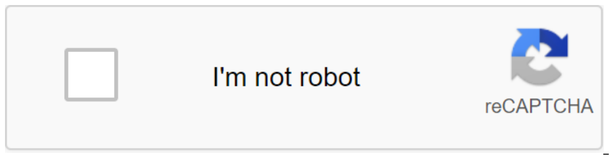

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Data sheet for isotopic pennies lab answers

Roman Oleynik (Own Work) (CC-BY-SA-3.0) through the Commons to demonstrate that the isotopes of the element have different masses; that isotopes are atoms of the same element that have different amounts of neutrons; and that the atomic mass is the weighted average value of the element's natural isotopes. Context This is the first in a series of three lessons about isotopes, radioactive decay and core. The second lesson, Radioactive Decay: A Sweet Imitation of Half-Seed Periods, introduces the idea of a semi-seed. The final lesson, Frosty Snowman meets its demise: Analogy with Carbon Dating, based on gathering evidence now and extrapolating it into the past. This lesson helps students build their understanding of the properties of matter, in particular, it will help them understand that the average atomic mass is not a simple average, but is weighted according to the percentage abundance. Before working on this lesson, students should be familiar with the periodic table and had to have some basic instructions in the following concepts: isotopes, mass number, and atomic number. Students should be able to describe the atom and its basic structure. This lesson helps students understand the important idea that neutrons in the nucleus add to the mass of the atom. Preliminary understanding of this lesson can be found at level 6-8, in particular, the idea that the atoms of any element are similar, but different from the atoms of other elements. (4D structure of matter (6-8) #1) Ideas of this lesson are important for building an understanding of the concept that the nucleus of radioactive isotopes spontaneously disintegrates. Electrically neutral particles (neutrons) in the nucleus add to its mass, but do not affect the number of electrons and therefore have little to no effect on the atom's connections with other atoms (its chemical behavior). A block of pure carbon, for example, consists of two species, or isotopes, carbon atoms, which are slightly different in mass but have almost identical chemical properties. Scientists continue to investigate atoms and have found even smaller components from which electrons, neutrons and protons are made. According to studies, students can first take isotopes to be something in addition to atoms or as soon as unusual, unstable nuclides. The most important features of isotopes (in terms of general scientific literacy) are their almost identical chemical behavior and their various nuclear stabilitys. Insisting on strict use of isotopes and nuclide is probably not worth it, and the last term can be ignored. (Benchmarks for Scientific Literacy, p. 79.) In this lesson, the pennies of different compositions represent isotopes. Students can easily understand that pennies of different masses are still a penny. Planning ahead before class, prepare the canisters as follows: Put a piece of tape on the sides and write a code letter on top of each canister. Don't forget to keep the code letters on a separate piece of paper. Weigh the canisters with their tops. Record the mass on the tape on the side. Place the penny sample in the canister. Write down the number of old and new pennies next to the corresponding code letters on a separate sheet of paper. Print canisters with a small amount of Superglue. Note: These sealed canisters can be stored year after year. Motivation Refers students to a picturesque periodic table. If students are offline, they can look at the periodic table in their tutorials or you can print a copy of Web Elements: Printable Periodic Table for their use. When students look at the periodic table, ask them if they see any atomic masses that are whole numbers. Then ask them, Why do all the atomic masses in the periodic table include a decimal point, not just whole numbers? Later in the class, students will reconsider their answers. Tell the students: Atomic mass belongs to the average atomic mass of natural isotopes of any element. Since this is the average number of different isotopes, it is usually a decimal number. The mass number, on the other hand, is the counting of protons and neutrons for any one isotope and is always a whole number. Display a collection of atoms such as a glass of mortar or a glass of milk. Ask students: In this collection of atoms, are all atoms of this element exactly the same? Let them explain that the isotopes of the element have the same chemical properties, but different weights. Development Tell Students: In 1913, T. W. Richards found two atomic masses of lead. In 1919, F. W. Aston separated neon atoms into two different isotopes, after he invented the mass spectrograph. Since then, many isotopes of the elements have been discovered. All of them are listed in many places, including the websites used in this lesson. Remind students that ALL atoms are isotopes. Natural chemical elements tend to blend isotopes, and so their atomic masses are weighted average masses of isotopes in the mixture. The spread of the Science NetLinks lab package, Isotopes Penny, for each student. You can group students in any size group, but working in pairs includes and attracts each student. Tell students: In this activity, you will find a weighted average mass of two types of pennies. Then you will find a number of each type of penny in your mystery sample using the concepts that you have developed in the activity. On the first page of the lab suite, ask students to define the following terms in their own words: isotopes, mass number, and atomic number. At the end of the lesson, students will be asked to think and revise, if necessary, these You may want to collect these sheets to test the student's understanding. If students seem to need additional instructions on isotopes, you should consider these concepts before proceeding to the lab. Students should be able to complete Parts A, B and C in one grade period. You can assign Penny Isotopes to a score sheet as a homework assignment. Score Do Students Complete Penny Isotopes Score Sheet, so you can evaluate the student's understanding of concepts in this lesson. In the first part of the assessment, students apply what they have learned to different elements. They also write a brief summary explaining how the laboratory illustrated the concepts of isotopes, mass numbers, and atomic numbers. Do students go back to their answers to the question in motivation. (Why do all the atomic masses in the periodic table include a decimal point, not just whole numbers?) Ask them to review or expand their responses based on what they have learned in this lesson. Aston Expansion, Francis William - The 1922 Nobel Biography, on the website of the Nobel eMuseum, provides information about Francis William Aston, the British chemist and physicist who won the 1922 Nobel Prize in Chemistry for detecting isotope elements using a mass spectrograph. Students can browse the Photograhic Periodic Elements table to see a diagram of all the elements and each known isotope. Send us feedback on this lesson.