2 Which is a decomposition reaction and which is not? HCl + NaOH → NaCl + H2O CaCO3 → CaO + CO2 Which is a decomposition reaction and which is not? 3O2 → 2O3 2KClO3 → 2KCl + 3O2 Which is a decomposition reaction and which is not? Na2O + CO2 → Na2CO3 H2SO3 → H2O + SO2 Which is a decomposition reaction and which is not? 2C7H5N3O6 → 3N2 + 5H2O + 7CO + 7C 6H12O6 + 6O2 → 6CO2 + 6H2O Which is a combustion reaction and which is not? C6H12O6 + 6O2 → 6CO2 + 6H2O 2Fe2S3 + 9O2 → 2Fe2O3 + 6SO2 Which is a combustion reaction and which is not? CH4 + 2F2 → CF4 + 2HF 2H2 + O2 → 2H2O Which is a combustion reaction and which is not? P4 + 5O2 → 2P2O5 2Al2S3 + 9O2 → 2Al2O3 + 6SO2 Which is a combustion reaction and which is not? C2H4 + O2 → C2H4O2 C2H4 + Cl2 → C2H4Cl2 Is it possible for a composition reaction to also be a combustion reaction? Give an example to support your case. Is it possible for a decomposition reaction to also be a combustion reaction? Give an example to support your case. Complete and balance each combustion equation. C4H9OH + O2 → ? CH3NO2 + O2 → ? Complete and balance each combustion equation. B2H6 + O2 → ? (The oxide of boron formed is B2O3.) Al2S3 + O2 → ? (The oxide of sulfur formed is SO2.) Al2S3 + O2 → ? (The oxide of sulfur formed is SO3.) Answers not composition composition not decomposition decomposition Yes; 2H2 + O2 → 2H2O (answers will vary) C4H9OH + 6O2 → 4CO2 + 5H2O 4CH3NO2 + 3O2 → 4CO2 + 6H2O + 2N2 What is the Arrhenius definition of an acid? What is the Arrhenius definition of a base? Predict the products of each acid-base combination listed. Assume that a neutralization reaction occurs. HCl and KOH H2SO4 and KOH H3PO4 and Ni(OH)2 Predict the products of each acid-base combination listed. Assume that a neutralization reaction occurs. HBr and Fe(OH)3 HNO2 and Al(OH)3 HClO3 and Mg(OH)2 Write a balanced chemical equation for each neutralization reaction in Exercise 3. Write a balanced chemical equation for each neutralization reaction in Exercise 4. Write a balanced chemical equation for the neutralization reaction between each given acid and base. Include the proper phase labels. H(aq) + KOH(aq) → ? H2SO4(aq) + Ba(OH)2(aq) → ? Write a balanced chemical equation for the neutralization reaction between each given acid and base. Include the proper phase labels. HNO3(aq) + Fe(OH)3(s) → ? H3PO4(aq) + CsOH(aq) → ? Write the net ionic equation for each neutralization reaction in Exercise 7. Write the net ionic equation for each neutralization reaction in Exercise 8. Write the complete and net ionic equations for the neutralization reaction between HClO3(aq) and Zn(OH)2(s). Assume the salt is soluble. Write the complete and net ionic equations for the neutralization reaction between H2C2O4(s) and Sr(OH)2(aq). Assume the salt is insoluble. Explain why the net ionic equation for the neutralization reaction between HCl(aq) and KOH(aq) is the same as the net ionic equation for the neutralization reaction between HNO3(aq) and RbOH. Explain why the net ionic equation for the neutralization reaction between HCl(aq) and KOH(aq) is different from the net ionic equation for the neutralization reaction between HCl(aq) and AgOH. Write the complete and net ionic equations for the neutralization reaction between HCl(aq) and KOH(aq) using the hydronium ion in place of H+. What difference does it make when using the hydronium ion? Write the complete and net ionic equations for the neutralization reaction between HClO3(aq) and Zn(OH)2(s) using the hydronium ion in place of H+. Assume the salt is soluble. What difference does it make when using the hydronium ion? Answers An Arrhenius acid increases the amount of H+ ions in an aqueous solution. KCl and H2O K2SO4 and H2O Ni3(PO4)2 and H2O HCl + KOH → KCl + H2O H2SO4 + 2KOH → K2SO4 + 2H2O 2H3PO4 + 3Ni(OH)2 → Ni3(PO4)2 + 6H2O H(aq) + KOH(aq) → K(aq) + H2O(l) H+(aq) + OH-(aq) → H2O(l) 2H+(aq) + SO42-(aq) → Ba2+(aq) + 2OH-(aq) → BaSO4(s) + 2H2O(l) Complete ionic equation: 2H+(aq) + 2ClO3-(aq) + Zn2+(aq) + 2OH-(aq) → Zn2+(aq) + 2ClO3-(aq) + 2H2O(l) Net ionic equation: 2H+(aq) + 2OH-(aq) → 2H2O(l) Because the salts are soluble in both cases, the net ionic reaction is just H+(aq) + OH-(aq) → H2O(l). Complete ionic equation: H3O+(aq) + Cl-(aq) + K+(aq) + OH-(aq) → 2H2O(l) + K+(aq) + Cl-(aq) Net ionic equation: H3O+(aq) + OH-(aq) → 2H2O(l) The difference is simply the presence of an extra water molecule as a product. 2K(s) + Br2(l) → 2KBr(s) an oxidation-reduction reaction? Explain your answer. Is the reaction NaCl(aq) + AgNO3(aq) → NaNO3(aq) + AgCl(s) an oxidation-reduction reaction? Explain your answer. In the reaction 2Ca(s) + O2(g) → 2CaO indicate what has lost electrons and what has gained electrons. In the reaction 16Fe(s) + 3S8(s) → 8Fe2S3(s) indicate what has lost electrons and what has gained electrons. In the reaction 2Li(s) + O2(g) → Li2O2(s) indicate what has been oxidized and what has been reduced. What are two different definitions of oxidation? What are two different definitions of reduction? Assign oxidation numbers to each atom in each substance. Assign oxidation numbers to each atom in each substance. PF5 (NH4)2S Hg Li2O2 (lithium peroxide) Assign oxidation numbers to each atom in each substance. Assign oxidation numbers to each atom in each substance. NaH (sodium hydride) NO2 NO2- AgNO3 Assign oxidation numbers to each atom in each substance. CH2O NH3 Rb2SO4 Zn(C2H3O2)2 Assign oxidation numbers to each atom in each substance. Identify what is being oxidized and reduced in this redox equation by assigning oxidation numbers to the atoms. 2NO + Cl2 → 2NOCl Identify what is being oxidized and reduced in this redox equation by assigning oxidation numbers to the atoms. Fe + SO3 → FeSO3 Identify what is being oxidized and reduced in this redox equation by assigning oxidation numbers to the atoms. 2K + F2 → 2KF + 2HF + O2 Identify what is being oxidized and reduced in this redox equation by assigning oxidation numbers to the atoms. SO3 + SCl2 → SOCl2 + SO2 Identify what is being oxidized and reduced in this redox equation by assigning oxidation numbers to the atoms. 2K + MgCl2 → 2KCl + Mg Identify what is being oxidized and reduced in this redox equation by assigning oxidation numbers to the atoms. C7H16 + 11O2 → 7CO2 + 8H2O Answers Yes; both K and Br are changing oxidation numbers. Ca has lost electrons, and O has gained electrons. Li has been oxidized, and O has been reduced. loss of electrons; increase in oxidation number P: 0 S: +4; O: -2 S: +2; O: -2 Ca: 2+; N: +5; O: -2 C: +4; O: -2 Ni: +2; Cl: -1 Ni: +3; Cl: -1 C: 0; H: +1; O: -2 N: -3; H: +1 Rb: +1; S: +6; O: -2 Zn: +2; C: 0; H: +1; O: -2 N is being oxidized, and Cl is being reduced. O is being oxidized, and Kr is being reduced. K is being oxidized, and Mg is being reduced. Additional Exercises Chemical equations can also be used to represent physical processes. Write a chemical reaction for the boiling of water, including the proper phase labels. Chemical equations can also be used to represent physical processes. Write a chemical reaction for the freezing of water, including the proper phase labels. Explain why 4Na(s) + 2Cl2(g) → 4NaCl(s) should not be considered a proper chemical equation. Explain why H2(g) + 1/2O2(g) → H2O(l) should not be considered a proper chemical equation. Does the chemical reaction represented by 3Zn(s) + 2Al(NO3)3(aq) → 3Zn(NO3)2(aq) + 2Al(s) proceed as written? Why or why not? Does the chemical reaction represented by 2Au(s) + 2HNO3(aq) → 2AuNO3(aq) + H2(g) proceed as written? Gold is a relatively useful metal for certain applications, such as jewelry and electronics. Does your answer suggest why this is so? Explain what is wrong with this double-replacement reaction. NaCl(aq) + KBr(aq) → NaK(aq) + ClBr(aq) Predict the products of and balance this double-replacement reaction. Ag2SO4(aq) + SrCl2(aq) → ? Write the complete and net ionic equations for this double-replacement reaction. BaCl2(aq) + Ag2SO4(aq) → ? Write the complete and net ionic equations for this double-replacement reaction. Ag2SO4(aq) + SrCl2(aq) → ? Identify the spectator ions in this reaction. What is the net ionic equation? NaCl(aq) + KBr(aq) → NaBr(aq) + KCl(aq) Complete this reaction and identify the spectator ions. What is the net ionic equation? 3H2SO4(aq) + 2Al(OH)3(s) → ? Can a reaction be a composition reaction and a redox reaction at the same time? Give an example to support your answer. Can a reaction be a combustion reaction and a redox reaction at the same time? Give an example to support your answer. Can a reaction be a decomposition reaction and a redox reaction at the same time? Give an example to support your answer. Can a reaction be a combustion reaction and a double-replacement reaction at the same time? Give an example to support your answer. Why is CH4 not normally considered an acid? Methyl alcohol has the formula CH3OH. Why would methyl alcohol not normally be considered a base? What are the oxidation numbers of the nitrogen atoms in these substances? N2 NH3 NO N2O NO2 N2O4 N2O5 NaNO3 What are the oxidation numbers of the sulfur atoms in these substances? SF6 Na2SO4 K2SO3 SO3 SO2 S8 Na2S Disproportion is a type of redox reaction in which the same substance is both oxidized and reduced. Identify the element that is disproportionating and indicate the initial and final oxidation numbers of that element. 2CuCl(aq) → CuCl2(aq) + Cu(s) Disproportion is a type of redox reaction in which the same substance is both oxidized and reduced. Identify the element that is disproportionating and indicate the initial and final oxidation numbers of that element. 3Cl2(g) + 6OH-(aq) → 5Cl-(aq) + ClO3-(aq) + 3H2O(l) Answers H2O(l) Answers H2O(l) The coefficients are not in their lowest whole-number ratio. No; zinc is lower in the activity series than aluminum. In the products, the cation is pairing with the cation, and the anion is pairing with the anion. Complete ionic equation: Ba2+(aq) + 2Cl-(aq) + 2Ag+(aq) + SO42-(aq) → BaSO4(s) + 2AgCl(s) Net ionic equation: The net ionic equation is the same as the complete ionic equation. Each ion is a spectator ion; there is no overall net ionic equation. Yes; H2 + Cl2 → 2HCl (answers will vary) Yes; 2HCl → H2 + Cl2 (answers will vary) It does not increase the H+ ion concentration; it is not a compound of H+. Copper is disproportionating. Initially, its oxidation number is +1; in the products, its oxidation number is +2 and 0, respectively. Was this article helpful?

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