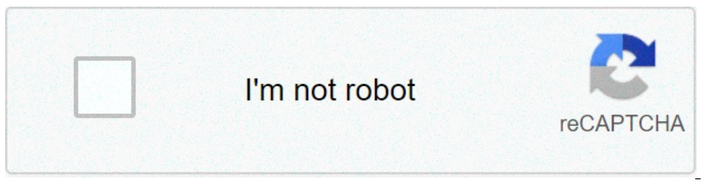

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Chemistry matter and change chapter 4

 1 Chapter 4 Atomic StructurePages 2 Atomic Structure Section 4.1- Studying the atomSection 4.2- The Structure of an Atom Section 4.3- Modern Atomic Theory 3 The Structure of MatterWhat is an atom? All matter is made up of atoms. The atom is the smallest particle of matter which retains the properties of the matter. What is an element? A substance which cannot be broken down into anything simpler. Elements are made up of 1 type of atom. H, Na, Cl, O 4 The Structure of MatterWhat is a molecule? A molecule is formed when 2 or more atoms are combined. A molecule cannot be broken down by physical means into its elements. NaCl, H2O 5 The Structure of an Atom Properties of Subatomic ParticlesWhat are three subatomic particles? Protons, electrons, and neutrons are subatomic particles. 6 The Structure of an AtomWhat is an atom? An atom contains a central NUCLEUS which contains the subatomic particles called PROTONS and NEUTRONS. The nucleus is surrounded by the third subatomic particle called the ELECTRON. 7 The Structure of an AtomWhat is an atom? 8 Properties of Subatomic ParticlesProtons A proton is a positively charged subatomic particle. It is found in the nucleus of every atom. Each proton is assigned a charge of 1+. Each nucleus must contain at least one proton. 9 Properties of Subatomic ParticlesElectrons An electron is a negatively charged subatomic particle. It is found in the space outside the nucleus. Each electron has a charge of 1−. 10 Properties of Subatomic ParticlesNeutrons A neutron is a neutral subatomic particle. It is found in the nucleus of an atom. It has a mass almost exactly equal to that of a proton. 11 Comparing Subatomic ParticlesHere are some similarities and differences between protons, electrons, and neutrons. Protons and neutrons have almost the same mass. About 2000 electrons equal the mass of one proton. An electron has a charge that is equal in size to, but the opposite of, the charge of a proton. Neutrons have no charge. Protons and neutrons are found in the nucleus. Electrons are found in the space outside the nucleus. 12 Atomic Structure Virtually all of an atoms mass is contained within the dense nucleus. Every atom is mostly empty space! 13 In space surrounding nucleusAtomic Structure Most atoms have this basic structure of 3 particles: Subatomic Particle Symbol Location Charge Electron e In space surrounding nucleus -1 Proton P Inside the nucleus +1 Neutron N 14 Atomic Number and Mass NumberHow are atoms of one element different from atoms of other elements? Atoms of different elements have different numbers of protons. 15 Atomic Number Atomic Number The atomic number of an element is the number of protons in an atom of that element. All atoms of any given element have the same atomic number. Each hydrogen atom has one proton in its nucleus. Hydrogen is assigned the atomic number 1. Each element has a unique atomic number. 16 Atomic # = # Protons Every element is identified by its Atomic # Atomic Number Atomic # = # Protons Every element is identified by its Atomic # 17 Atomic Number and Mass NumberThe number of protons in the nucleus of an atom can vary. The # protons identifies an element. The number of protons of an element is known as the element's atomic number. 18 Atomic Number and Mass NumberEach element has a different atomic number. A The atomic number of sulfur (S) is 16. B The atomic number of iron (Fe) is 26. C The atomic number of silver (Ag) is 47. 19 Atomic Number and Mass NumberAtoms are neutral, so each positive charge in an atom is balanced by a negative charge. That means the atomic number of an element also equals the number of electrons in an atom of that element. Hydrogen has an atomic number of 1, so a hydrogen atom has 1 electron. Sulfur has an atomic number of 16, so a sulfur atom has 16 electrons. 20 Atomic Number and Mass NumberThe mass number of an atom is the sum of the protons and neutrons in the nucleus of that atom. To find the number of neutrons in an atom, you need the mass number of the atom and its atomic number. The atomic number of aluminum is 13. An atom of aluminum that has a mass number of 27 has 13 protons and 14 neutrons 21 Isotopes Isotopes are atoms of the same element that have different numbers of neutrons and different mass numbers. To distinguish one isotope from another, the isotopes are referred by their mass numbers. For example, oxygen has 3 isotopes: oxygen-16, oxygen-17, and oxygen-18. All three oxygen isotopes can react with hydrogen to form water or combine with iron to form rust. 22 Isotopes What is the difference between two isotopes of the same element? Isotopes of an element have the same atomic number but different mass numbers because they have different numbers of neutrons. 23 Isotopes With most elements, it is hard to notice any differences in the physical or chemical properties of their isotopes. Hydrogen is an exception. Hydrogen-1 has no neutrons. (Almost all hydrogen is hydrogen-1.) Hydrogen-2 has one neutron, and hydrogen-3 has two neutrons. Because a hydrogen-1 atom has only one proton, adding a neutron doubles its mass. 24 Isotopes Water that contains hydrogen-2 atoms in place of hydrogen-1 atoms is called heavy water. 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Home School Home District Home Our School Activities Athletics Guidance Parents & Students Staff For Students Teacher Pages " Allen, Erin Andrewlevich, Amber Aurelia, P. Lauren Banchi, Hope Barazani, Susan Barry, James Bassler, Brian Beal, Steven Bovard, Molly Brittin, Sabrina Brokenshire, Jason Brown, Angela Brown, Jack Carey, Stacey Cassidy, Robert Catarro, Albert Christine, Shannon Collins, Wendy Corrigan, Michael Cox, Dennis Cozza, Paul Cumberland, John Cutillo, Marc Czekaj, Jeffrey Dale-Miller, Cynthia Daley, Erin Dalton, Audrey Day, Michael DeCecco, Greg DiCarne, Charles DiChiara, Frederick DiFilippo, Donna Douglass, Debbie Egan, Rachel Ellingson, Karen Eriksson, Eileen Fiedler, Amanda Flack, Julie Forlini, Meghan Francis, Aaron Francis, Janna Freedman, Deborah Friedant, Rena Fries, Abbey Fries, David Goldsman, Eric Goldstein, Susan Goral, John Green, Lauren Hagan, Edward Harper, Heather Hessler, Lindsay Hoban, Jennifer Hontz, William Hughes, Daniel Jayo, Ignacio Jones, Jennifer Kapusta, Justin Karetny, Elizabeth Kaufman, Michelle Keeny, William Kerwood, Samuel King, Kristen King-Berkovitz, Nancy Koenig, Jennifer Konell, Lindsay Kowal, Amy Leahy, Molly Lewis, Ashley List, Yana Lutz, Megan MacInnes, Rebecca Marchetti, Gregory Martin, Shannon Mauro, Jordan McCaffery, Dina McCullough, Fran Miller, Bernie Mitchell, Karen Moody, Tia Mooney, Colleen Mulville, Robert Newman, Daniel O'Brien, Nicole O'Brien, Rita O'Connor, Joseph Petry, Amanda Pettigrew, Melissa Pisauro, Kathleen Rhodes, Carolyn Russell, Keith Sander, Michael Sauvion, Joan Schuh, Alexandra Schwartz, Jennifer Schwoerer, Vanessa Shapiro, Craig Sherin, Bernie Sherman, Emily Slipp, Lisa Smith, Todd Social Studies Stein, Rise Stek, Heather Sudholz, Lisa Teeter, Nicole Tenaglia, Cheri Thackray, Gwen Tocci, Alfred Tomlinson, Jessica Trageser, Theresa Tyson, Cara U'Selis, Linda Vargas, Ariel Veltre, Paul Walton, Nicholas Weber, Carrie Weinert, Kelli Weisensale, Judy Wirtshafter, Shawn Wisniewski, Brian Yannaccone, Allison Hering, Tara Podsobinski, Chris Adams, Karen Albrecht, Gerald Albrecht, Michelle Fisher, Carolyn Chapter Summaries – Chemistry Matter and Change Ch 1 – Introduction to Chemistry 1.1 The Stories of Two Chemicals Ozone Layer, atmosphere, ozone formation, chlorofluorocarbons, CFC's 1.2 Chemistry and Matter Chemistry Central Science matter characteristics, mass and weight, what you see 1.3 Scientific Methods observation, quantitative data, hypothesis, experiments, independent variable, dependent variable, control, conclusion, model, theory, scientific law, 1.4 Scientific Research pure research, applied research, technology, Ch 2 – Data Analysis 2.1 Units of Measure SI Units, base units, time (second s), length (meter m), mass (kilogram kg) Derived Units, volume (cubic meter m3), density Temperature, kelvin (K), Celsius (C) °C + 273 = K 2.2 Scientific Notation and Dimensional Analysis Add & subtract similar, multiply & divide similar DimensionalAbnalysis, conversion factor 2.3 How reliable are measurements? 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