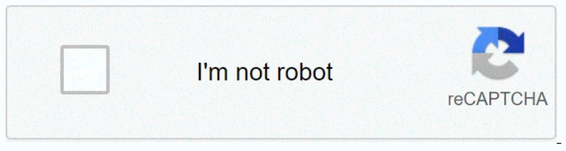
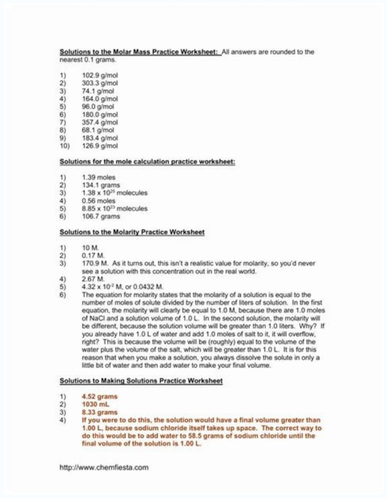


I'm not robot!

Molarity calculations worksheet answers

Molarity worksheet answer key. Grams and liters molarity calculations worksheet answers. Molarity worksheet answers. Molarity and dilution calculations worksheet answers. Molarity and molality calculations worksheet answers.



Solutions to the Molar Mass Practice Worksheet: All answers are rounded to the nearest 0.1 grams.

1) 102.9 g/mol
2) 303.3 g/mol
3) 74.1 g/mol
4) 164.0 g/mol
5) 96.0 g/mol
6) 180.0 g/mol
7) 357.4 g/mol
8) 68.1 g/mol
9) 183.4 g/mol
10) 126.9 g/mol

Solutions for the mole calculation practice worksheet:

1) 1.39 moles
2) 134.1 grams
3) 1.38×10^{23} molecules
4) 0.56 moles
5) 8.85×10^{23} molecules
6) 106.7 grams

Solutions to the Molarity Practice Worksheet

1) 10 M.
2) 0.17 M.
3) 170.9 M. As it turns out, this isn't a realistic value for molarity, so you'd never see a solution with this concentration out in the real world.
4) 2.67 M.
5) 4.32×10^{-2} M, or 0.0432 M.
6) The equation for molarity states that the molarity of a solution is equal to the number of moles of solute divided by the number of liters of solution. In the first equation, the molarity will clearly be equal to 1.0 M, because there are 1.0 moles of NaCl and a solution volume of 1.0 L. In the second solution, the molarity will be different, because the solution volume will be greater than 1.0 liters. Why? If you already have 1.0 L of water and add 1.0 moles of salt to it, it will overflow, right? This is because the volume will be (roughly) equal to the volume of the water plus the volume of the salt, which will be greater than 1.0 L. It is for this reason that when you make a solution, you always dissolve the solute in only a little bit of water and then add water to make your final volume.

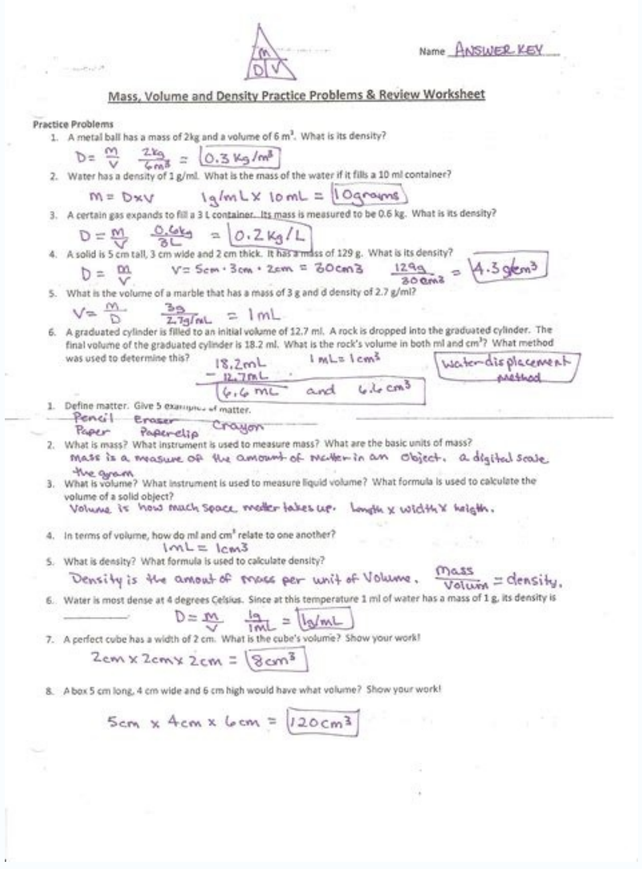
Solutions to Making Solutions Practice Worksheet

1) 4.52 grams
2) 1030 mL
3) 8.33 grams
4) If you were to do this, the solution would have a final volume greater than 1.00 L, because sodium chloride itself takes up space. The correct way to do this would be to add water to 58.5 grams of sodium chloride until the final volume of the solution is 1.00 L.

http://www.chemfiesta.com

Worksheet 27 molarity and parts per million calculations answers. Chemical calculations worksheet answers.

Lesson Day Date Topic 1. Molarity 1 2. Molarity Lab Molarity 2 3. Stoichiometry 4. Titrations lab 1 Homework WS # 4 5. Titrations Lab 2 Homework WS # 5 6. Dilutions 7. Spectrophotometry Lab 8. Molarity and Dilutions 9. Ion Concentration 10. Molarity Unit Review # 1 11. Molarity Unit Review # 2 12. Chemistry 11 Calculations Practice Test # 1 13. Chemistry 11 Calculations Practice Test # 2 Molarity Worksheet # 1 1. 15.8 g of KCl is dissolved in 225 mL of water. Calculate the molarity. 15.8 g x 1 mole Molarity = 74.6 g = 0.941 M 0.225 L 2. Calculate the mass of KCl required to prepare 250. mL of 0.250 M solution. 0.250 L x 0.250 moles x 74.6 g = 4.66 g 1 L 1 mole 3. Calculate the volume of 0.30 M KCl solution that contains 6.00 g of KCl. 6.00 g x 1 mole x 1 L = 0.27 L 74.6 g 0.30 mol 4. Calculate the volume of 0.250 M H2SO4 that contains 0.250 g H2SO4. 0.250 g H2SO4 x 1 mole x 1 L = 0.0102 L 98.12 g 0.250 mole 5. 1.50 g of NaCl is dissolved in 100.0 mL of water. Calculate the concentration. 1.50 g x 1 mole Molarity = 58.5 g = 0.256 M 0.1000 L 6. How many moles of NaCl are in 250. mL of a 0.200 M solution? 0.250 L x 0.200 mole = 0.0500 moles 1 L 7. How many litres of a 0.200 M KCl solution contain 0.250 moles? 0.250 moles x 1 L = 1.25 L 0.200 moles 8. How many millilitres of 0.200 M H2SO4 are required to completely neutralize 250. mL of 0.250 M NaOH? H2SO4 + 2NaOH → Na2SO4 + 2HOH ? mL 0.250 L 0.250 L NaOH x 0.250 mole x 1 mole H2SO4 x 1 L x 1000 mL = 156 mL 1 L 2 mole NaOH 0.200 mole 1 L 9. Calculate the mass of CuSO4.5H2O required to prepare 100.0 mL of 0.100 M solution. 0.100 L x 0.100 mole x 249.7 g = 2.50 g 1 L 1 mole 10. Calculate the mass of Cu(NO3)2.6H2O required to prepare 100.0 mL of 0.200 M solution.



Name ANSWER KEY

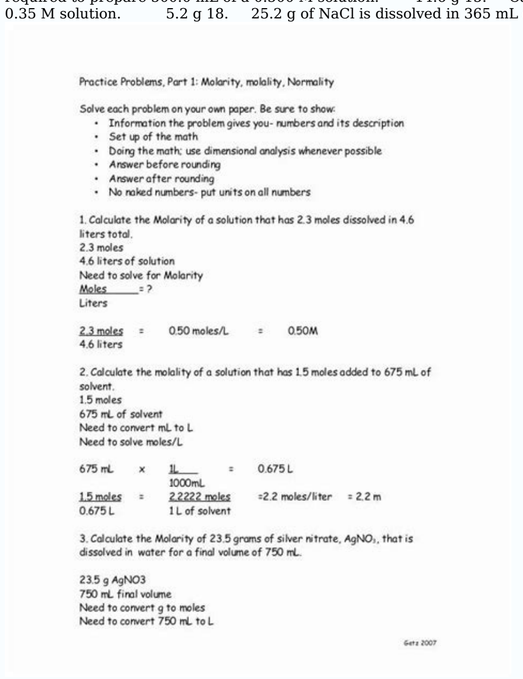
Mass, Volume and Density Practice Problems & Review Worksheet

Practice Problems

1. A metal ball has a mass of 2kg and a volume of 6 m^3. What is its density?
   $D = \frac{m}{v}$ $\frac{2kg}{6m^3} =$ 0.3 Kg/m^3
2. Water has a density of 1 g/ml. What is the mass of the water if it fills a 10 ml container?
   $m = D \times V$ 1g/mL x 10 mL = 10grams
3. A certain gas expands to fill a 3 L container. Its mass is measured to be 0.6 kg. What is its density?
   $D = \frac{m}{v}$ $\frac{0.6kg}{3L} =$ 0.2 Kg/L
4. A solid is 5 cm tall, 3 cm wide and 2 cm thick. It has a mass of 129 g. What is its density?
   $D = \frac{m}{v}$ $V = 5cm \cdot 3cm \cdot 2cm = 30cm^3$ $\frac{129g}{30cm^3} =$ 4.3 g/cm^3
5. What is the volume of a marble that has a mass of 3 g and d density of 2.7 g/ml?
   $V = \frac{m}{D}$ $\frac{3g}{2.7g/mL} =$ 1 mL
6. A graduated cylinder is filled to an initial volume of 12.7 ml. A rock is dropped into the graduated cylinder. The final volume of the graduated cylinder is 18.2 ml. What is the rock's volume in both ml and cm^3? What method was used to determine this? 18.2mL − 12.7mL = 5.6 mL and 5.6 cm^3 1 mL = 1 cm^3 water displacement method

1. Define matter. Give 5 examples of matter.
   Pencil Eraser Paper Paperclip Crayon
2. What is mass? What instrument is used to measure mass? What are the basic units of mass?
   mass is a measure of the amount of matter in an object. a digital scale the gram
3. What is volume? What instrument is used to measure liquid volume? What formula is used to calculate the volume of a solid object?
   Volume is how much space matter takes up. length x width x height.
4. In terms of volume, how do ml and cm^3 relate to one another?
   1mL = 1cm3
5. What is density? What formula is used to calculate density?
   Density is the amount of mass per unit of Volume. $\frac{Mass}{Volume}$ = density.
6. Water is most dense at 4 degrees Celsius. Since at this temperature 1 ml of water has a mass of 1 g, its density is
   $D = \frac{m}{v}$ $\frac{1g}{1mL} =$ 1g/mL
7. A perfect cube has a width of 2 cm. What is the cube's volume? Show your work!
   2cm x 2cm x 2cm = 8cm^3
8. A box 5 cm long, 4 cm wide and 6 cm high would have what volume? Show your work!
   5cm x 4cm x 6cm = 120cm^3

5.91 g 11. Calculate the mass of CoCl3.6H2O required to prepare 500.0 mL of a 0.200 M solution. 27.4 g 12. 50.0 g of NaCl is dissolved in 200.0 mL of water, calculate the molarity. 4.27 M 13. 25.0 g of CuSO4.8H2O is dissolved in 25.0 mL of water, calculate the molarity. 3.29 M 14. Calculate the mass of NaCl required to prepare 500.0 mL of a 0.500 M solution. 14.6 g 15. Calculate the volume of 0.500 M NaCl solution required to contain 0.0500 g of NaCl. 0.00171 L 16. Calculate the volume of 0.200 M NaCl solution required to contain 0.653 g of NaCl. 0.0558L 17. Calculate the mass of NaCl required to prepare 256 mL of a 0.35 M solution. 5.2 g 18. 25.2 g of NaCl is dissolved in 365 mL of water, calculate the molarity.



Practice Problems, Part 1: Molarity, molality, Normality

Solve each problem on your own paper. Be sure to show:
- Information the problem gives you- numbers and its description
- Set up of the math
- Doing the math; use dimensional analysis whenever possible
- Answer before rounding
- Answer after rounding
- No naked numbers- put units on all numbers

1. Calculate the Molarity of a solution that has 2.3 moles dissolved in 4.6 liters total.
2.3 moles
4.6 liters of solution
Need to solve for Molarity
Moles_____= ?
Liters

2.3 moles = 0.50 moles/L = 0.50M
4.6 liters

2. Calculate the molality of a solution that has 1.5 moles added to 675 mL of solvent.
1.5 moles
675 mL of solvent
Need to convert mL to L
Need to solve moles/L

675 mL x 1L / 1000mL = 0.675 L

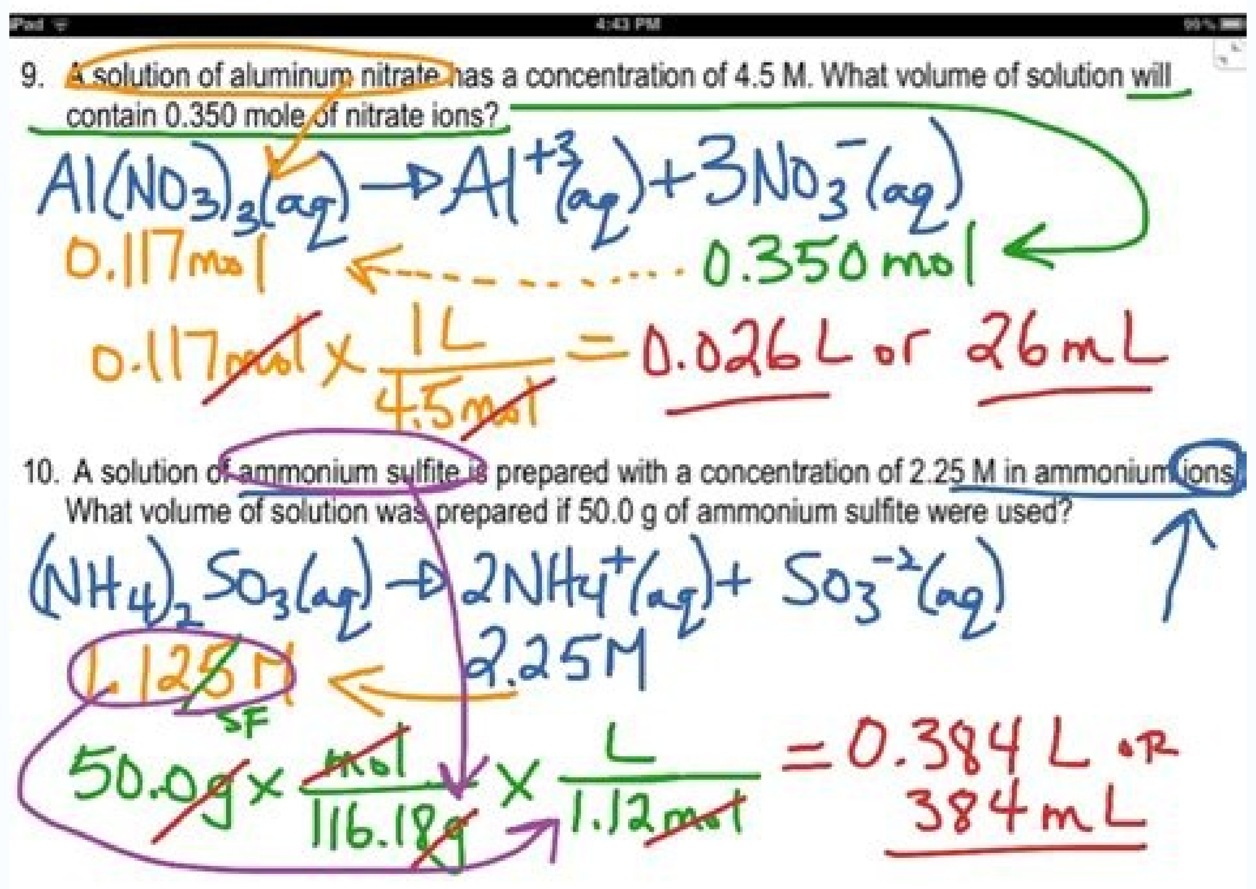
1.5 moles = 2.2222 moles = 2.2 moles/liter = 2.2 m
0.675 L 1 L of solvent

3. Calculate the Molarity of 23.5 grams of silver nitrate, $AgNO_3$, that is dissolved in water for a final volume of 750 mL.

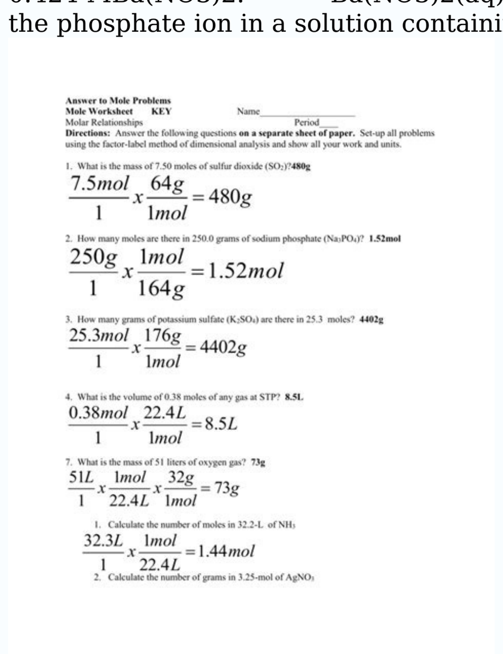
23.5 g AgNO3
750 mL final volume
Need to convert g to moles
Need to convert 750 mL to L

Getz 2007

1.18 M 19. 56.3 g of CuSO4.8H2O is dissolved in 30. mL of water, calculate the molarity. 6.2 M Worksheet # 2 Molarity 1. Calculate the mass of CuSO4.6H2O required to prepare 200.0 mL of 0.300 M solution. 0.200 L x 0.300 moles x 267.72 g = 16.1 g 1 L 1 mole 2. Calculate the mass of CoCl3.8H2O required to prepare 300.0 mL of a 0.520 M solution. 0.300 L x 0.520 moles x 309.56 g = 48.3 g 1 L 1 mole 3. 150.0 g of NaCl is dissolved in 250.0 mL of water, calculate the molarity. 150.0 g x 1 mole Molarity = 58.5 g (3sig figs) = 10.3 M 0.250 L 4. 25.2 g of CuSO4.6H2O is dissolved in 28.0 mL of water, calculate the molarity. 25.2 g x 1 mole Molarity = 267.72 g = 3.36 M 0.0280 L 5. Calculate the mass of NaCl required to prepare 565.0 mL of a 0.450 M solution. 0.5650 L x 0.450 moles x 58.5 g = 14.9 g 1 L 1 mole 6. Calculate the volume of 0.250 M NaCl solution required to contain 0.0300 g of NaCl. 0.0300 g NaCl x 1 mole x 1 L = 0.00205 L 58.5 g 0.250 mole 7. Calculate the volume of 0.500 M NaCl solution required to contain 0.52 g of NaCl. 0.52 g NaCl x 1 mole x 1 L = 0.018 L 58.5 g 0.500 mole 8. Calculate the mass of NaCl required to prepare 360.0 mL of a 0.35 M solution. 0.3600 L x 0.35 moles x 58.5 g = 7.4 g 1 L 1 mole 9. 55.6 g of NaCl is dissolved in 562 mL of water, calculate the molarity. 55.6 g x 1 mole Molarity = 58.5 g = 1.69 M 0.562 L 10. 78.9 g of CuSO4.8H2O is dissolved in 500.0 mL of water, calculate the molarity. 78.9 g x 1 mole Molarity = 303.76 g = 0.519 M 0.5000 L Stoichiometry Worksheet # 3 1. Excess sodium hydroxide solution is added to 20.0 mL of 0.184 M ZnCl2, calculate the mass of zinc hydroxide that will precipitate. NaOH(aq) + ZnCl2(aq) → Zn(OH)2(s) + 2NaCl(aq) 0.0200 L ?



g 0.0200 L ZnCl2 x 0.184 mole x 1 mole Zn(OH)2 x 99.42 g = 0.366 g Zn(OH)2 1 L 1 mole ZnCl2 1 mole 2. How many millilitres of 1.09 M HCl are required to react with a solution formed by dissolving 0.775 g of sodium carbonate? Na2CO3(aq) + 2HCl(aq) →
2NaCl(aq) + H2O(l) + CO2(g) 0.775g ? mL 0.775 g Na2CO3 x 1 mole x 2 mole HCl x 1 L x 1000 mL = 13.4 mL 106 g 1 mole Na2CO3 1.09 moles 1 L 3. Calculate the number of grams barium carbonate that can be precipitated by adding 50.0 mL of
0.424 MBa(NO3)2. Ba(NO3)2(aq) + K2CrO4(aq) → BaCrO4(s) + 2KNO3(aq) 0.0500 L Ba(NO)2 x 0.424 mole x 1 mole BaCO3 x 253.3 g = 5.37 g BaCrO4 1 L 1 mole Ba(NO)2 1 mole 4. Determine the number of millilitres of 0.246 M AgNO3 required to precipitate all
the phosphate ion in a solution containing 2.10 g of sodium phosphate. 3AgNO3(aq) + Na3PO4(aq) → Ag3PO4(s) + 3NaNO3(aq) 156 mL 5.


Answer to Mole Problems
Mole Worksheet KEY Name____
Molar Relationships Period____
Directions: Answer the following questions **on a separate sheet of paper.** Set-up all problems using the factor-label method of dimensional analysis and show all your work and units.

1. What is the mass of 7.50 moles of sulfur dioxide (SO2)? **480g**
$\frac{7.5mol}{1} x \frac{64g}{1mol} = 480g$

2. How many moles are there in 250.0 grams of sodium phosphate (Na3PO4)? **1.52mol**
$\frac{250g}{1} x \frac{1mol}{164g} = 1.52mol$

3. How many grams of potassium sulfate (K2SO4) are there in 25.3 moles? **4402g**
$\frac{25.3mol}{1} x \frac{176g}{1mol} = 4402g$

4. What is the volume of 0.38 moles of any gas at STP? **8.5L**
$\frac{0.38mol}{1} x \frac{22.4L}{1mol} = 8.5L$

7. What is the mass of 51 liters of oxygen gas? **73g**
$\frac{51L}{1} x \frac{1mol}{22.4L} x \frac{32g}{1mol} = 73g$

1. Calculate the number of moles in 32.2-L of NH3
$\frac{32.3L}{1} x \frac{1mol}{22.4L} = 1.44mol$

2. Calculate the number of grams in 3.25-mol of AgNO3

How many grams of silver nitrate must be used in the preparation of 150. mL of 0.125 M solution. 3.19 g 6. What volume of SO2 is generated by the complete reaction of 35.0 mL of 0.924 M Na2SO3? Na2SO3(aq) + 2NaOH(aq) → 2NaCl(aq) + H2O(l) + SO2(g) 0.724 L 7. How many milliliters of 6.2 M
NaOH must react to liberate 2.4 L of hydrogen at STP? 2Al(s) + 6NaOH(aq) → 2Na3AlO3(aq) + 3H2(g) 35 mL 8. Calculate the weight of H2C2O4.2H2O required to make 750.0 mL of a 0.480 M solution. 45.4 g 9. 25.4 L of HCl gas at STP are dissolved in 2.5 L of water to produce an acid solution.
What volume of 0.200 M Ba (OH) 2 will this solution neutralize? 2HCl + Ba(OH)2 → BaCl2 + 2HOH 25.4 L HCl x 1 mole x 1mole Ba (OH) 2 x 1L = 2.83 L 22.4 L 2 mole HCl 0.200 mol 10. 8.25 L at STP of HCL gas is dissolved in
500 ml of water to produce an acid solution. What volume of 0.200 M Ca (OH) 2 will this solution neutralize? Ca (OH) 2 + 2HCl → CaCl2 + 2H2O 8.25 L HCL x 1 mole x 1 mole Ca (OH) 2 x 1 L = 0.921L 22.4 L 2 mole HCL 0.200
mol 11. 250 mL of water is added to 100 mL of 0.0200M H2SO4.
What volume of 0.100M KOH will it neutralize? H2SO4 + 2KOH → 2K2SO4 + 2HOH 0.1 L H2SO4 x 0.0200mol x 2 mole KOH x 1 L x 1000 mL 1L 1 mole H2SO4 0.100 mol 1 L = 40ml 12. What volume of 0.924 M Na2SO3 is required for the
production of 350.0 mL of SO2 at STP? 2HCl + Na2SO3(aq) + 2NaOH(aq) → 2NaCl(aq) + H2O(l) + SO2(g) 1.69 x 10-2L 13. How many milliliters of hydrogen at STP can be generated by 500.0 mL 6.2 M NaOH completely reacting with excess Al. 2Al(s) + 6NaOH(aq) → 2Na3AlO3(aq) +
3H2(g) 3.5 x 104 mL 14. 64.5 L of HCl gas at STP are dissolved in water to produce an acid solution. What volume of 0.200 M Ba (OH)2 will this solution neutralize? 7.20 L Titration Calculations Worksheet # 4 1.
In a titration 12.5 mL of 0.200 M NaOH ia required to neutralize 10.0 mL of H2SO4. Calculate the concentration of the acid ? H2SO4 + 2NaOH → Na2SO4 + 2HOH 0.0100 L 0.0125 L ? M 0.200 M Molarity = 0.0125 L NaOH x 0.200 moles
x 1 mole H2SO4 1 L 2 mole NaOH 0.0100 L = 0.125 M 2. In a titration 22.5 mL of 0.100 M HCl ia required to neutralize 20.0 mL of Ba(OH)2 . Calculate the concentration of the base ?
2HCl + Ba(OH)2 → BaCl2 + 2HOH 0.0225 L 0.0200 L 0.100 M ? M Molarity = 0.0225 L HCl x 0.100 moles x 1 mole Ba(OH)2 1 L 2 mole HCl
0.0200 L = 0.0563 M 3. A burette filled with 1.52 M nitric acid solution reads 33.10 mL initially. After titrating a 25.00 mL sample of barium hydroxide the endpoint was reached and the burette showed 46.30 mL. What is the barium hydroxide concentration? 46.30 - 33.10 = 13.20 mL = 0.01320 L
2HNO3 + Ba(OH)2 → Ba(NO3)2 + 2HOH 0.01320 L 0.02500 L 1.52 M ?
M 0.0132L HNO3 x 1.52 mole x 1 mole Ba(OH)2 Molarity = 1 L 2 mole HNO3 = 0.402 M 0.02500 L 4. A burette filled with 2.557 M sodium hydroxide solution reads 15.62 mL initially. After titrating a 25.00 mL sample of
phosphoric acid the endpoint was reached and the burette now showed 39.22 mL. What is the [phosphoric acid]? 39.22 - 15.62 = 23.60 mL = 0.02360 L 3NaOH + H3PO4 → Na3PO4 + 3H2O 0 .02360 L 0.02500 L 2.557 M ?
M 0.02360 L NaOH x 2.557 mole x 1 mole H3PO4 Molarity = 1 L 3 mole NaOH = 0.8046 M 0.02500 L 5. A 10.00 mL sample of 2.120 M sodium hydroxide solution is placed in a 250.0 mL Erlenmeyer flask. An indicator called
bromothymol blue is added to the solution.
The solution is blue. Hydrochloric acid was added from a burette until there was a green color (endpoint had been reached). Determine the concentration of hydrochloric acid given the following burette readings: Burette final = 22.04 mL Burette initial - 12.08 mL
Difference = 9.96 mL Beware subtraction!!!! One sig fig is lost!!! NaOH + HCl → NaCl + H2O .01000 L .00996 L 2.120 M ? M 0.01000 L NaOH x 2.120 mole x 1 mole HCl Molarity =
1 L 1 mole NaOH = 2.13 M HCl 0.00996 L 6. The following data was obtained during the titration of 1.0097 M sodium hydroxide with a 25.00 mL aliquot of hydrofluoric acid: Trial 1 Trial 2 Trial 3
Burette Final Reading 34.56 mL 39.42 mL 44.20 mL Burette Initial Reading 14.94 mL 19.86 mL 24.66 mL Vol. of NaOH Added Use the above information to determine the concentration of the acid. NaOH
+ HF → NaF + H2O 0 .01955 L 0 .0250 L 1.0097 M ? M 0.01955 L NaOH x 1.0097 mole x 1 mole HF [HF] = 1 L 1 mole NaOH = 0.7896 M 0.0250 L 7. The following
data was obtained during the titration of 0.0998 M sodium hydroxide with a 10.00 mL aliquot of sulphuric acid: Trial 1 Trial 2 Trial 3 Burette Final Reading 26.05 mL 48.52 mL 33.78 mL Burette Initial Reading 2.46 mL 34.94 mL 20.22
mL Vol. of NaOH added Use the above information to determine the concentration of the acid. 6.77 x 10-2 M 8. The following data was obtained during the titration of 2.0554 M hydrochloric acid with a 25.00 mL aliquot of barium hydroxide: Trial 1
Trial 2 Trial 3 Burette Final Reading 22.92 mL 25.32 mL 41.30 mL Burette Initial Reading 0.06 mL 2.58 mL 18.54 mL Volume of Acid Added Use the above information to determine the concentration of the barium hydroxide.
0.9352 M 9. What volume of 2.549 M NaOH is needed to fully titrate 50.0 mL of 1.285 M HCl solution ? HCl + NaOH → 0.0500 L HCl x 1.285 mol x 1 mole NaOH x 1L = 0.0252 L 1 L 1 mole HCl 2.549 mole 10. What volume of 1.146 M KOH is needed to
fully titrate 20.8 mL of 0.557 M H2SO4 solution ? H2SO4 + 2KOH → 0.0208 L H2SO4 x 0.557 mol x 2 mole KOH x 1L = 0.0202 L 1 L 1 mole H2SO4 1.146 mole Titrations Worksheet # 5 1. Calculate the mass of H2C2O4.2H2O required to prepare 500.0
mL of a 0.200M solution. 12.6 g 2. Calculate the mass of Cu2SO4.6H2O required to prepare 200.0 mL of a 0.300M solution.
19.9 g 3. In a titration 0.200 M NaOH is used to neutralize 10.0 mL of H2SO4. In three runs, the following data was collected. Calculate the concentration of the acid. Volume of 0.20 M NaOH (mL) Initial Burette Reading 12.90 15.70 18.50 Final Burette
Reading 15.70 18.50 21.50 0.028 M 4. In a titration 0.250 M KOH is used to neutralize 25.0 mL of H3PO4. In three runs, the following data was collected. Calculate the concentration of the acid. Volume of 0.250 M KOH (mL) Initial Burette Reading 2.90
15.70 28.70 Final Burette Reading 15.70 28.70 42.70 12.80 13.00 14.00 Use 12.90 mL 0.0430 M 5. Calculate the volume of 0.500M H3PO4 required to neutralize 25.0 mL of 0.200M NaOH. 0.00333L 6.
Calculate the volume of 0.50 M NaOH required to neutralize 35.0 mL of 0.100M H2C2O4.
0.014L 7. In a titration 35.7 mL of 0.250 M H3PO4 is used to neutralize 25.0 mL of KOH. Calculate the molarity of the base. 2.08 M 8. In a titration 35.2 mL of 0.20 M H2C2O4 is used to neutralize 10.0 mL of NaOH. Calculate the molarity of the base. 1.4 M 9. 2 Al + 3 I2 → 2 AlI3
Initial 12.0 mol 15.0 mol 0 Change: End: 2.0 mol 0mol 10.0 mol 10. C + 2Cl2 → CCl4 Initial 16.0 mol 34.0 mol 0 Changes: End: 0 mol 2.0
mol 16.0 mol 11. 4 Fe + 3 O2 → 2 Fe2O3 Initial 12.0 mol 8.0 mol 0 Change: End: 1.3 mol 0 mol 5.3 mol 12. 2 NO + O2 → 2 NO2
100. g x 1 mole 100.
g x 1 mole 0 30.0 g 32.0 g Init: 3.333 3.125 3.333 Change: 3.333 1.667 3.333 End: 0 1.458 mol x 32.0 g 3.333 x 46.0 g
1 mole 1 mole Grams: 0 g 46.7 g 153 g 13. Calculate the volume of H2 gas produced at STP by the reaction of 300. mL of 0.500 M HCl with excess Zn. Zn + 2HCl → H2 + ZnCl2 0.300 L x 0.500
moles x 1 mole H2 x 22.4 L = 1.68 L 1 L 2 mole HCl 1 mole 14. Calculate the volume of 0.30 M KCl solution that contains 9.00 g of KCl. 0.40 L Dilutions Worksheet # 6 1. 20.0 mL of 0.200 M NaOH solution is diluted to a final volume of 100.0 mL, calculate the new concentration.
M1V1 = M2V2 (20.0)(0.200) = M2(100.0) M2 = 0.0400 M 2. 15.0 mL of a solution of NaOH is diluted to a final volume of 250.0 mL and the new molarity is 0.0500 M. Calculate the original molarity of the base. M1V1 = M2V2 (15.0) M1 = (250.0) (0.0500) M1 =
0.833 M 3. 50.0 mL of 0.025 M NaOH solution is added to 150.0 mL of water. Calculate the new molarity. V2 = 50.0 mL + 150.0 mL = 200.0 M1V1 = M2V2 (0.025)(50.0) = M2 (200.0) M2 = 0.0063M 4.
45.0 mL of a solution of NaOH is diluted by adding 250.0 mL of water to produce a new molarity of 0.0500 M. Calculate the molarity of the base. 0.328 M 5. A 0.125 M solution is concentrated by evaporation to a reduced final volume of 100.0 mL and a molarity of 0.150 M. Calculate the original volume.
120. mL 6. 850.0 mL of 0.280 M KOH solution is diluted to a final volume of 1000.0 mL, calculate the new concentration. 0.238 M 7. 95.0 mL of a solution of NaOH is diluted to a final volume of 135 mL and the new molarity is 0.0500 M. Calculate the original molarity of the base. 0.0711 M Molarity Review # 7 1.
Convert 250. g AgNO3 to formula units and then to atoms of O. 2.66 x 1024 at O 2. Convert 5.9 x1025 H2 molecules to grams. 2.0 x 102 g H2 3. Calculate the percentage composition of MgSO4. 20.2 % Mg 26.7 % S 53.2 % O 4. A compound is 42.3 % C, 5.94 % H, 32.9 % N, and18.8 % O and has a
molecular mass of 425.25 g/mol. Calculate the empirical and molecular formula. C3H5N2O C15H25N10O5 5. How many grams O2 are required to consume 56.3 g Al?
4Al + 3O2 → 2Al2O3 50.0 g O2 6.
25.5 mL of 0.100 M HCl reacts with excess Zn to produce 25.3 mL of H2 gas at STP. Calculate the theoretical yield in mL and the percentage yield of H2 gas. Zn + 2HCl → H2 + ZnCl2. 0.0255 L x 0.100 mole x 1 mole H2 x 22.4 L = 0.0286 L 88.6 % 1 L 2
mole HCl 1 mole 7. Calculate the energy produced by the complete reaction of 150. g H2. 2H2 + O2 → 2H2O + 130.
KJ 4.83 x 103 KJ 8. 84.0 g of Al reacts with 122 g O2 to produce Al2O3. How many grams of Al2O3 are produced? Determine the mass of the reactant in excess and the limiting reactant. 4Al + 3O2 → 2Al2O3 84.0 g x 1 mole 122 g x 1 mole 27.0
g 32.0 g I 3.111 mole 3.8125 mole 0 C 3.111 mole 2.333 mole 1.5556 mole E 0 1.4795 mole 1.5556 mole 47.3 g
159 g 9. 15.2 g of Al reacts with 14.3 g O2 to produce Al2O3. How many grams of Al2O3 are produced? Determine the mass of the reactant in excess and the limiting reactant. 4Al + 3O2 → 2Al2O3 15.2 g x 1 mole 14.3 g x 1 mole 27.0
g 32.0 g I 0.5630 mole 0.4469 mole 0 C 0.5630 mole 0.4222 mole 0.2815 mole E 0 0.0247 mole 0.2815 mole 0.79 g
28.7 g 10. 15.8 g of KCl is dissolved in 225 mL of water. Calculate the molarity. [KCl] = 15.8 g x 1 mole = 0.941 M 74.6 g 0.225 L 11. Calculate the mass of KCl required to prepare 250.0 mL of 0.250 M solution. 0.2500L
x 0.250 mole x 74.6 g = 4.66 g KCl 1 L 1 mole 12.
Calculate the volume of 0.30 M BaCl2 solution that contains 6.00 g of KCl. 6.00 g x 1 mole x 1 L = 0.27 L 74.6 g 0.30 mole 13. Calculate the volume of 0.250 M H3PO4 that contains 0.250 g H2SO4. 0.250 g x 1 mole x 1 L = 0.0102 L
98.03 g 0.250 mole 14. 1.5 g of BaCl2 is dissolved in 100.0 mL of water. Calculate the concentration. 0.072 M 15. How many moles of BaCl2 are in 250.0 mL of a 0.200 M solution? 0.0500 moles 16. How many litres of a 0.200 MBaCl2 solution contain 0.250 moles? 1.25 L 17. Calculate the
volume of H2 gas produced at STP by the reaction of 400.0 mL of 0.800 M HCl with excess Zn. Zn + 2HCl → H2 + ZnCl2 3.58 L 18. Calculate the volume of 0.250 M H3PO4 required to neutralize 25.5 mL of 0.200 M NaOH. H3PO4 + 3NaOH ® Na3PO4 + 3HOH ?
L 0.0255 L 0.0255 L NaOH x 0.200 mole x 1 mole H3PO4 x 1 L = 0.00680 L 1 L 3 mole NaOH 0.250 mole 19. Calculate the volume of 0.500 M KOH required to neutralize 45.3 mL of 0.320 M H2SO4 . H2SO4 + 2KOH ®
K2SO4 + 2HOH 0.0453 L ? L 0.0453 L H2SO4 x 0.320 mole x 2 mole KOH x 1 L = 0.0580 L 1 L 1 mole H2SO4 0.500 mole 20. Calculate the mass of CoCl3.6H2O required to prepare 500.0 mL of a 0.200 M solution. 27.4 g
Worksheet # 8 Dilutions and Molarity 1. 40.0 mL of 0.400 M NaOH solution is diluted to a final volume of 200.0 mL, calculate the new concentration. M1V1 = M2V2 (0.400)(40.0) = M2(200.0) M2 = 0.0800 M 2. 85.0 mL of a solution of NaOH is diluted to a final volume of 290.0 mL and the new
molarity is 0.0500 M. Calculate the original molarity of the base. M1V1 = M2V2 M1(85.0) = (0.0500)(290.0) M1 = 0.171 M 3. 150.0 mL of 0.025 M NaOH solution is added to 150.0 mL of water. Calculate the new molarity. M1V1 = M2V2 (0.025)
(150.0) = M2(300.0) M2 = 0.013 M 4. 220.0 mL of a solution of NaOH is diluted by adding 250.0 mL of water to produce a new molarity of 0.0500 M. Calculate the molarity of the base. M1V1 = M2V2 M1(220.0) = (0.0500)(470.0) M1 = 0.107 M
5. A 0.350 M solution is concentrated by evaporation to a reduced final volume of 100.0 mL and a molarity of 0.825 M. Calculate the original volume. V1 = 236 mL 6. 850.0 mL of 0.280 M KOH solution is diluted to a final volume of 1000.0 mL, calculate the new concentration. M2 = 0.238 M 7. 28 g of KCl is
dissolved in 225 mL of water, calculate the molarity. 1.7 M 8. Calculate the mass of KCl required to prepare 125 mL of 0.450 M solution. 4.20 g 9. Calculate the volume of 0.40 M KCl solution that contains 8.00 g of KCl. 0.27 L 10. Calculate the volume of 0.400 M H2SO4 required to neutralize 25.0 mL of 0.200 M NaOH.
0.00625 L 11. Calculate the volume of H2 gas produced at STP by the reaction of 250.0 mL of 0.600 M HCl with excess Zn. Zn + 2HCl → H2 + ZnCl2 1.68 L 12. 8.5 L of HCl gas at STP is dissolved in 325 mL of water, calculate the molarity of the acid solution. 1.2 M 13. How many moles of NaCl are in
350.0 mL of a 0.400 M solution?
0.140M 14. How many litres of a 0.300 M KCl solution contain 0.350 moles? 1.17 L 15. Calculate the mass of 8.25 x 105 mL of H2 gas at STP. 74.4 g 16. Calculate the number of formula units of KCl in 200.0 mL of 0.300 M solution. 3.61 x 1022 FU Worksheet # 9 Ion Concentration 1. What is the
concentration of each ion in a 10.5 M sodium sulphite solution? Na2SO3 → 2 Na+ + SO32- 10.5 M 21.0M 10.5M 2. What is the concentration of each ion in the solution formed when 94.5 g of nickel (III) sulphate is dissolved into 850.0 mL of water? Ni2 (SO4) 3 → 2Ni3+
+ 3SO42- 0.274 M 0.548M 0.822M Molarity = 94.5 g x 1 mole 405.7 g = 0.274M 0.8500L 3. If 3.78 L of 0.960 M calcium fluoride solution is added to 6.36 L of water, what is the resulting concentration of each ion? M1V1 =
M2V2 CaF2 → Ca2+ + 2F- (0.960) (3.78) = M2 (10.14) 0.358 M 0.358 M 0.716 M M2= 0.358 M 4. What is the concentration of each ion in a 5.55 M zinc phosphate solution? Zn3 (PO4) 2 → 3Zn 2+
+ 2PO43- 5.55 M 16.7 11.1 M 5. What is the concentration of each ion in the solution formed when 94.78 g of iron (III) sulphate is dissolved into 550.0 mL of water? Fe2 (SO4)3 → 2Fe3+ + 3SO42-
0.4309 M 0.8619 M 1.293 M 94.78 g x 1 mol [Fe2 (SO4) 3] = 399.9 g = 0.4309 M 0.5500 L 6. If 6.25 L of 0.560 M sodium bromide solution is added to
3.45 L of water, what is the resulting Concentration of each ion? M1V1 = M2V2 NaBr → Na + + Br - (0.560) (6.25) = M2 (9.70) 0.361 M 0.361 M 0.361 M M2= 0.361 M 7. 50.0 mL of 0.200 M Na3PO4 solution is mixed with 150.0 mL of 0.400 M
Na2CO3. Calculate all ion concentrations. Na3PO4 → 3 Na+ + PO43- 50.0 0.200 M 0.150 M 0.0500 M 200.0 Na2PO4 → 2 Na+ + CO32- 150.0 0.400 M 0.600 M 0.300 M 200.0 [Na+] = 0.600 M + 0.150 M = 0.750
M 8. What is the concentration of each ion in the solution formed when 16.5 g of Aluminum sulphate is dissolved into 600.0 mL of water? 16.5 g x 1 mol [Al2 (SO4) 3] = 342.3 g = 0.0803 M 0.600
L Al2 (SO4) 3 → 2Al3+ + 3SO42- 0.0803 M 0.161 M 0.241M 9. If 1.78 L of 0.420 M barium fluoride solution is added to 2.56 L of water, what is the resulting concentration of each ion? M1V1 = M2V2 BaF2 → Ba2+ + 2F-
(0.420)(1.78) = M2 (4.34) 0.172 M 0.172 M 0.345 M M2 = 0.172 M 10. What is the concentration of each ion in a 1.22 M zinc acetate solution? Zn (CH3COO) 2 → Zn 2+ + 2CH3COO- 1.22 M 1.22M
2.44M 11. What is the concentration of each ion in the solution formed when 94.78 g of cobalt (III) sulphate is dissolved into 400.0 mL of water? [Co2(SO4)3] = 94.78 g x 1 mole 406.1 g = 0.5835 M 0.4000 L
Co2(SO4)3 → 2Co3+ + 3SO42- 0.5835 M 1.167 M 1.750 M 12. If the chloride concentration in 2.00 L of solution is 0.0900 M, calculate the [Al3+] and the molarity of the AlCl3 solution. AlCl3 → Al3+ + 3Cl- 0.0300 M
0.0300 M 0.0900 M 13. If the [Ga3+] concentration in 2.00 L of solution is 0.0300 M, calculate the [SO42-] and the molarity of the Ga2(SO4)3 solution. Ga2(SO4)3 → 2Ga3+ + 3SO42- 0.0150 M 0.0300 M 0.0450 M 14. In a titration 12.5 mL of 0.200 M NaOH is needed to neutralize 10.0 mL
of H3PO4, calculate the acid concentration. H3PO4 + 3NaOH → Na3PO4 + 3HOH 0.0100 L 0.0125 L ? M 0.200 M [H3PO4] = 0.0125 L NaOH x 0.200 mole x 1 moles H3PO4 1 L
3 mole NaOH = 0.0833 M 0.0100 L 15. What volume of 0.200 M H2SO4 is required to neutralize 25.0 mL of 0.300 M NaOH? H2SO4 + 2NaOH → Na2SO4 + 2HOH ? L 0.0250 L 0.200 M 0.300 M 0.0250 L NaOH
x 0.300 mole x 1 moles H2SO4 x 1 L = 0.0188 L 1 L 2 NaOH 0.200 mole 16. The [Cl-] = 0.600 M in 100.0 mL of a AlCl3 solution. How many grams AlCl3 are in the solution? AlCl3 ® Al3+ + 3Cl- 0.200 M 0.600 M 0.1000
L x 0.200 mole x 133.5 g = 2.67 g 1 L 1 mole 17. The [SO42-] = 0.600 M in 100.0 mL of a Al2(SO4)3 solution.
How many grams Al2(SO4)3 are in the solution? 6.85 g Worksheet # 10 Molarity Unit Review # 1 1. 200.0 mL of 0.200 M H2SO4 reacts with 250.0 mL of 0.40 M NaOH, calculate the concentration of the excess base. H2SO4 + 2NaOH → Na2SO4 + 2HOH
0.2000 L x 0.200 mole 0.250 L x 0.40 mole 1 L 1 L I 0.0400 mole 0.100 mole C 0.0400 mole 0.0800 mole E 0 0.020 Note the loss of one sig fig!
[NaOH] = 0.020 mole = 0.044 M 0.4500 L Note that the final volume is 250.0 + 200.0 mL 2. 100.0 mL of 0.100 M H2SO4 reacts with 50.0 mL of 0.20 M NaOH, calculate the concentration of the excess acid. H2SO4 + 2NaOH →
Na2SO4 + 2HOH 0.1000 L x 0.100 mole 0.050 L x 0.20 mole 1 L 1 L I 0.0100 mole 0.010 mole C 0.0050 mole 0.010 mole E 0.0050 mole 0
[H2SO4] = 0.0050 mole = 0.033 M 0.1500 L Note that the final volume is 100.0 + 50.0 mL 3. 500.0 mL of 0.100 M H2SO4 reacts with 400.0 mL of 0.400 M NaOH, calculate the concentration of the excess base. H2SO4 +
2NaOH → Na2SO4 + 2HOH 0.5000 L x 0.100 mole 0.4000 L x 0.40 mole 1 L 1 L I 0.0500 mole 0.16 mole C 0.0500 mole 0.100 mole E 0 mole
0.06 mole Note the loss of sig figs! [NaOH] = 0.06 mole = 0.07 M 0.900 L Note that the final volume is 500.0 + 400.0 mL 4. 100.0 mL of 0.200 M MgCl2 reacts with 300.0 mL of 0.400 M AlCl3, calculate all ion concentrations.
MgCl2 → Mg2+ + 2Cl- 100.0 0.200 M 0.0500 M 0.100 M 400.0 AlCl3 → Al3+ + 3Cl- 300.0 0.400 M 0.300 M 0.900 M 400.0 [Cl-] = 0.100 M + 0.900 M = 1.000 M 5. Change 2.66 moles of H2O to molecules.
1.60 x 1024 molecules 6. Change 9.7x1019 atoms Fe to moles. 1.6 x 10-4 mole 7. Convert 88.3 g AgNO3 to formula units and then to atoms of O. 88.3 g x 1 mol x 6.02 x 1023 FU x 3 atoms O = 9.39 x 1023 atoms O 169.9 g 1 mol 1 FU 8. Convert 3.8 x 1025 H2 molecules to
grams. 1.3 x 102 g 9. Calculate the empirical formula of a compound that is 62.2 % Pb, 8.454 % N, and 28.8 % O. Is this compound ionic or covalent? Pb (NO3) 2 10. A compound is 42.3 % C, 5.94 % H, 32.9 % N, and 18.8 % O and has a molecular mass of 425.25 g/mol. Calculate the empirical and molecular formula.
C15H25N10O5 11. How many moles of Al2O3 are produced by the reaction 200. g Al? 4Al + 302 → 2Al2O3 3.70 mole 12.
How many moles Al are required to produce 300. g Al2O3? 4Al + 302 → 2Al2O3 5.88 mole 13. 100. g Al reacts with excess O2 to produce 150. g Al2O3 according to Calculate the theoretical and percentage yield. 4Al + 302 → 2 Al2O3.
79.4 % 14. Calculate the energy produced by the complete reaction of 150. g H2. 2H2 + O2 → 2H2O + 130. KJ 4.83 x 103 kJ 15. How many grams of H2 would be needed to produce 260. KJ of energy?
2H2 + O2 → 2H2O + 130. KJ 8.08 g 16. 20.
mol H2 reacts with 8.0 mol O2 to produce H2O. Determine the number of grams reactant in excess and number of grams H2O produced. Identify the limiting reactant. 8 g H2 , 2.9 x 102 g H2O 17. How many litres of O2 gas are required to produce 100. g Al2O3? 4Al + 302 → 2Al2O3 32.9 L 18.
15.8 g of KCl is dissolved in 225 mL of water. Calculate the molarity. 0.941 M 19. Calculate the mass of KCl required to prepare 250.0 mL of 0.250 M solution. 4.66 g 20. Calculate the volume of 0.30 M KCl solution that contains 6.00 g of KCl. 0.27 L 21. Calculate the volume of 0.250 M H2SO4 required to neutralize 20.0 mL
of 0.100 M NaOH. 0.00400 L 22. Calculate the volume of H2 gas produced at STP by the reaction of 150.0 mL of 0.500 M HCl with excess Zn. Zn + 2HCl → H2 + ZnCl2 0.840 L 23. 1.5 L of HCl gas at STP is dissolved in 225 mL of water, calculate the molarity of the acid solution. 0.30 M 24. How many
moles of NaCl are in 250. mL of a 0.200 M solution? 0.0500 moles 25. How many litres of a 0.200 M KCl solution contain 0.250 moles? 1.25 L 26.
Calculate the mass of 2.25 x 105 mL of H2 gas at STP. 20.3 g 27. Calculate the number of formula units of KCl in 100.0 mL of 0.200 M solution. 1.20 x 1022 FU 28. 40.6g of KBr is dissolved in 500.0 mL of water, calculate the molarity. 0.682 M 29. Calculate the mass of KBr required to prepare 450.0 mL of 0.350 M solution.
18.7 g 30. Calculate the volume of 0.50 M KCl solution that contains 3.00 g of KCl. 0.080 L 31. Calculate the volume of 0.250 M H3PO4 required to neutralize 25.5 mL of 0.200 M NaOH. 0.00680 L 32. In a titration 22.5 mL of 0.200 M H3PO4 is required to neutralize 10.0 mL of KOH. What is the molarity of the base?
1.35 M Worksheet # 11 Molarity Unit Review # 2 1. 100.0 mL of 0.200 M HCl, 200.0 mL of 0.100 M HBr, and 175 mL of 0.100 M Ba(OH)2. Calculate the concentration of the excess acid or base. 0.1000 L x 0.200 mole = 0.0200 mole HCl 1L 0.2000 L x 0.100 mole = 0.0200 mole HBr
1L = 0.0400 mole HX 0.175L x 0.100 mole = 0.0175 mole Ba(OH)2 1L 2HX + Ba(OH)2 I 0.0400 mole 0.0175 mole C 0.0350 mole 0.0175 mole E 0.0050 mole 0.0000 Total Volume = 100.0 mL + 200.0 mL + 175
mL = 475 mL [HX] = 0.0050 mole 0.475 L [HX] = 0.011 M 2. 150.0 mL of 0.200 M HCl and 250 mL of 0.300 M HNO3 react with excess CaCO3. Calculate the theoretical yield of CO2. Start by writing an equation. HCl + CaCO3 ® CO2 + CaCl2 + H2O 0.1500 L HCl x 0.200 mole x 1 mole CO2
x 44.0 g = 0.660 g 1 L 2 mole HCl 1 mole HNO3 + CaCO3 ® CO2 + Ca(NO3)2 + H2O 0.2500 L HNO3 x 0.300 mole x 1 mole CO2 x 44.0 g = 1.65 g 1 L 2 mole HCl 1 mole Total 2.31 g 3. Calculate the percentage
composition of Al2(SO4)3 to three significant figures. 2 Al 54.0 %Al = 54.0 x 100% = 15.8 % 342.3 3 S 96.3 %S = 96.3 x 100% = 28.1 % 342.3 12 O 192.0 % O =
192.0 x 100% = 56.1% 342.3 342.3 4. A compound is 42.3 % C, 5.94 % H, 32.9 % N, and and18.8 % O and has a molecular mass of 850.5g/mol. Calculate the empirical and molecular formula. 42.3 g C x 1 mol = 3.525 mol = 3
C3H5N2O → C30H50N20O10 12.0 g 5.94 g H x 1 mol = 5.881 mol = 5 1.01 g 32.9 g N x 1 mol = 2.350 mol = 2 14.0 g 18.8 g O x 1 mol = 1.175 mol = 1
16.0 g 5. How many grams of 02 are required to consume 56.3 g Al? 4Al + 302 → 2Al2O3 56.3 g Al x 1 mol x 3 mol O2 x 32.0 g = 50.0 g O2 27.0 g 4 mol Al 1 mol 6. 15.8 g of AlCl3 is dissolved in 225 mL
of water, calculate the molarity. Molarity = 15.8 g x 1 mol 133.5 g = 0.526 M 0.225 L 7. Calculate the mass of AlCl3 required to prepare 250.0 mL of 0.250 M solution. 0.250 L x 0.250 mol x 133.5 g = 8.34 g
L 1 mol 8. Calculate the volume of 0.30 M AlCl3 solution that contains 6.00 g of AlCl3. 6.00 g x 1 mol x 1 L = 0.15 L 33.5 g 0.30 mol 9. Calculate the volume of 0.450 M H2SO4 required to neutralize 25.0 mL of
0.200 M NaOH. H2SO4 + 2NaOH → Na2SO4 + 2HOH ? L 0.025 L 0.025 L NaOH x 0.200 mol x 1 mol H2SO4 x L = 0.00556 L L 2 mol NaOH 0.450 mol 10. Calculate the volume of H2
gas produced at STP by the reaction of 350.0 mL of 0.600 M HCl with excess Zn. Zn + 2HCl → H2 + ZnCl2 0.350 L HCl x 0.600 mol x 1 mol H2 x 22.4 L = 2.35 L L 2 mol HCl 1 mol 11. 2.9 L of HCl gas at STP is dissolved in
225 mL of water, calculate the molarity of the acid solution. Molarity = 2.9 L x 1 mol = 0.58 M 22.4 L 0.225 L 12. How many moles of NaCl are in 500.0 mL of a 0.300 M solution? 0.500 L x 0.300 mol = 0.150 mol
L 13. How many litres of a .2300 M KCl solution contain 0.250 moles? 0.250 mol x L = 1.09 L 0.2300 mol 14. Calculate the mass of 560. mL of CO2 gas at STP. 0.560 L x 1 mol x 44.0 g = 1.10g
22.4 L 1 mol 15. Calculate the number of formula units of NaCl in 100.0 mL of 0.200 M solution. 0.100 L x 0.200 mol x 6.02 x 1023 FU = 1.20 x 1022 FU L 1 mol 16. 25.5 mL of 0.100 M HCl reacts with excess Zn to produce 25.3 mL of H2 gas at STP.
Calculate the theoretical yield in mL and the percentage yield of H2 gas. Zn + 2HCl → H2 + ZnCl2. 0.0255 L x 0.100 mol x 1 mol H2 x 22.4 L = 0.0286 L L 2 mol HCL 1 mol % Yield = 25.3 x 100 % = 88.6 %
28.6 17. Calculate the energy produced by the complete reaction of 150. g H2. 2H2+O2 → 2H2O + 130KJ 150 g H2 x 1mol x 130 KJ = 4.83 x 103 KJ 2.02 g 2 mol 18. 84.0 g of Al reacts with 122g O2 to produce Al2O3. How
many grams of Al2O3 are produced? Determine the mass of the reactant in excess and the limiting reactant. 4 Al + 3O2 → 2Al2O3 84.0 g x 1 mol 122g x 1mol 27.0 g 32.0 g I 3.111
mol 3.813 mol 0 C 3.111 mol 2.333 mol 1.556 E 0 1.48 mol 1.556 Limiting 47.4 g O2 excess 159 g 19. Calculate the
percentage composition of Na2SO4. 2 Na 46.0 g % Na = 32.4 % 1 S 32.1 g % S = 22.6 % 4 O 64.0 g % O = 45.0 % 142.1 20. How many litres of O2 gas are required to produce 100. g
Al2O3? 4Al + O2 → 2Al2O3 100. g Al2O3 x 1 mole x 3 mole O2 x 22.4 L = 32.9 L 102 g 2 mole Al2O3 1 mole 21. Calculate the molar mass of a gas that weighs 19.43 g and has a STP volume of 9.894 L.
If the gas is a very funny one containing nitrogen and used by the dentist, determine the molar mass and molecular formula for the gas. 9.894 L x 1 mole = 0.4417 mole 22.4 L Molar Mass = 19.43 g = 44.0 g/mole N2O
0.4417 mole Write a balanced formula equation, complete ionic equation, and net ionic equation for each reaction. There are two no reactions.
22.
Zn(s) + 2AgNO3(aq) → 2Ag(s) + Zn(NO3)2(aq) Zn(s) + 2Ag+ + 2NO3- → 2Ag(s) + Zn2+ + 2NO3- Zn(s) + 2Ag+ → 2Ag(s) + Zn2+ 23. BaS (aq) + 2KOH(aq) → Ba(OH)2(s) + K2S(aq) Ba2+ + S2- + 2K+ +
2OH- → Ba(OH)2(s) + 2K+ + S2- Ba2+ + 2OH- → Ba(OH)2(s) 24. 2NaCl(aq) + F2(g) → 2NaF(aq) + Cl2(g) 2Na+ + 2Cl- + F2(g) → 2Na+ + 2F- + Cl2(g) 2Cl- + F2(g) → 2F- + Cl2(g) 25. Sr(OH)2 (aq)
+ CuSO4(aq) → Cu(OH)2 (s) + SrSO4(s) Sr2+ + 2OH- + Cu2+ + SO42- → Cu(OH)2 (s) + SrSO4(s) Sr2+ + 2OH- + Cu2+ + SO42- → Cu(OH)2 (s) + SrSO4(s) 26. NaCl(aq) + Cu(NO3)2(aq) → No reaction, both possible
products have high solubility 27. NaCl(aq) + ZnF2(aq) → No reaction, both possible products have high solubility 28. 100.0 g of an aqueous compound that is 45.49 % Pb, 12.31 % N, and 42.20 % O reacts with another compound that is 28.16 % N, 8.13 % H, 20.79 % P, and 42.91 % O. If the actual yield of the product
containing lead is 60.0 g, calculate the percentage yield. 60.0 g Actual Yield 3Pb(NO3)4(aq) + 4(NH4)3PO4(aq) → Pb3(PO4)4(s) + 12NH4NO3(aq) 100.0 g ? g Theoretical Yield 100.0 g Pb(NO3)4 x 1 mole
x 1 mole Pb3(PO4)4 x 1001.6 g = 73.3 g 455.2 g 3 mole 3Pb(NO3)4 1 mole % yield = 60.0 g x 100% = 81.8 % 29. The following data was obtained during the titration of 2.0554 M hydrochloric acid with a 25.00 mL aliquot of barium
hydroxide: Trial 1 Trial 2 Trial 3 Burette Final Reading 22.92 mL 25.32 mL 41.30 mL Burette Initial Reading 0.06 mL 2.58 mL 18.54 mL Vol. of Acid Added 22.86 mL 22.74
mL 22.76 mL Use the above information to determine the concentration of the barium hydroxide. 2HCl + Ba(OH)2 → 0.02275 L 0.02500 L 2.0554 M ? M Molarity Ba(OH)2 = 0.02275 L x 2.0554 mole x 1 mole Ba(OH)2
1 L 2 mole HCl 0.02500 L = 0.9352 M 30. 20.0 mL of 0.200 M NaOH solution is diluted to a final volume of 100.0 mL, calculate the new concentration. M1V1
= M2V2 (0.200)(20.0) = M2(100) M2 = 0.0400 M 31. 20.0 mL of 0.300 M AlCl3 is mixed with 20.0 mL of 0.300 CaCl2, calculate all ion concentrations. AlCl3 → Al3+ + 3Cl- 20.0 0.300 M 0.150 M 0.450 M 40.0 CaF2 → Ca2+
+ 2Cl- 20.0 0.300 M 0.150 M 0.300 M 40.0 [Cl-] = 0.450 M + 0.300 M = 0.750 M 32. A burette filled with 2.000 M sodium hydroxide solution reads 20.20 mL initially. After titrating a 25.00 mL sample of phosphoric acid the endpoint was reached and the burette now showed 40.20 mL. What is the [phosphoric
acid]? H3PO4 + 3NaOH → 0.02500 L 0.02000 L ? M 2.000 M Molarity H3PO4 = 0.02000 L x 2.000 mole x 1 mole H3PO4 1 L 3 mole NaOH
0.02500 L = 0.5333 M 33. Calculate the volume of 0.500M KOH required to neutralize 45.0 mL of 0.320 M H2SO4. H2SO4 + 2KOH → 0.0450 L ? L 0.0450 L H2SO4 x 0.320 moles
x 2 mole KOH x 1 L = 0.0576 L 1 L 1 mole H2SO4 0.500 mole 34. 100.0 mL of 0.200 M H2SO4 reacts with 150.0 mL of 0.40 M NaOH, calculate the concentration of the excess base. H2SO4 + 2NaOH → 0.1000 L x 0.200
mole 0.1500 L x 0.40 mole 1 L 1L I 0.0200 mole 0.060 mole C 0.0200 mole 0.0400 mole E 0 0.020 mole Note the loss of one sig fig [NaOH] = 0.020 mole = 0.080 M
0.250 L 35. 200.0 mL of 0.10 M H2SO4 reacts with 100.0 mL of 0.20 M NaOH, calculate the concentration of the excess acid. H2SO4 + 2NaOH → 0.2000 L x 0.100 mole 0.1000 L x 0.20 mole 1 L 1L I 0.0200
mole 0.020 mole C 0.010 mole 0.020 mole E 0.010 loss of one sig fig 0 [H2SO4] = 0.010 mole = 0.033 M 0.300 L 36. 250.0 mL of 0.100 M H2SO4 reacts with 100.0 mL of 0.400 M NaOH and 200.0 mL of 0.200 M KOH, calculate the
concentration of the excess base. H2SO4 + 2XOH → 0.2500 L x 0.100 mole 0.1000 L x 0.400 mole + 0.2000 L x 0.200 mole 1 L 1L 1L I 0.0250 mole 0.0800 mole C 0.0250
mole 0.0500 mole E 0 0.0300 mole [NaOH] = 0.0300 mole = 0.0545 M 0.550 L 37. If the [Al3+] concentration in 3.00 L of solution is .0275 M, calculate all of the ion concentrations and the molarity of a Al2(SO4)3 solution.
Al2(SO4)3 → 2Al3+ + 3SO42- 0.0138 M 0.0275 M 0.0413 M 38. If the sodium ion concentration is 0.450 M in 150.0 mL of a Na3PO4 solution. Determine the mass of Na3PO4 in the solution. Na3PO4 → 3Na+ + PO43- 0.150 M 0.450 M
0.150 M 3.69 g Worksheet # 12 Chemistry 11 Calculations Practice Test # 1 Pick two formulas that match each classification: 1. a b Acid a) HCl e) KOH 2. c d Covalent Nonacid b) CH3COOH f) NH4Cl 3. h f
Salt c) CH4 g) Ba(OH)2 4. e g Base d) HOH h) AgNO3 5. Calculate the molarity of the solution formed when 200 g of NaCl is dissolved in 100 mL of H2O.
Molarity = 200g x 1 mole 58.5g = 34.2 M 0.100 L 6. How many grams of AgCl are required to prepare 150 mL of 0.200 M solution? 0.150L x 0.200 mole x 143.4 g = 4.30 g 1 L 1 mole 7. How many litres of 0.200 M AgCl are needed to
provide 50 g of AgCl? 50g x 1 mole x 1 L = 1.7 L 143.4g 0.200 mole 8. 100 g of AlCl3 is dissolved in 200 mL H2O, calculate [Al3+] and [Cl-]. 100 g x 1 mole Molarity = 133.5 g = 3.745 M AlCl3 → Al3+ + 3Cl- 0.200 L
3.745 M 3.75 M 11.2M 9. In three runs of a titration 36.9, 34.4 and 34.3 mL of 0.200 M NaOH was required to neutralize a 25.0 mL sample of H2CO3. Calculate the molarity of the acid. H2SO4 + 2NaOH → Na2SO4 + 2HOH
0.0250 L 0.3435 L ? M 0.200 M [H2SO4] = 0.03435 L x 0.200 mole x 1 mole H2SO4 = 0.137 M 1 L 2 mole NaOH
0.0250 L = 0.137 M 10. Calculate the [NaOH] due to excess NaOH in the new solution produced by mixing 100. mL 0.200 M HCl and 100. mL 0.300 M NaOH. HCL + NaOH → NaCl + HOH 0.100L x 0.200 mole =
0.0200 mol 0.100L x 0.300 mol = .030 mole 1 L 1 L I 0.0200 mole 0.0300 mole C 0.0200 mole 0.0200 mole E 0 mole 0.0100 mole Total Volume = 200 mL = 0.200 L Molarity =

0.0100 mole = 0.0500 M 0.200 L 11. A empty beaker has a mass of 29.86 g. The same beaker is filled with 0.250 L with a solution of CaCl2 and weighs 87.26 g. The solution is evaporated to dryness and the mass of the beaker and solid is 62.31 g. Calculate the molarity of the solution. Mass of CaCl2 = 62.31 – 29.86 = 32.45g Molarity = 32.45g x 1 mole 111.1g = 1.17 M .250 L 12. Complete the reaction equations. i) Formula Equation/Chemical Equation 2AgNO3 (aq) + Na2SO4 (aq) → Ag2SO4(s) + 2NaNO3(aq) ii) Total Ionic Equation 2Ag+(aq) + 2NO3-(aq) + 2Na+(aq) + SO42-(aq) → Ag2SO4(s) + 2Na+(aq) + 2NO3-(aq) iii) Net Ionic Equation 2Ag+(aq) + SO42- → Ag2SO4(s) 13. Complete the formula equation: 2H3PO4(aq) + 3Sr(OH)2(aq) → Sr3(PO4)2(s) + 6HOH(l) Complete the complete ionic equation: 6H+(aq) + 2PO43- + 3Sr2+(aq) + 6OH- → Sr3(PO4)2(s) + 6HOH(l) Complete the net ionic equation: 6H+(aq) + 2PO43- + 3Sr2+(aq) + 6OH- → Sr3(PO4)2(s) + 6HOH(l) 14. Complete the formula equation: Fe3(PO4)2(aq) + 3Zn(s) → 3Fe(s) + Zn3(PO4)2(s) Complete the complete ionic equation: 3Fe2+(aq) + 2PO43- + 3Zn(s) → 3Fe(s) + Zn3(PO4)2(s) Complete the net ionic equation: 3Fe2+(aq) + 2PO43- + 3Zn(s) → 3Fe(s) + Zn3(PO4)2(s) Worksheet # 13 Chemistry Calculations Practice Test # 2 1. Calculate the number of formula units in 250. g CaCl2. 1.35 x 1024 FU 2. Calculate the mass of 2.35 x 1020 molecules of CO2. 0.0172 g 3. Calculate the STP volume of 10.0 g of CO2 gas.

5.09 L 4. Calculate the number of grams CaCl2 in 350. mL of a 0.250M solution. 9.72g 5. Calculate the volume of 0.250 M NaCl solution that would contain 0.17 g NaCl. 0.012L 6. 1.26 g of AlCl3 are dissolved in 160.0 ml of water. Calculate the molarity of the solution. 0.0590M 7. 12.5 ml of CO2 gas at STP are dissolved in 250.0 ml of water. Calculate the molarity of the solution. 0.00223M 8. 10.0 g of Al2(SO4)3 is dissolved in 155 ml of water. Calculate the two ion concentrations. 0.377 M 0.565 M 9. 200.0 ml of 0.200M H3PO4 reacts with 200.0 ml of 0.300M KOH. Calculate the molarity of the excess acid in the new solution formed.

0.0500M 10. 16 g of Ca react with water. Calculate the volume of H2 gas produced at STP. Ca + 2H2O ® H2 + Ca(OH)2 8.9L 11. In a titration 0.200 M NaOH is used to neutralize 10.0 mL of H2SO4. In three runs the following data was collected. Calculate the concentration of the acid. Volume of 0.200 M NaOH 25.3 mL 25.8 mL 25.6 mL 0.256 M 12. 60.0 g of Al react with 60.0 g of O2. Calculate the amount of excess reactant. 4Al + 3O2 → 2Al2O3 6.66 g O2 13. Calculate the percentage composition of the elements in Ga2 (SO4)3 to three significant digits. 32.6% , 22.5% , 44.9% 14. What volume of 0.300 M solution must be diluted to a final volume of 1200.0 mL and have a molarity of 0.2500M. 1.00L 15. Calculate the number of grams NaCl produced by the complete reaction of 520 g Cl2. 2Na + Cl2 → 2NaCl 857g 16. If the actual yield of NaCl in the last question was 200. g, calculate the percentage yield of NaCl. 23.3% 17. 200.0 ml 0.200 M HCl reacts with 400.0 ml 0.150M NaOH. Calculate the molarity of excess base. HCl + NaOH → NaCl + H2O 0.0333M 18. 100.0 mL of 0.250 M HCl solution is diluted by adding 250.0 mL of water, calculate the new concentration. 0.0714M 19. 65.5 mL of 0.300 M is diluted to a new molarity of 0.0600 M, how much water was added?

262mL 20. 56.0 mL of 0.100 M HCl reacts with 0.250 M Ba (OH) 2, calculate the volume of base required to completely neutralize the acid. 0.0112L 21. Write the formula, complete, and net ionic equation for each. H3PO4 (aq) and NaOH (aq). H3PO4 (aq) + 3NaOH (aq) → Na3PO4 (aq) + 3HOH (l) 3H+ (aq) + PO4-3 (aq) + 3Na+ (aq) + 3OH- (aq) → 3Na+ (aq) + PO4-3 (aq) + 3HOH (l) H+ (aq) + OH- (aq) → HOH (l) 22. Write the formula, complete, and net ionic equation for each. Na3PO4 (aq) and Ca (NO3) 2(aq). 2Na3PO4 (aq) + 3Ca(NO3) 2 (aq) → Ca3 (PO4) 2 (s) + 6NaNO3 (aq) Na+ (aq) + 2PO43- (aq) +3Ca2+ (aq) + 6NO3- (aq) → Ca3 (PO4) 2 (s) + 6Na+ (aq)+ 6NO3- (aq) 3Ca2+ (aq) + 2PO43- (aq) → Ca3 (PO4) 2 (s) 23. Write the formula, complete, and net ionic equation for each. Cu (NO3) 2(aq) and Ag(s). Ag (s) + Cu (NO3) 2 (aq) → No Reaction 24. A empty beaker has a mass of 25.86 g. The same beaker is filled with 0.250 L with a solution of Cl2 and weighs 87.26 g. The solution is evaporated to dryness and the mass of the beaker and solid is 36.31 g. Calculate the molarity of the solution.

0.376 M 25. 125.0 g of an aqueous compound that is 3.091 % H, 31.62 % P, and 65.29 % O reacts with another compound that is 80.14 % Ba, 18.68 % O, and 1.179 % H. If the actual yield of the solid product is 350. g, calculate the percentage yield of the solid. 91.2% 26. 0.0250 M 27. 0.0091 M 28. [Ca2+] = 0.0714 M [Al3+] = 0.193 M [Cl-] = 0.722M 29 [Na+] = 0.333 M [PO43-] = 0.0667 M [SO42-] = 0.0667 M 30. 0.0827 M 31. 150.0 mL of 0.200 M HCl and 250.0 mL of 0.300 M HNO3 react with excess CaCO3. Calculate the theoretical yield of CO2. Start by writing an equation. 2.31 g