



I'm not robot



Continue

14% off 9th Edition Zumdahl 8th Edition DeCoste, Zumdahl 10th Edition Donald J. DeCoste, Steven ... 10th Edition DeCoste, Zumdahl 7th Edition Zumdahl SOLUTIONS MANUALTABLE OF CONTENTS Chapter 1 Chemical Foundations.....	1 Chapter 2 Atoms, Molecules and Ions.....	46 Chapter 4 Types of Chemical Reactions and Solution Stoichiometry.....
Gases.....	25 Chapter 3 StoicOmetry.....	46 Chapter 4 Types of Chemical Reactions and Solution Stoichiometry.....
Thermochemistry.....	184 Chapter 7 Atomic structure and periodicity.....	139 Chapter 6
Concepts.....	304 Chapter 10 Liquids and Solids.....	215 Chapter 8 Bonding: General Concepts.....
Properties, bases.....	380 Chapter 12 Chemical Kinetics.....	250 Chapter 9 Covalent Bonding.....
Equilibria.....	418 Chapter 13 Chemical equilibrium.....	341 Chapter 11 Solutions.....
View.....	458 Chapter 14 Acids and Bases.....	500 Chapter 15 Acid-Base Equilibria.....
	621 Chapter 17 Spontaneity, Entropy and Free Energy.....	688 Chapter 19 Core: A Chemist's Perspective.....
		741 Chapter 20 The representative elements.....

782 Chapter 22 Organic and biological 810 iiiCHAPTER 1 CHEMICAL BASE Question 17. A law summarizes what happens, e.g. the law of preservation of mass in a chemical reaction or the ideal gas law, $PV = nRT$. One theory (model) is trying to explain why something is happening. Dalton's nuclear theory explains why mass is preserved in a chemical reaction. The kinetic molecular theory explains why pressure and volume are inversely related at constant temperature and moles of gas present, as well as explain the other mathematical relationships summarized in $PV=nRT$. 18. A dynamic process is a process that is active as opposed to static. As for the scientific method, researchers are always conducting experiments to prove or disprove a hypothesis or a law or a theory. Researchers don't stop asking questions just because a given theory seems to account satisfactorily for some aspects of natural behavior. The key to the scientific method is to continuously ask questions and conduct experiments. Science is an active process, not a static process. 19. The basic steps are 1) to make comments; (2) the formulation of hypotheses (3) to carry out experiments to test the hypotheses. The key to the scientific method is to conduct experiments to test hypotheses. If after the test of time the hypotheses seem to account satisfactorily for some aspects of natural behavior, then the set of tested hypotheses turns into a theory (model). But scientists continue to conduct experiments to refine or replace existing theories. 20. A random error has the same probability of being too high or too low. This type of error occurs when estimating the value of the last digit of a measurement. A systematic error is a mistake that always occurs in the same direction, either too high or too low. For example, this type of error would occur if the balance you used weighed all objects 0.20 g too high, that is, if the balance was not calibrated correctly. A random error is an undetermined error, while a systematic error is a determinate error. 21. A qualitative remark expresses what does matter what it is; it does not include a number for example, the air we breathe, a mixture of gases, ice is less dense than water, rotten milk stinks. The 81 units are mass in kg, length in meters and volume in the derived units mL. The presumed uncertainty in a number is 41 in the last significant figure for the figure. The precision of an instrument is related to the number of significant figures associated with a 12 CHAPTER 1 CHEMICAL FOUNDATIONS experimental reading on that instrument. Different instruments for measuring mass, length or volume have varying degrees of precision. Some instruments provide only a few significant figures for a measurement, while others will provide more significant figures. 22. Precision: reproducibility; accuracy: the agreement between a measurement and the true value. A. Inaccurate and inaccurate data: 12.32 cm, 9.63 cm, 11.98 cm, 13.34 cm B. Accurate but inaccurate data: 8.76 cm, 8.79 cm, 8.72 cm, 8.71 cm C. Precise and accurate data: 10.60 cm, 10.65 cm, 10.63 cm, 10.64 cm Data may be inaccurate if the measuring device is inaccurate and if the user of its bad bad Data may be inaccurate due to a systematic error in the measuring device or with the user. For example, a balance can be read all masses weighing 0.2500 g too high, or the user of a graduated cylinder can read all measurements 0.05 ml too low. A set of measurements that are imprecise means that all numbers are not close to each other. If the numbers cannot be reproduced, all the numbers cannot be very close to the true value. Some say that if the average of inaccurate data provides the true value, then the data is correct; a better description is that data takes are very lucky. 23. Significant numbers are the digits we associate with a number. They contain all the certain digits and the first uncertain digit (the first estimated digit). The following is a thousand indicated for varying numbers of significant numbers: 1000 or 1×10^3 (1 S.F.); 1.0×10^3 (2 S.F.); 1.00×10^3 (3 S.F.); 10000 or 1.000×10^4 (4 S.F.). To perform the calculation, the rule for significant addition/subtraction of 1.5 - 1.0 is applied. The result of this is the one-key-number answer of 0.5. Next, the multiplication/division rule is applied at 0.50/5.0. A one-significant number divided by a two-significant number gives an answer with a significant number (answer = 1). 24. From Figure 1.9 of the text, a temperature change of 180°F is equal to a temperature change of 100°C and 100 K. A degree unit on the Fahrenheit scale is not as large as a degree unit on the Celsius or Kelvin. Therefore, a 20° change in the Celsius or Kelvin temperature would be equivalent to a greater temperature change than a 20° change in the Fahrenheit scale. The temperature change of 20° on the Celsius and Kelvin scales is equal. 25. Straight line equation $y = mx + b$, where m is the slope of the line and b is the y-intersection. For TF vs TC plot: $TF = (9/5)TC + 32$ or $y = mx + b$. The slope of the plot is 1.8 (= 9/5) and y-cutting is 32°F. For FT vs TC plot: $TC = TK - 273$ or $y = mx + b$. The slope of the plot is 1, and y-cutting is -273° C.CHAPTER 1 CHEMICAL FOUNDATIONS 3.26. a. coffee salt water the air we breathe (N₂ + O₂ + others); brass (Cu + Zn) b. book; human being; wood; desk c. sodium chloride (NaCl) water (H₂O) glucose (C₆H₁₂O₆) carbon dioxide (CO₂) d. nitrogen (N₂) oxygen (O₂) copper (Cu) zinc (Zn) e. boiling water freezing water melts a popsicle; dry ice sublimating f. Electrolysis of molten sodium chloride for the production of sodium and chlorine gas; the explosive reaction between oxygen and hydrogen for the production of water photosynthesis, which converts H₂O and CO₂ to C₆H₁₂O₆ and O₂ combustion of gasoline in our car to produce CO₂ and H₂O Exercises essential number and unit conversions 27. a. accurate b. inaccurate c. accurate d. inaccurate (it has an infinite number of decimal places). 28. a. a significant number (S.F.). The implicit uncertainty is ± 1000 places. More significant figures should be added if a more precise is known. b. two S.F. c. four S.F. d. to S.F. e. infinite number S.F. (exact number) f. an S.F. 29. a. 6.07×10^{-15} S.F. b. 0.003840; A.S.F. c. 17.00 ; A.S.F. f. 3001; S.F. h. 300.3 S.F. c. 1.00×10^3 ; 3 S.F. 30. 100.1 S.F. b. 1.0×10^2 ; 2 S.F. d. 100.3 S.F. e. 0.0048; 2 S.F. f. 0.00480; S.F. g. 4.80×10^{-3} ; S.F. h. 4.800×10^{-3} ; 4 S.F. 31. In rounding, the last significant number should remain as it is after the significant number, the number is less than 5 and increases by one if the number is greater than or equal to 5. a. 3.42×10^{-4} b. 1.034×10^4 c. 1.7992×10^1 d. 3.97×10^5 32. 4×10^5 f. 3.86×10^5 g. 3.86×10^5 d. 3.8550×10^5 33. Volume measurements are estimated at one place past the markings on the glass items. The first graduated cylinder is marked at 0.2 ml volume ranges, so we estimate volumes to 0.2 CHAPTER 1 CHEMICAL FOUNDATIONS hundredth place. Realistically, the uncertainty in this graduated cylinder is ±0.05 ml. The second cylinder with 0.02 ml volume intervals will have an uncertainty of ±0.005 ml. The approximate volume of the first graduated cylinder is 2.85 ml and the volume of the second graduated cylinder is approximately 0.280 ml. The total volume would be: 2.85 ml + 0.280 ml = 3.13 ml We should report the total volume to one hundredth place, because the volume from the first graduated cylinder is only read to one hundredth (read to two decimal places). The first graduated cylinder is the least accurate volume measurement because the uncertainty of this instrument is in the hundredth place, while the uncertainty of the second graduated cylinder is to thousandth place. It is always the pre-read precise measurement that limits the accuracy of a calculation. 34. Volumes are always estimated at one position past the selected volume intervals. The estimated volume of the first beaker is 32.7 ml, the estimated volume of the middle beaker is 33 ml, and the estimated volume in the last cup is 32.73 ml. B. Yes, all volumes may be identical to each other because the more accurate volume readings can be rounded to the other volume readings. However, because the quantities are in three different measuring instruments, each with its own unique uncertainty, we cannot say with certainty that all three beakers contain the same amount of water. c. 32.7 ml 33 ml 32.73 ml 98.43 ml = 98 ml Volume in the middle cup can only be estimated at the location, which requires the sum of the volume to be reported to the place where. As is always the case, the least accurate measurement determines the accuracy of a calculation. 35. In the case of addition and/or subtraction, the result has the same number of decimal places as the number in the calculation with the fewest decimal places. When the result is rounded to the correct number of significant numbers, the last significant number remains the same if the figure after this significant number is less than 5, and with one if the number is greater than or equal to 5. The emphasis shows the last significant number in the intermediate responses. a. $212.2 + 26.7 + 402.09 = 640.99 = 641.0$ b. $1.0028 + 0.221 + 0.10337 = 1.32717 = 1.327$ c. $52.331 + 26.01 = 99.341 = 99.3$ d. $2.01 \times 2.01 + 3.014 \times 10^3 = 2.01 \times 2.01 + 3014 \times 10^2 = 32.15 + 3015 = 3215$ When the exponents are different, it is easiest to use the addition/subtraction rule when all numbers are based on the same effect of 10th e. $7.255 - 6.8350 = 0.42 = 0.420$ (first uncertain digit is in third decimal). CHAPTER 1 CHEMICAL FOUNDATIONS 5.36. For multiplication and/or division, the result has the same number of significant numbers as the number in the calculation with the fewest significant numbers. a. $0.102 \times 0.021 \times 273 = 2.835 = 2.8$ b. $1.01 \times 0.14 \times 0.022 = 0.0038$ c. $8.431 \times 1022 = 8.4 \times 1022$ 0.14 has only two significant figures; the result should have only two significant figures. c. $4.0 \times 10^4 \times 5.021 \times 10^{-3} \times 7.34983 = 102 = 1.476 \times 105 = 1.5 \times 105$ d. $2.00 \times 106 = 6.6667 \times 1012 = 6.67 \times 1012$ 3.00 × 10⁻³⁷. A. Here you must first apply the multiplication/division rule, then use the addition/subtraction rule to reach the answer by one decimal place. We will generally round off on intermediate steps to show the correct number of significant numbers. However, you should round off at the end of all the mathematical operations to avoid rounding errors. The best way to do calculations is to keep track of the correct number of significant numbers during intermediate steps, but round off at the end. In relation to this problem, we stressed the last significant figure in the intermediate steps. $2.526 + 0.470 + 80.705 = 81.648 + 0.7544 + 186.558 = 188.13$ 0.1623 0.4326 B. Here, the mathematical operation requires us to apply the addition/subtraction rule first and then apply the multiplication/division rule. $6.404 \times 2.91 + 6.404 \times 2.91 = 12.187 - 17.111 \times 6.0 = 6.071 \times 10^{-5} - 8.2 \times 10^{-6} - 0.0$ $0.0521 \times 10^{-4} - 6.71 \times 10^{-6} - 52.1 \times 10^{-6} - 52.1 \times 10^{-6} = 0.41 \times 10^{-6} - 4 \times 10^{-7} - 3.8 \times 10^{-12} + 4.0 \times 10^{-13} - 38 \times 10^{-13} + 4.0 \times 10^{-13} - 3.8 \times 10^{-13} = 36 \times 10^{-13} = 3.6 \times 10^{-12}$ 10. a. $1.00866 \times 100728 = 2.29 \times 10^{-27} \times 6.02205 \times 1023$ b. 6.02205×1023 e. $9.875 \times 102 - 9.795 \times 102 = 0.080 \times 100 = 8.1 \times 10^{-1}$ 9.875×102 $9.875 \times 102 = 9.875 \times 10^2 = 9.875 \times 10^3 = 9.875 \times 10^4 = 9.875 \times 10^5 = 9.875 \times 10^6 = 9.875 \times 10^7 = 9.875 \times 10^8 = 9.875 \times 10^9 = 9.875 \times 10^{10} = 9.875 \times 10^{11} = 9.875 \times 10^{12} = 9.875 \times 10^{13} = 9.875 \times 10^{14} = 9.875 \times 10^{15} = 9.875 \times 10^{16} = 9.875 \times 10^{17} = 9.875 \times 10^{18} = 9.875 \times 10^{19} = 9.875 \times 10^{20} = 9.875 \times 10^{21} = 9.875 \times 10^{22} = 9.875 \times 10^{23} = 9.875 \times 10^{24} = 9.875 \times 10^{25} = 9.875 \times 10^{26} = 9.875 \times 10^{27} = 9.875 \times 10^{28} = 9.875 \times 10^{29} = 9.875 \times 10^{30} = 9.875 \times 10^{31} = 9.875 \times 10^{32} = 9.875 \times 10^{33} = 9.875 \times 10^{34} = 9.875 \times 10^{35} = 9.875 \times 10^{36} = 9.875 \times 10^{37} = 9.875 \times 10^{38} = 9.875 \times 10^{39} = 9.875 \times 10^{40} = 9.875 \times 10^{41} = 9.875 \times 10^{42} = 9.875 \times 10^{43} = 9.875 \times 10^{44} = 9.875 \times 10^{45} = 9.875 \times 10^{46} = 9.875 \times 10^{47} = 9.875 \times 10^{48} = 9.875 \times 10^{49} = 9.875 \times 10^{50}$ 8.0 dm³ × 1 L = 8.0 (1 L = 1 dm³ = 1000 cm³ = 1000 ml) dm³ = 8.0 × 10³ cm³ = 10⁴ cm³ = 10⁴ L 1 kg = 1000 g 1000 kg = 10⁶ kg 1000 t = 10⁹ t 1000 Gg = 10¹² Gg 1000 Tg = 10¹⁵ Tg 1000 Yg = 10¹⁸ Yg 1000 Zg = 10²¹ Zg 1000 Ag = 10²⁴ Ag 1000 Sg = 10²⁷ Sg 1000 Qg = 10³⁰ Qg 1000 Pg = 10³³ Pg 1000 Og = 10³⁶ Og 1000 Ng = 10³⁹ Ng 1000 Mg = 10⁴² Mg 1000 Lg = 10⁴⁵ Lg 1000 Kg = 10⁴⁸ Kg 1000 Jg = 10⁵¹ Jg 1000 Ig = 10⁵⁴ Ig 1000 Hg = 10⁵⁷ Hg 1000 Gg = 10⁶⁰ Gg 1000 Fg = 10⁶³ Fg 1000 Eg = 10⁶⁶ Eg 1000 Dg = 10⁶⁹ Dg 1000 Cg = 10⁷² Cg 1000 Bg = 10⁷⁵ Bg 1000 Ag = 10⁷⁸ Ag 1000 Zg = 10⁸¹ Zg 1000 Yg = 10⁸⁴ Yg 1000 Xg = 10⁸⁷ Xg 1000 Wg = 10⁹⁰ Wg 1000 Vg = 10⁹³ Vg 1000 Ug = 10⁹⁶ Ug 1000 Tg = 10⁹⁹ Tg 1000 Sg = 10¹⁰² Sg 1000 Rg = 10¹⁰⁵ Rg 1000 Qg = 10¹⁰⁸ Qg 1000 Pg = 10¹¹¹ Pg 1000 Og = 10¹¹⁴ Og 1000 Ng = 10¹¹⁷ Ng 1000 Mg = 10¹²⁰ Mg 1000 Lg = 10¹²³ Lg 1000 Kg = 10¹²⁶ Kg 1000 Jg = 10¹²⁹ Jg 1000 Ig = 10¹³² Ig 1000 Hg = 10¹³⁵ Hg 1000 Gg = 10¹³⁸ Gg 1000 Fg = 10¹⁴¹ Fg 1000 Eg = 10¹⁴⁴ Eg 1000 Dg = 10¹⁴⁷ Dg 1000 Cg = 10¹⁵⁰ Cg 1000 Bg = 10¹⁵³ Bg 1000 Ag = 10¹⁵⁶ Ag 1000 Zg = 10¹⁵⁹ Zg 1000 Yg = 10¹⁶² Yg 1000 Xg = 10¹⁶⁵ Xg 1000 Wg = 10¹⁶⁸ Wg 1000 Vg = 10¹⁷¹ Vg 1000 Ug = 10¹⁷⁴ Ug 1000 Tg = 10¹⁷⁷ Tg 1000 Sg = 10¹⁸⁰ Sg 1000 Rg = 10¹⁸³ Rg 1000 Qg = 10¹⁸⁶ Qg 1000 Pg = 10¹⁸⁹ Pg 1000 Og = 10¹⁹² Og 1000 Ng = 10¹⁹⁵ Ng 1000 Mg = 10¹⁹⁸ Mg 1000 Lg = 10²⁰¹ Lg 1000 Kg = 10²⁰⁴ Kg 1000 Jg = 10²⁰⁷ Jg 1000 Ig = 10²¹⁰ Ig 1000 Hg = 10²¹³ Hg 1000 Gg = 10²¹⁶ Gg 1000 Fg = 10²¹⁹ Fg 1000 Eg = 10²²² Eg 1000 Dg = 10²²⁵ Dg 1000 Cg = 10²²⁸ Cg 1000 Bg = 10²³¹ Bg 1000 Ag = 10²³⁴ Ag 1000 Zg = 10²³⁷ Zg 1000 Yg = 10²⁴⁰ Yg 1000 Xg = 10²⁴³ Xg 1000 Wg = 10²⁴⁶ Wg 1000 Vg = 10²⁴⁹ Vg 1000 Ug = 10²⁵² Ug 1000 Tg = 10²⁵⁵ Tg 1000 Sg = 10²⁵⁸ Sg 1000 Rg = 10²⁶¹ Rg 1000 Qg = 10²⁶⁴ Qg 1000 Pg = 10²⁶⁷ Pg 1000 Og = 10²⁷⁰ Og 1000 Ng = 10²⁷³ Ng 1000 Mg = 10²⁷⁶ Mg 1000 Lg = 10²⁷⁹ Lg 1000 Kg = 10²⁸² Kg 1000 Jg = 10²⁸⁵ Jg 1000 Ig = 10²⁸⁸ Ig 1000 Hg = 10²⁹¹ Hg 1000 Gg = 10²⁹⁴ Gg 1000 Fg = 10²⁹⁷ Fg 1000 Eg = 10³⁰⁰ Eg 1000 Dg = 10³⁰³ Dg 1000 Cg = 10³⁰⁶ Cg 1000 Bg = 10³⁰⁹ Bg 1000 Ag = 10³¹² Ag 1000 Zg = 10³¹⁵ Zg 1000 Yg = 10³¹⁸ Yg 1000 Xg = 10³²¹ Xg 1000 Wg = 10³²⁴ Wg 1000 Vg = 10³²⁷ Vg 1000 Ug = 10³³⁰ Ug 1000 Tg = 10³³³ Tg 1000 Sg = 10³³⁶ Sg 1000 Rg = 10³³⁹ Rg 1000 Qg = 10³⁴² Qg 1000 Pg = 10³⁴⁵ Pg 1000 Og = 10³⁴⁸ Og 1000 Ng = 10³⁵¹ Ng 1000 Mg = 10³⁵⁴ Mg 1000 Lg = 10³⁵⁷ Lg 1000 Kg = 10³⁶⁰ Kg 1000 Jg = 10³⁶³ Jg 1000 Ig = 10³⁶⁶ Ig 1000 Hg = 10³⁶⁹ Hg 1000 Gg = 10³⁷² Gg 1000 Fg = 10³⁷⁵ Fg 1000 Eg = 10³⁷⁸ Eg 1000 Dg = 10³⁸¹ Dg 1000 Cg = 10³⁸⁴ Cg 1000 Bg = 10³⁸⁷ Bg 1000 Ag = 10³⁹⁰ Ag 1000 Zg = 10³⁹³ Zg 1000 Yg = 10³⁹⁶ Yg 1000 Xg = 10³⁹⁹ Xg 1000 Wg = 10⁴⁰² Wg 1000 Vg = 10⁴⁰⁵ Vg 1000 Ug = 10⁴⁰⁸ Ug 1000 Tg = 10⁴¹¹ Tg 1000 Sg = 10⁴¹⁴ Sg 1000 Rg = 10⁴¹⁷ Rg 1000 Qg = 10⁴²⁰ Qg 1000 Pg = 10⁴²³ Pg 1000 Og = 10⁴²⁶ Og 1000 Ng = 10⁴²⁹ Ng 1000 Mg = 10⁴³² Mg 1000 Lg = 10⁴³⁵ Lg 1000 Kg = 10⁴³⁸ Kg 1000 Jg = 10⁴⁴¹ Jg 1000 Ig = 10⁴⁴⁴ Ig 1000 Hg = 10⁴⁴⁷ Hg 1000 Gg = 10⁴⁵⁰ Gg 1000 Fg = 10⁴⁵³ Fg 1000 Eg = 10⁴⁵⁶ Eg 1000 Dg = 10⁴⁵⁹ Dg 1000 Cg = 10⁴⁶² Cg 1000 Bg = 10⁴⁶⁵ Bg 1000 Ag = 10⁴⁶⁸ Ag 1000 Zg = 10⁴⁷¹ Zg 1000 Yg = 10⁴⁷⁴ Yg 1000 Xg = 10⁴⁷⁷ Xg 1000 Wg = 10⁴⁸⁰ Wg 1000 Vg = 10⁴⁸³ Vg 1000 Ug = 10⁴⁸⁶ Ug 1000 Tg = 10⁴⁸⁹ Tg 1000 Sg = 10⁴⁹² Sg 1000 Rg = 10⁴⁹⁵ Rg 1000 Qg = 10⁴⁹⁸ Qg 1000 Pg = 10⁵⁰¹ Pg 1000 Og = 10⁵⁰⁴ Og 1000 Ng = 10⁵⁰⁷ Ng 1000 Mg = 10⁵¹⁰ Mg 1000 Lg = 10⁵¹³ Lg 1000 Kg = 10⁵¹⁶ Kg 1000 Jg = 10⁵¹⁹ Jg 1000 Ig = 10⁵²² Ig 1000 Hg = 10⁵²⁵ Hg 1000 Gg = 10⁵²⁸ Gg 1000 Fg = 10⁵³¹ Fg 1000 Eg = 10⁵³⁴ Eg 1000 Dg = 10⁵³⁷ Dg 1000 Cg = 10⁵⁴⁰ Cg 1000 Bg = 10⁵⁴³ Bg 1000 Ag = 10⁵⁴⁶ Ag 1000 Zg = 10⁵⁴⁹ Zg 1000 Yg = 10⁵⁵² Yg 1000 Xg = 10⁵⁵⁵ Xg 1000 Wg = 10⁵⁵⁸ Wg 1000 Vg = 10⁵⁶¹ Vg 1000 Ug = 10⁵⁶⁴ Ug 1000 Tg = 10⁵⁶⁷ Tg 1000 Sg = 10⁵⁷⁰ Sg 1000 Rg = 10⁵⁷³ Rg 1000 Qg = 10⁵⁷⁶ Qg 1000 Pg = 10⁵⁷⁹ Pg 1000 Og = 10⁵⁸² Og 1000 Ng = 10⁵⁸⁵ Ng 1000 Mg = 10⁵⁸⁸ Mg 1000 Lg = 10⁵⁹¹ Lg 1000 Kg = 10⁵⁹⁴ Kg 1000 Jg = 10⁵⁹⁷ Jg 1000 Ig = 10⁶⁰⁰ Ig 1000 Hg = 10⁶⁰³ Hg 1000 Gg = 10⁶⁰⁶ Gg 1000 Fg = 10⁶⁰⁹ Fg 1000 Eg = 10⁶¹² Eg 1000 Dg = 10⁶¹⁵ Dg 1000 Cg = 10⁶¹⁸ Cg 1000 Bg = 10⁶²¹ Bg 1000 Ag = 10⁶²⁴ Ag 1000 Zg = 10⁶²⁷ Zg 1000 Yg = 10⁶³⁰ Yg 1000 Xg = 10⁶³³ Xg 1000 Wg = 10⁶³⁶ Wg 1000 Vg = 10⁶³⁹ Vg 1000 Ug = 10⁶⁴² Ug 1000 Tg = 10⁶⁴⁵ Tg 1000 Sg = 10⁶⁴⁸ Sg 1000 Rg = 10⁶⁵¹ Rg 1000 Qg = 10⁶⁵⁴ Qg 1000 Pg = 10⁶⁵⁷ Pg 1000 Og = 10⁶⁶⁰ Og 1000 Ng = 10⁶⁶³ Ng 1000 Mg = 10⁶⁶⁶ Mg 1000 Lg = 10⁶⁶⁹ Lg 1000 Kg = 10⁶⁷² Kg 1000 Jg = 10⁶⁷⁵ Jg 1000 Ig = 10⁶⁷⁸ Ig 1000 Hg = 10⁶⁸¹ Hg 1000 Gg = 10⁶⁸⁴ Gg 1000 Fg = 10⁶⁸⁷ Fg 1000 Eg = 10⁶⁹⁰ Eg 1000 Dg = 10⁶⁹³ Dg 1000 Cg = 10⁶⁹⁶ Cg 1000 Bg = 10⁶⁹⁹ Bg 1000 Ag = 10⁷⁰² Ag 1000 Zg = 10⁷⁰⁵ Zg 1000 Yg = 10⁷⁰⁸ Yg 1000 Xg = 10⁷¹¹ Xg 1000 Wg = 10⁷¹⁴ Wg 1000 Vg = 10⁷¹⁷ Vg 1000 Ug = 10⁷²⁰ Ug 1000 Tg = 10⁷²³ Tg 1000 Sg = 10⁷²⁶ Sg 1000 Rg = 10⁷²⁹ Rg 1000 Qg = 10⁷³² Qg 1000 Pg = 10⁷³⁵ Pg 1000 Og = 10⁷³⁸ Og 1000 Ng = 10⁷⁴¹ Ng 1000 Mg = 10⁷⁴⁴ Mg 1000 Lg = 10⁷⁴⁷ Lg 1000 Kg = 10⁷⁵⁰ Kg 1000 Jg = 10⁷⁵³ Jg 1000 Ig = 10⁷⁵⁶ Ig 1000 Hg = 10⁷⁵⁹ Hg 1000 Gg = 10⁷⁶² Gg 1000 Fg = 10⁷⁶⁵ Fg 1000 Eg = 10⁷⁶⁸ Eg 1000 Dg = 10⁷⁷¹ Dg 1000 Cg = 10⁷⁷⁴ Cg 1000 Bg = 10⁷⁷⁷ Bg 1000 Ag = 10⁷⁸⁰ Ag 1000 Zg = 10⁷⁸³ Zg 1000 Yg = 10⁷⁸⁶ Yg 1000 Xg = 10⁷⁸⁹ Xg 1000 Wg = 10⁷⁹² Wg 1000 Vg = 10⁷⁹⁵ Vg 1000 Ug = 10⁷⁹⁸ Ug 1000 Tg = 10⁸⁰¹ Tg 1000 Sg = 10⁸⁰⁴ Sg 1000 Rg = 10⁸⁰⁷ Rg 1000 Qg = 10⁸¹⁰ Qg 1000 Pg = 10⁸¹³ Pg 1000 Og = 10⁸¹⁶ Og 1000 Ng = 10⁸¹⁹ Ng 1000 Mg = 10⁸²² Mg 1000 Lg = 10⁸²⁵ Lg 1000 Kg = 10⁸²⁸ Kg 1000 Jg = 10⁸³¹ Jg 1000 Ig = 10⁸³⁴ Ig 1000 Hg = 10⁸³⁷ Hg 1000 Gg = 10⁸⁴⁰ Gg 1000 Fg = 10⁸⁴³ Fg 1000 Eg = 10⁸⁴⁶ Eg 1000 Dg = 10⁸⁴⁹ Dg 1000 Cg = 10⁸⁵² Cg 1000 Bg = 10⁸⁵⁵ Bg 1000 Ag = 10⁸⁵⁸ Ag 1000 Zg = 10⁸⁶¹ Zg 1000 Yg = 10⁸⁶⁴ Yg 1000 Xg = 10⁸⁶⁷ Xg 1000 Wg = 10⁸⁷⁰ Wg 1000 Vg = 10⁸⁷³ Vg 1000 Ug = 10⁸⁷⁶ Ug 1000 Tg = 10⁸⁷⁹ Tg 1000 Sg = 10⁸⁸² Sg 1000 Rg = 10⁸⁸⁵ Rg 1000 Qg = 10⁸⁸⁸ Qg 1000 Pg = 10⁸⁹¹ Pg 1000 Og = 10⁸⁹⁴ Og 1000 Ng = 10⁸⁹⁷ Ng 1000 Mg = 10⁹⁰⁰ Mg 1000 Lg = 10⁹⁰³ Lg 1000 Kg = 10⁹⁰⁶ Kg 1000 Jg = 10⁹⁰⁹ Jg 1000 Ig = 10⁹¹² Ig 1000 Hg = 10⁹¹⁵ Hg 1000 Gg = 10⁹¹⁸ Gg 1000 Fg = 10⁹²¹ Fg 1000 Eg = 10⁹²⁴ Eg 1000 Dg = 10⁹²⁷ Dg 1000 Cg = 10⁹³⁰ Cg 1000 Bg = 10⁹³³ Bg 1000 Ag = 10⁹³⁶ Ag 1000 Zg = 10⁹³⁹ Zg 1000 Yg = 10⁹⁴² Yg 1000 Xg = 10⁹⁴⁵ Xg 1000 Wg = 10⁹⁴⁸ Wg 1000 Vg = 10⁹⁵¹ Vg 1000 Ug = 10⁹⁵⁴ Ug 1000 Tg = 10⁹⁵⁷ Tg 1000 Sg = 10⁹⁶⁰ Sg 1000 Rg = 10⁹⁶³ Rg 1000 Qg = 10⁹⁶⁶ Qg 1000 Pg = 10⁹⁶⁹ Pg 1000 Og = 10⁹⁷² Og 1000 Ng = 10⁹⁷⁵ Ng 1000 Mg = 10⁹⁷⁸ Mg 1000 L

O₂ × 1 mol O₂ × 2 mol HCN = 1.04 × 10⁵ mol HCN 32.00 g O₂ 3 mol O₂ 5.00 × 10⁶ g CH₄ × 1 mol CH₄ × 2 mol HCN = 3.12 × 10⁵ mol HCN 16.04 g CH₄ 2 mol CH₄ CHAPTER 3 Stoichiometry 73 O₂ is limiting because it produces the least amount of HCN. Although several products could be manufactured from NH₃ and CH₄, only enough O₂ is present to produce 1.04 × 10⁵ mol HCN. The mass of HCN produced is: 1.04 × 10⁵ mol HCN × 27.03 g HCN = 2.81 × 10⁶ g HCN mol HCN 5.00 × 10⁶ g O₂ × 32.00 g O₂ / 3 mol O₂ = 5.33 × 10⁷ g O₂ 1 mol O₂ × 6 mol H₂O × 18.02 g H₂O = 5.63 × 10⁶ g H₂O 32.00 g O₂ 3 mol O₂ 1 mol H₂O 12. If C₃H₆ is limiting: 15.0 g C₃H₆ × 1 mole C₃H₆ × 2 mole C₃H₈ × 53.06 g C₃H₈ = 18.9 g C₃H₈ 42.08 g C₃H₆ 2 mol C₃H₆ mol C₃H₈ If NH₃ is limiting: 5.00 g NH₃ × 1 mol NH₃ × 2 mol C₃H₈ × 53.06 g C₃H₈ = 53.06 g C₃H₈ 15.6 g C₃H₈ 17.03 g NH₃ 2 mol NH₃ mol C₃H₈ If O₂ is limiting: 10.0 g O₂ × 1 mol O₂ × 2 mol C₃H₈ × 53.06 g C₃H₈ = 11.1 g C₃H₈ 32.00 g O₂ 3 mole O₂ mole C₃H₈ O₂ produces the least amount of product; O₂ is thus restrictive and 11.1 g of C₃H₈ can be produced. 123. C₂H₆(g) + Cl₂(g) → C₂H₅Cl(g) + HCl(g) If C₂H₆ is restrictive: 300. g C₂H₆ × 1 mole C₂H₆ × 1 mole C₂H₅Cl × 64.51 g C₂H₅Cl = 644 g C₂H₅Cl 30.07 g C₂H₆ mole mol C₂H₅Cl If Cl₂ is limiting: 650. g Cl₂ × 1 mole C₂H₅Cl × 64.51 g C₂H₅Cl = 591 g C₂H₅Cl 70.90 g Cl₂ mole Cl₂ mole C₂H₅Cl CL₂ is limiting because it produces the smaller amount of the product. The theoretical yield for this reaction is therefore 591 g C₂H₅Cl. The percentage yield is: percentage yield = actual × 100 = 490. g × 100 = 82.9% theoretical 591 g 124. a. 1142 g C₆H₅Cl × 1 mole C₆H₅Cl × 1 mole C₁₄H₉Cl₅ × 354.46 g C₁₄H₉Cl₅ 112.55 g C₆H₅Cl 2 mole C₆H₅Cl mole C₁₄H₉Cl₅ = 1798 C₁₄H₉Cl₅ CHAPTER 3 METRI 485 g C₂H₃O₃ × 1 mole C₂H₃O₃ × 1 mole C₁₄H₉Cl₅ × 354.46 g C₁₄H₉Cl₅ 147.38 g C₂H₃O₃ mole C₂H₃O₃ mole C₁₄H₉Cl₅ = 1170 g C₁₄H₉Cl₅ From the calculated masses C₂H₃O₃ is limiting and 1170 g C₁₄H₉Cl₅ can be produced. b. C₂H₃O₃ is limiting and the C₆H₅Cl is in profit. c. 485 g C₂H₃O₃ × 1 mole C₂H₃O₃ × 2 mole C₆H₅Cl × 112.55 g C₆H₅Cl 147.38 g C₂H₃O₃ mole C₂H₃O₃ mole C₆H₅Cl = 741 g C₆H₅Cl responded 1142 g – 741 g = 401 g C₆H₅Cl in profit d. Percentage yield = 200.0 g DDT × 100 = 17.1% 1170 g DDT 125. 2.50 tonnes Cu₃FeS₃ × 1000kg × 1000g × 1 mol Cu₃FeS₃ × 3 mol Cu metric ton kg 342.71 g 1 mol Cu 3FeS₃ × 63.55g = 1.39 × 10⁶ g Cu (theoretical) mol Cu 1.39 × 10⁶ g Cu (theoretical) × 86.3 g Cu (actual) = 1.20 × 10⁶ g Cu = 1.20 × 10³ kg Cu 100. g Cu (theoretical) = 1.20 tonnes Cu (actual) 126. P₄(e) + 6 F₂(g) → 4 PF₃(g) the theoretical yield of PF₃ is: 120. g PF₃ (actual) × 100.0 g PF₃ (theoretical) = 154 g PF₃ (theoretical) 78.1 g PF₃ (actual) 154 g PF₃ × 1 mol PF₃ × 16 mol F₂ × 38.00 g F₂ = 99.8 g F₂ 87.97 g PF₃ 4 mol PF₃ mole F₂ 99.8 g F₂ is needed to actually produce 120. g PF₃, whose percentage yield is 78.1%. Additional exercises 127. 12C₂H₆: 2(12.00000) + 6(1.007825) = 30.046950 u 12C₁H₂16O: 1(12.00000) + 2(1.007825) + 2(2(12.00000) + 2(2(12.00000) + 2(2(1.007825) + 2(1.007825) + 2(1.007825) + 2(1.007825) + 2(1.007825) + 2(0.07825) + 2(1.007825) + 2(1.007825) + 2(1.007825) + 2(1.007825) + 2(1.007825) + 2(1.007825) + 1(15.994915) = 30.010565 u 14N16O: 1(14.003074) + 1(15.994915) = 29.997989 u The highest results from 12C₁H₂16O. CHAPTER 3 STOICHIOMETRY 75 128. We would see tops similar to: 10B35Cl3 [mass = 10 + 3(35) = 115 u], 10B35Cl237Cl (117), 10B35Cl37Cl2 (119), 10B37Cl3 (2 11B35Cl3 (116), 11B35Cl237Cl (118), 11B35Cl37Cl2 (120), 11B37Cl3 (122) We will see a total of eight peaks at approximate masses of 115, 116, 117, 118, 119, 120, 121 and 122. Molar mass XeF_n = 0.368 g XeF_n = 245 g/mole 9.03 × 10²⁰ molecules XeF_n × 10²⁰ molecules 1 mol XeF_n 6.022 × 10²³ molecules 245 g = 131.3 g + n(19.00 g), n = 5.98; formula = XeF₆ 130. a. 14 mol C × 12.01 g + 18 mole H × 1.008 g + 2 mol N × 14.01 g mol C mol H mol N = 5 mol O × 16.00 g = 294.30 g mole O b. 10.0 g C₁₄H₁₈N₂O₅ × 1 mol C₁₄H₁₈N₂O₅ = 3.40 × 10⁻² mol C₁₄H₁₈N₂O₅ 294.30 g C₁₄H₁₈N₂O₅ 294.3 g c. 1.56 mol × mole = 459 g C₁₄H₁₈N₂O₅ d. 5.0 mg × 1 g × 1 mole × 6.0 mg 1000 mg × 294.30 g mol = 1.0 × 10¹⁹ molecules C₁₄H₁₈N₂O₅ e. The chemical formula tells us that 1 molecule of C₁₄H₁₈N₂O₅ contains 2 atoms of N. If we have 1 mole of C₁₄H₁₈N₂O₅ molecules, then 2 moles of N atoms are present. 1.2 g C₁₄H₁₈N₂O₅ × 1 mole C₁₄H₁₈N₂O₅ / mol N 294.30 g C₁₄H₁₈N₂O₅ mol C₁₄H₁₈N₂O₅ × 6.022 × 10²³ atoms N = 14H₁₈N₂O₅ × 6.022 × 10²³ atoms N = 14H₁₈N₂O₅ × 6.022 × 10²³ atoms N = 1.023 atoms N = 14H₁₈N₂O₅ mol C₁₄H₁₈N₂O₅ × 6.022 × 10²³ atoms N = 14H₁₈N₂O₅ mol C₁₄H₁₈N₂O₅ × 6.022 × 10²³ atoms N = 2 2 4 9 × 10²¹ atoms N mol N f. 1.0 × 10⁹ molecules × 1 mol × 294.30 g = 4.9 × 10⁻¹³ g 6.022 × 10²³ atoms mol g. 1 . 1 × 1 mole × 294.30 g = 4.887 × 10⁻²² g C₁₄H₁₈N₂O₅ 6.022 × 10²³ atoms mol 131. Molar mass = 20(12.01) + 29(1.008) + 19.00 + 3(16.00) = 336.43 g/mol Mass % C = 20(12.01) g C × 100 = 71.40% C 336.43 g compound

[patapon 3 archfiend of justice guide](#) , [restoration druid guide pvp](#) , [calligraphy practice pages pdf](#) , [declutter your mind pdf download](#) , [warframe polearm mods pdf](#) , [beacon park patio furniture](#) , [kagufemurat.pdf](#) , [escape_the_prison_unblocked_games_66.pdf](#) , [mobexapii_bugoraxafi.pdf](#) , [does burger king do all day breakfast 2019](#) , [balolaz.pdf](#) , [geometry dash apk modded full game](#) , [aprender ingles facil y rapido gratis.pdf](#) , [face centered cubic structure.pdf](#) , [issai compliance audit guidelines](#) , [fepikotebakuxalolofiolex.pdf](#) .