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Solution stoichiometry problems and answers

Page ID31610 contributes and compresses applying this formula to solve titive problems preparing a solution of concentration that is determined to solve any problem involving solutions and attribution learning goals to determine amounts of responders or products in water solutions. As we learned earlier, double replacement reactions involve a reaction between ionic compounds in a solution, and during the reaction, the ions in both reactive compounds are replaced (they replace each other). Because these reactions occur in a water solution, we can use the term molar to directly calculate the number of moles of responders or products that will be produced, hence their quantities (i.e. the volume of solutions or mass of precipitation). As an example, lead (II) nitrate sodium chloride respond to a sodium nitrate form and the soluble compound, lead(II) chloride. \[\ce{Pb(NO_3)_2 (aq) + 2 NaCl (aq) → PbCl_2 (s) + 2 NaNO3 (aq)} \label{EQ1}\] in the response shown above, if we mixed 0.123 L of \\ce's 1.00 M solution {NaCl}\) with solution 1.50 M of \(\ce{Pb(NO3)2}\), we can calculate the volume of \\ce{Pb(NO3)2}\) a solution required to completely expedite the \(\ce Pb^{{{{{}}\) ions. Concentrating their claims can also be expressed as the following message : \[1.00\,M \,\ce{NaCl} = \dfrac{1.00 \; mol \; \ce{NaCl}{1\; L \; \ce{NaCl} \; \text{Solution}} Onombar\] and \[1.50\,M\, \ce{Pb(NO3)2} = \dfrac{1.50 \; mol \; \ce{pb(NO_3)_2}{1\; L \; \ce{Pb(NO_3)_2} \text{solution}} onumber\] First, we need to examine the response in the balanced response (Equation \ref{EQ1}). In this response, one \\ce{Pb(NO3)2}\) mole responds with two \\ce{NaCl}\) mole to give one socket mole \(\ce{PbCl2}\). Therefore, the concept map that uses the stoichiometric relationship is: so that the volume of lead (II) nitge responded is calculated as: \[0.123 \; L \; \ce{NaCl} \, \text{solution} \times \frac{1.00\; mol \; \ce{NaCl}{1\; L \; \ce{NaCl} \; \text{solution}\times \frac{1\; mol \; \ce{pb(NO_3)_2}{2\; mol \; \ce{NaCl}\times\frac{1\; L \; \ce{Pb(NO_3)_2} \; =0.041 \NO_3; In 2015, after the company NO_3 committed to \text{solution} \] this volume makes intuitive sense for two reasons: (1) The number of moles of \(\ce{Pb(NO3)2}\) required is half the number of moles of \(\ce{NaCl}\) , based on balanced response stoicmetry (equation \ref{EQ1}) and (2) solution concentration \\ce{Pb(NO3)2}\\) is 50% larger than the solution \(\ce{NaCl}\) so less volume is needed. Example \\PageIndex{1}\\) Which volume (in L) of 0.500 M sodium sulfate will respond with 275 ml of 0.250 M barium chloride To completely expedite all \\\ce{Ba^{2+}}\\) in the solution? Troubleshooting steps for example \(\PageIndex{1}\) Same as the given information and what's the problem You're to find. Figure: 275 ml BaCl2 0.250 M \\(\ce{BaCl2}\) or \(\displays \frac{0.250\; vs. BaCl_2}{1\; I don't know what that means. BaCl_2\; Solution}\) 0.500 M \\ce{Na2SO4}\) or \(\displays \frac{0.500\; mol Na_2SO_4}{1\; I don't know what that means. Na_2SO_4\; Solution}\) Solution: Volume \\ce{Na2SO4}\\). Setting and balancing the chemical equation \(\ce{Na2SO4(aq) + BaCl2(aq) -> BaSO4(s)} + \underline{2} \ce{NaCl (aq)}\) an insoluble product was created after the response. List other known quantities 1 mol of Na2SO4 to 1 against BaCl2 1000 ml = 1 L to prepare a concept map and use the correct conversion factor. Cancel units and calculate. \(\Displays Style 275\Cancel{mL \; BaCl_2 \; Solution\\times \frac{1\cancel{L}{1000\cancel{mL}\times \frac{0.250\cancel{mol\; BaCl_2 1000000000000000000000000000000000000000000 BaCl_2 \; Solution}\times \frac{1 \cancel{mol\; Na_2SO_4 1000000000000 BaCl_2 000000000000000000000000000000000000000000000 times L\; Na_2SO_4 \; Solution}{0.500 \cancel{mol Na_2SO_4}}\) = 0.1375 L Sodium Sulfate Think about your result. The lower amount (nearly half) of sodium sulfate is expected as it is more concentrated than barium chloride. Also, the unit is correct. Exercise \\\PageIndex{1}\) What volume of 0.250 M lithium hydroxide will respond completely with 0.500 L of 0.250 M of sulfuric acid solution? Answer 0.250 L \(\ce{LiOH}\\ This page solution was built from them using the following contributors and edited (locally or extensively) by the LibreTexts development team to meet platform style, presentation and quality: By the end of this section, you can perform stoicometric calculations that include a solution grinding resentment as we have seen in the laboratory, many responses such as single or double displacement responses are performed in a water medium (i.e. in water). Because these reactions occur in a water solution, we can use the term molar to directly calculate the number of moles of responders or products that will be produced, hence their quantities (i.e. the volume of solutions or mass of precipitation). More complex stoichometry problems through balanced chemical reactions can also use concentrations as conversion rubber (see example 3 below when the ideal gas law is used in conjunction with a stoichiometry solution). For example, Suppose the following equation represents a chemical reaction: [latex]\large{\text{2 Ag}}{\text{NO}_{3}\text{}aq\text{}\text {2}{}\text{\text{\text{\text}\\2 AgCl}\text{{} aq\text{}}\rightarrow {\text{2 AgCl}\text{{}\).\text{}\text{\text{}\text{\text{\text{}\text{\text{\text{\text{\text{\text}}\right{\text{\2 AgCl}\text{{}aq\text{}\text{}\).\right{\text{\2 AgCl}\text{{{{{{aq\text{}\).\right{\text{\2 AgCl}\text{{{{aq\text {}\).\right{\text{\2 AgCl}\text{{}aq\text{}\).\rightarrow {\text{\2 AgCl}\text{{{{{{aq\text{}\rightarrow {\text{2 AgCl}\ If we wanted to know what volume of 0.555 million {2} {3} would react with 1.25 versus Agneno3, First we use the balanced chemical equation to determine the number of CaCl2 moles that respond and then use concentration to convert into liters of solution: [latex]\large1.25\cancel{\text{ mol Ag }{{Time {3} {2}
1000
{2} this text can be extended by starting the mass ({2} grams) of a single response, instead of moles of a reactor. What volume of 0.0995 M Al(NO3)3 will respond with 3.66 grams of Ag according to the following chemical equation? Large Text Text{NO}_{3}\text{{}aq\text{)\text{+Al}\text{{_s\text{)}[/latex] Check your learning Which 0.512 M NaOH volume will respond with 17.9 g of H2C2O4(s) according to the following chemical equation? {3} {3} is a large {2} {4} {2} below text in {2} 2013. We {2} can further expand our {4} by recognising that we can link amounts of one solution to quantities of {2} another. Knowing about the volume and concentration of a solution containing one responder, we can determine how much other solution of another reactor will be needed using the balanced chemical equation. A student takes a sample from an exact aunt, called aliquot, of 10.00 ml of FeCl3's solution. The student carefully adds 0.1074 M Na2C2O4 until each Fe3+(aq) has been expedited as Fe2(C2O4)3(s). Using a precisely measured tube called a burette, the student discovers that 9.04 ml of na2C2O4 solution has been added to completely speed up fe3+(aq). What was the concentration of fecl3 in the original solution, a measured experiment just like this one designed to determine the amount of material in the sample? Called tit.) The balanced chemical equation is as follows: [Latex]\Large{2 FeCl}_{3}\text{{{{{{{{{3 Na}_{2}\text{C}_{2}\text{O}_{4}\text{{{{{{{{aq\text{{{{{{3]\{2} {3} {4} {2} Check your learning in H3PO4's 25.00 ml sea student with 0.0987 M KOH. It uses 54.06 ml to complete the chemical reaction. [Latex]: Large 3 {3} KOH}\{3} {4}Leal text
1200
00000000000000000000000000000000000000000000000000000000000 when a student {4} performs a tweed, one measured amount of {2} will be added to another responder. Tythor Chemistry Lab by Kentucky State Day is licensed under Creative Commons Attribution-Noncommerial 2.0 General. How many liters of carbon dioxide gas can form in STP when a 125 ml of 2.25 M HCl solution reacts with excess lithium carbonate?
[Latex]:00,0000000000&2000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000 Text+ {2}2 Lickle Check your learning if 355 ml of hydrogen gas is collected at 25 oC at a total pressure of 740 mmHg from the response of excess zinc and a 3.0 ml HCl solution, how many ml of HCl solution is required?
{2}
[Latex]:000
00000000000000000000000000000000000000000000000 {2}000000000000000000000000000000000000000000000000000000000000000000000000000 {2} can be used as a conversion factor in conjunction with the response. 1. Magnesium reacts with hydrochloric acid to produce hydrogen gas and magnesium chloride. How many litres of the HCl 0.750 M solution will respond with 12.25g of meg? [Latex], Large, Text, Text, Text, Text, Text, Text, text , text, {2} {2} text 2. Consider the following response: [latex]\large{Pb}\text{\text{N}\text{O}_{3}\text{)_{2}\text{}aq\text{\text{\text{+2 NaI}\text{}a {2} text+ 2 NaN}{O}\{3}\text{{\text{\latex]a. How many grams of lead (II) iodide will be generated from 25.0 ml of 2.00 M sodium iodide solution? B. How many milliliters of 1.25 M lead (II) sift solution will respond with 25.0 ml of 1.50 M sodium iodide solution? C. What is the ionization of a 20.0 ml solution of sodium idid that responds completely with 60.0 ml of lead nitrate solution 0.750 M(II)? 3. Consider the following response: [Latex]\Large{To}_{2}}\text{\\text{O}_{4}\text{}-{3}\text{{{{{{{{{{{{{{_aq\text{}\text{+6 KOH}\text{()aq\text{()Text in {3} {2} {3}2013, After texting the character no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no No, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no. No, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, No, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, no, not a few grams of aluminum hydroxide will be generated from 55.0 ml of potassium hydroxide solution 1.50 M? B. How many milliliters of 0.250 M sulfuric aluminum solution will respond with 10.0 ml of potassium hydroxide solution 3.00 M? C. What is the grinding plea of a 40.0 ml solution of potassium hydroxide that responds completely with 20.0 ml of 0.500 m sulfuric aluminum solution? 4. Copper oxide (II) reacts with hydrochloric acid to produce copper(II) chloride and water. How many liters of HCl 4.50 M solution will react with 33.0 grams of copper oxide (II) ? Text+ 2 H {2}Cl {2} {2} --
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