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| **Pathway 4: Chapter 2 Homework/Study Pack  Sample Chapter 2 Exam** |
| **Part A. Atoms Part B:** [**Density**](http://www.lsua.us/chem1001/sampletest/01M2fh.html)[**Answers**](http://www.fscj.me/chm1025/sampletest/25M2hiSampleAnswer.htm) **Part C:** [**Forms of Energy**](http://www.lsua.us/chem1001/sampletest/25M1eSample.htm)[**Answers**](http://www.lsua.us/chem1001/sampletest/25M1eSampleAnswers.htm)[**Fig 3.13**](http://www.fccj.us/chm1025/CorwinImages/Chapter04/fg04_13.html)[**Fig 3.14**](http://www.fccj.us/chm1025/CorwinImages/Chapter04/fg04_14.html)[**Fig 3.15**](http://www.fccj.us/chm1025/CorwinImages/Chapter04/fg04_15.html)[**Fig 3.16**](http://www.fccj.us/chm1025/CorwinImages/Chapter04/fg04_16.html) **Part D.** [**Energy Transformations**](http://www.lsua.us/chem1001/sampletest/25M1e1Sample.htm)[**Answers**](http://www.lsua.us/chem1001/sampletest/25M1e1SampleAnswers.htm) **Part E.** [**Temperature Conversions**](http://www.lsua.us/chem1001/sampletest/01M2gh.htm)[**Answers**](http://www.fscj.me/chm1025/sampletest/25M2gSampleAnswer.htm) **Part F.** [**Properties of Solid, Liquids, and Gases**](http://www.fccj.us/chm1025/SampleTest/25M6ao.htm)[**Answers**](http://www.fccj.us/chm1025/SampleTest/25M6aoAnswer.htm) **Part G.** [**Gas Laws**](http://www.fscj.me/chm1025/sampletest/25M6d.htm)[**Answers**](http://www.fscj.me/chm1025/sampletest/25M6dAns.htm) **Part G0. Gas Pressure and Calculations Part G1. Boyles Law of Gases Calculations Part G2. Charles Law of Gases Calculations Part G3. Gay-Lussac’s Law of Gases Calculations Part G4: Dalton Law of Gases Calculations Part G5. Ideal Gas Law Calculations Part G6. Avogadro’s Law of Gases Calculations Part H.** [**Gas Law Calculation**](http://www.fscj.me/chm1025/sampletest/25M6e.htm)[**Answers**](http://www.fscj.me/chm1025/sampletest/25M6eAns.htm) **Part K.** [**Kinetic Molecular Theory**](http://www.lsua.us/chem1001/sampletest/01M6a.htm)[**Answers**](http://www.lsua.us/chem1001/sampletest/01m6aAns.htm) **Part P.** [**Phase Diagrams**](http://www.fccj.us/chm1025/sampletest/25M1f.htm)[**Answers**](http://www.lsua.us/chm1025/sampletest/25M1fAnswers.htm) **Part V. Chapter 2 Vocabulary**  **Part M: Chapter 2 Multiple Choice (Blackboard - Course Content-Required Path 2 Quizzes – Chapter 2) Part Z: Chapter 2 Conceptual Chemistry Spotlight: Green Chemistry**  **Path 4 Chapter 2 Part A: Atoms (from Chapter 1: the Micron!)**    **How Small is Small?**  **Define: Astronomical;**    **Macroscopic;**    **Microscopic;**  **Sub-Microscopic**    **To Understand Chemistry is to study the three major worlds of matter:  Macroscopic; Sub-microscopic; and Symbolic**    **Households spend many hours removing dust from furniture and the air. The size of one of these particles, which is the cause of problems such as asthma, can be found in the range of several nanometers (10−9 m)  to just under a millimeter (10−3 m). More commonly, however, dust are those particles between  1 and 100 micrometers (10−6 m).**  **Three thirds of the sources determined the diameter of a speck of dust to be a small number and/or a range,  but one source referred to the diameter as specifically 254 micrometers. That is odd and may not be completely accurate. *The Handbook of Chemistry and Physics* provided the most different answer.  The range of the size of dust was very large and specific to the type of dust.**  **The dust that fills the air is composed of many things, such as fibers, hairs, pollen, bacteria, and molds.  Large cities also have smoke and tarry soot in their atmospheric dust. They also have a greater  concentrations of dust than in smaller cities or mountainous areas. Dust is a major contributor to  atmospheric pollution but it can also serve as nuclei for the condensation of water vapor into droplets.  Without them, fog, mist and clouds would not exist.**  **There are also several hazards that can come from dust. When found in high concentration in some  types of mills and mines, they are an explosion hazard. Also, when silica is found in dust, it can ruin  machinery because of how rigid it is and can cause problems if it is inhaled.**  **Marina Bolotovsky – 2003**  **What the eye can see and what particles deposit in your lungs:**    **Indoor Air Quality - What You Should Know**  **Based on studies by the Environmental Protection Agency (EPA), billions  of dollars are spent annually for medication to help Americans breathe or cure their  respiratory illnesses. Eleven million Americans have asthma. Twenty-eight million have hay fever and other allergies. Physicians are now discovering that the solution  to the problems of many of these people is not in medicine but in reducing  the pollutants in the air they breathe.**  **Every year at least 6,000 new chemical compounds are developed.  Many are used indoors every day, at home and at work. Add to these pollutants  the mold, mildew, bacteria, viruses, tobacco smoke, grease, pollen, dirt, asbestos, lead and numerous other contaminants that can affect our breathing and our health. Then allow them to circulate in today’s nearly airtight indoor environment. No wonder  our indoor air is, on average, two to ten times as polluted as the worst outdoor air.**    **Sizing chart in microns for bacteria, spores, viruses, smoke, pet dander, & dust**  **Viruses and bacteria that thrive in the ducts, coils, and recesses of building  ventilation systems have been proven to cause ailments ranging from influenza to tuberculosis. Some HVAC systems have been found to contain up to 27 species of fungi.**  **Based on information given at the First Annual Air Quality convention sponsored  by EPA, April 1992, Tampa, Florida:**  **• 40% of all buildings pose a serious health hazard due to indoor air pollution,  according to the World Health Organization.**  **• EPA estimates an 18% annual production loss to American business due to poor  indoor air quality.**  **• 20% of all employees have a major illness related to indoor air pollution  such as allergies, asthma, auto-immune diseases, etc.**  **• EPA says high levels of formaldehyde cause cancer**  **• Scientists now recognize that pollutants, even at acceptable concentration,  combined together in an indoor environment have a synergistic negative effect.**    **Airborne particles**  Airborne particles are solids suspended in the air.  **Larger particles - larger then 100 μm**  terminal velocities > 0.5 m/s  fall out quickly  includes hail, snow, insect debris, room dust, soot aggregates, coarse sand, gravel, and sea spray  **Medium-size particles - in the range 1 to 100 μm**  sedimentation velocities greater than 0.2 m/s  settles out slowly  includes fine ice crystals, pollen, hair, large bacteria, windblown dust, fly ash, coal dust, silt, fine sand, and small dust  **Small particles - less than 1 μm (submicron)**  falls slowly, take days to years to settle out of a quiet atmosphere.  In a turbulent atmosphere they may never settle out  can be washed out by water or rain  includes viruses, small bacteria, metallurgical fumes, soot, oil smoke, tobacco smoke, clay, and fumes  **Hazardous Dust Particles**  Smaller dust particles can be hazardous for humans. In many jurisdictions dust fractions at specified particle sizes in working environments are required to be measured.  **Inhalable Dust**  Airborne particles which can enter the nose and mouth during normal breathing. Particles of 100 microns diameter or less.  **Thoracic Dust**  Particles that will pass through the nose and throat, reaching the lungs. Particles of 10 microns diameter and less. Referred to as PM10 in the USA.  **Respirable Dust**  Particles that will penetrate into the gas exchange region of the lungs. A hazardous particulate size less than 5 microns. Particle sizes of 2.5 micron (PM2.5) are often used in USA  **Particles 101: Did You Know?...** **- Visible particles constitute only about 10% of indoor air!**  **- Particle visibility depends on the eye itself. In other words, light intensity and   quality, background and particle type.**  **- Particles on furniture and those in a shaft of light are approximately   50 microns or larger.**  **- It may be possible to see particles as small as 10 microns under favorable conditions.**  **- The majority of harmful particles are 3 microns or less in size.**  **- Particles of 1 micron or less adhere to surfaces by molecular adhesion.  Scrubbing is generally the only way to remove them.**  **- Larger particles tend to settle out of the atmosphere due to weight.**  **- Smaller, "respirable" particles remain virtually suspended in the air until breathed in.**  **- Approximately 98-99% of all particles by count are in the size range of 5 microns  or less. These particles tend to remain in suspension or settle out so slowly that only quality electronic air cleaners and HEPA air cleaners are effective in removing  these particles.**  **- The average person breathes in about 16,000 quarts of air per day.  Each quart contains some 70,000 visible and invisible particles.  *That's over a billion particles per day that our lungs have to filter out!***  **- The average home collects about 2 pounds of dust per week!**  **- A 9' x 12' carpet or rug will collect an average of about 10 pounds of dust per year!**  **How will you filter the air indoors in your home or apartment?**      **A better chart:**    **What could you do to prevent mold and viruses in your home?**  **Why is ozone (O3) a powerful and efficient cleaner and purifier  of indoor air quality?**  **How do negative ions generation help clean indoor air quality?**      **The first theory of matter:**          **Transmutation Not Possible by Chemical Change (Chapter 9):**  **~~Fe to Au~~ Transmutation Possible by Nuclear Change (Chapter 5) But Gold was not made from Iron During Nuclear Fusion!**      **This first chemistry book in French is very hard to read!**            **Mendeleev’s Periodic Table**        **John Suchocki Conceptual Chemistry 5th Edition Videos:**  ***Chapter 2: Particles of Matter*** 2.1 [The Submicroscopic World Is Super-Small](http://www.conceptualacademy.com/course/conceptual-chemistry/21-submicroscopic-world-super-small) (do not click on Video Quiz button)   Submicroscopic (4:56 Minutes) 2.2 [Discovering the Atom](http://www.conceptualacademy.com/course/conceptual-chemistry/22-discovering-atom) (do not click on Video Quiz button)  KM: Air Out CO#202a (5:18 minutes) (Optional) <http://bcove.me/8a30ohvs>  **Path 4 Chapter 2 Part A: Atoms Quiz:**  **Answer questions: !, 2, 25, 38, 44, 45, 83 for Section 2.1 at the end of the chapter Answer questions: 3 4, 5, 26, 46, 47, 48 49, 85 for section 2.2 at the end of the chapter**  **Path 4 Chapter 2 Part B: Density, Specific Gravity & Volume Problems** [**Answers**](http://www.fscj.me/chm1025/sampletest/25M2hiSampleAnswer.htm)          **John Suchocki Conceptual Chemistry 5th Edition Videos: Section 2.3** [**Mass Is How Much and Volume Is How**](http://www.conceptualacademy.com/course/conceptual-chemistry/23-mass-how-much-and-volume-how-spacious)  **Spacious (Three videos) a*.*   Distinguishing Mass, Weight, and Volume CO#203a (10:19 minutes)  b. KM: Penny Fingers CO@303b (2:56 Minutes)** [**http://bcove.me/avuq6dfv**](http://bcove.me/avuq6dfv)  **c. KM: Decisive Dimensions CO#203c (2:41 minutes)** [**http://bcove.me/rc9y51mu**](http://bcove.me/rc9y51mu) **Section 2.4 Ways to Think About Density CO#204a (8:06 minutes)** [**http://bcove.me/w6kzb3ms**](http://bcove.me/w6kzb3ms)  **Path 4 Chapter 2 Part B: Density, Specific Gravity & Volume Problems** [**Answers**](http://www.fscj.me/chm1025/sampletest/25M2hiSampleAnswer.htm)  **1. A quartz rock was cut into a rectangular solid paperweight. IF the paperweight has a mass of 165 g and measures 5.00 cm by 5.00 cm by 25.0 mm, what is its volume in cubic centimeters?**  **2. Calculate the density in g/mL for 10.0 grams of ethyl ether having a volume 14.0 mL.**  **Additional Homework (not required) for your practice:**  **Suchocki 5th  Edition:**  **Section 2.4 Chapter 2 Questions: 9, 10, 32, 33, 54-57**  ***How does the Galileo Thermometer Work?***  **Path 4 Chapter 2 Sample Test/Homework Packet**  **Part E: Energy/Forms of Energy**                **Define Energy:**  **What is the difference between the two types of energy: potential and kinetic energy?**  **List the six different forms of energy as an energy wheel as stated in the book:**  **Define the Law of Conservation of Energy:**  **Reword the Law of Conservation of Energy into the first law of thermodynamics:**  **Which state of matter has the lowest kinetic energy?**  **What is the “Heat Death Theory of the Universe”?**  **Bonus: define Gravitational Energy; Tidal Energy; Sound Energy; Magnetic Energy; Radiant Energy; Dark Energy**  **Chapter 2 Sample Test/Homework Packet**  **Part E1: Energy Transformations 1 point**  **Identify two forms of energy that are involved in each of the following energy conversions:**   1. **relating to a fossil fuel plant:**   **a. Burning coal converts water to steam:**  **b. A turbine spins and drives an electrical generator:**   1. **Solar Hot Water Energy Panels:** 2. **Photovoltaic Solar Energy Panels:** 3. **Radioactive emissions vaporize water into steam** 4. **Identify two forms of energy that are involved in each of the following devices:** 5. **Flashlight** 6. **Solar Calculator** 7. **Lead-acid battery** 8. **Classify the following energy sources as renewable and nonrenewable: a. Biomass f. Hydropower b. Petroleum g. Coal c. Geothermal h. natural gas d. Wind i. solar** 9. **Uranium j. propane**   **John Suchocki Video: 1.6 d.  Metric Prefixes (Conceptual Chemistry 5th Appendix B)             Video #CO106c (7.10 Minutes)**  **Mobile/Cell Phone Link:** [**http://bcove.me/bnei9533**](http://bcove.me/bnei9533)  **Part G Gas Laws**                                      **Pathway 2: Chapter 2 Part G D Gas Laws  *State:***  Boyle’s Law (In words and formula)  Charles Law (in words and formula)    Dalton’s Law of Partial pressures (in words and formula)  Gay-Lussac’s Law (in words and formula)  Avogadro’s Law (in words and formula)  Ideal Gas Equation (write only the equation  **Pathway 2/4 Chapter 2 Part G0-G6 Gas Law Problems**  ***Part G0: Gas Pressure Calculations:*** State standard conditions (STP) in three units of pressure (the last is your choice) and **oC** and **K temperatures:**   \_\_\_\_\_mm Hg or \_\_\_\_\_\_torre= \_\_\_\_\_\_atm = \_\_\_\_\_ \_\_\_\_\_\_(you write the unit too)   \_\_\_\_\_ **o**C = \_\_\_\_\_\_K    767 torre = \_\_\_\_\_\_atm  Are the values for the Molar Gas Volume Constant:  1 mole **CO2** =\_\_\_\_\_\_\_\_L **CO2@STP** 1 mole **H2** =\_\_\_\_\_\_\_\_L **H2@STP**  1 mole **N2** =\_\_\_\_\_\_\_\_L **N2@STP** 1 mole **O2** =\_\_\_\_\_\_\_\_L **O2@STP Calculate the Value of**R in LxAtm/(Kxmol) using the deal gas equation:  ***Part G1 Boyle’s Law***  1. A sample of a gas has a volume of 100 mL when measured at 25 **o**C and  760 mmHg. What volume will the gas occupy at 25 **o**C and 380 mmHg?  ***Part G2: Charles Law***  2. The volume of a gas is 100.0 mL at 27 **o**C. At what temperature in degrees Celsius would the volume of the gas  be 200.0 mL, assuming the pressure remains constant.  ***Part G4: Dalton’s Law of Partial Pressures***  3. Calculate the dry volume in milliliters of 200 mL of hydrogen gas collected over water at 25 **o**C at 760 torre pressure  with the temperature remaining constant. (The partial pressure of water vapor at 25 **o**C is 23.8 torre.)  ***Part G3: Gay-Lussac’s Law***  4. A sample of gas occupies 100.0 L at 710.0 torre and 27 **o**C. Calculate the pressure in torre if the temperature is  changed to 127 **o**C while the volume remains constant.  **Part G6: Avogadro’s Law**  5. A 1.5 mole sample of a gas occupies 25.0 L at 758 torre and 27oC. Calculate the Volume of the gas, if more  molecules are injected into the vessel increasing the moles to 2.5 moles, provided the pressure and the  temperature do not change.  ***Part G5: Ideal Gas Equation-Combined Gas Laws***  5. Calculate the number of moles of nitrogen gas in a 5.00 L cylinder at 27 **o**C and 4 atm pressure.  R = 0.0821 L atm/ K mole )  How much does this volume of gas weigh?  **Part F: Phase Diagrams  Identify the points labeled on the**  **Phase Diagram of water:**  **PhaseWaterLetter**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_A.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_B. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_H**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_C. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_I**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_D. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_J**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_E. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_K**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_F**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_G**  **CHM1025C Module One Homework Packet**  **Phase Diagram for Carbon Dioxide.**  **PhaseCO2Letter**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_M. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_T**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_N. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_U**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_O. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_V**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_P. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_W**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Q.**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_R**  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_S**  **Corwin’s Phase Diagram????**  **04_01_Figure**  **CHM1025C Module One Homework Packet**  **Part P1: Phase Diagram Applications**  **1 point**      **A demonstration of heating iodine in a beaker has purple vapors..can you explain  using the phase diagram above?**  **PhaseDiagramQuestionline**  **Watch Video:**  **Real Video Movie (Requires Real Video Plug In):**  [**http://www.fscj.me/PhaseDiagram/01Phase\_Diagram.rm**](http://www.fscj.me/PhaseDiagram/01Phase_Diagram.rm)**1.6 c.  Unit Conversion (Conceptual Chemistry 5th Appendix B)             Video #CO106c (5.26 Minutes)**  **Mobile/Cell Phone Link:** [**http://bcove.me/anfsogbq**](http://bcove.me/anfsogbq)  **Additional Videos Online Menu:**  [**http://www.fscj.me/chm1025/Video/Chapter2VideoMenu.html**](http://www.fscj.me/chm1025/Video/Chapter2VideoMenu.html)  [**Kinetic Molecular Theory**](http://www.lsua.us/chem1001/sampletest/01M6a.htm)**-Section 2.8**  **The gas properties and laws discussed in Chapter 2 are based on the Kinetic Molecular  theory.  The CHM 1025C texts list five or six basic assumptions.**  **You will write these assumptions on the test (red summary)**  **1. Gases are composed of *molecules*\*****[[1]](http://bb.fccj.edu/webapps/blackboard/content/" \l "_ftn1).  The *distance* between the molecules  is *very-very great* compared to the size of the molecules themselves, and  the total volume of the molecules is only a very-very small fraction of the  entire space occupied by the gas.  Therefore, considering volume, we are  primary considering *empty space*.  (This assumption explains why gases  are highly compressed and have very low densities.) (Gases are made up of very tiny molecules. The volume of a gas is mainly  empty space).**  **2. *No attractive forces* exist between molecules in a gas.  (This is what keeps a gas  from spontaneously becoming a liquid.) (Gas molecules have no attraction for one another.)**  **3. The molecules of a gas are in a state of constant, *rapid motion*, colliding with each other  and with the walls of the container in a perfectly random manner.   (This assumption explains why different gases normally mix completely.   The collisions between molecules and the walls of the container account for the pressure  exerted by the gas.) (Gas molecules demonstrate rapid motion, move in straight lines, and travel  in random directions.)**  **4. All of these molecular collisions are *perfectly elastic*. As a result, the *system as a  whole* experiences no loss of kinetic energy, the energy derived from the motion of a particle. (Gas molecules undergo perfect elastic collisions.)**  **5. The average kinetic energy per molecule of a gas is proportional to the absolute temperature,  and the average kinetic energy per molecule is the same at a given temperature and pressure for all gases.   (The average kinetic energy of gas molecules is proportional to the Kelvin temperature, that is  KE is approximately T.)**  **When we think of molecules of elemental gases, we usually think of the diatomic gases such as nitrogen,  oxygen, hydrogen, etc. The Nobel gases exist as monoatomic gases such as Helium, Neon, etc.**  **These assumptions are sometimes condensed as follows:**  **(a) Gases consist of particles (molecules or atoms), whose separation is much greater  than the size of the particles themselves.**  **(b) The particles of a gas are in continual, random, and rapid motion. As they move,  they collide with one another and with the walls of their container, but they do so  without energy loss.**  **(c) The average kinetic energy of gas particles is proportional to the gas temperature.  *All gases, regardless of molar mass, have the same average kinetic energy at the same  temperature.***  **The assumptions or postulates are summarized on page 47 of Chapter 2** |