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| CHEMISTRY | CODE: SCS21A |
| 2014-2015 SCHOOL YEAR | INSTRUCTOR: Ms. Bui |
| CLASSROOM: 510 | LAB ROOM: 506 |

**ISOTOPES**

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| Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Subject: Chemistry |

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| **READ:**1. **Isotopes**
	1. Atoms with the same atomic number but different mass numbers (mass number = protons + neutrons).
	2. Isotope notation – how to distinguish different isotopes of a given element
		1. Include Element name/symbol, mass number, atomic number (optional)
			1. Example: Carbon – 14 (Element name is carbon and mass number is 14)
			2. Example: C-14 (Element symbol is C (carbon) and mass number is 14)
			3. Example: 14C (element symbol is C and mass number is 14)
			4. Example: $\begin{matrix}14\\6\end{matrix}C$ (Element symbol is C, mass number is 14 and atomic number is 6)
	3. They have the same number of protons but different number of neutrons.
		1. To calculate neutron: Mass number – protons
		2. Carbon-12 and Carbon-13
			1. Both have 6 protons (look at atomic number) but Carbon-12 have 6 neutrons while Carbon-13 have 7 neutrons
2. **Atomic mass**
	1. The weighted average mass of all the **naturally** occurring isotopes of an element.
	2. Need relative abundance and atomic mass to calculate the weighted average mass or average atomic mass
	3. Example: Carbon has two naturally occurring isotopes - 98.89% Carbon-12 and 1.108% Carbon-13
		1. Solution: Convert the percentages to decimals and multiply the mass of each isotope by the relative abundance and add together.

 Percent x mass .9889 x 12 = 11.87 .01108 x 13 = + 0.1440  Total: 12.01  |

1. What information is necessary to determine the atomic mass of the element chlorine?
	1. The atomic mass of each artificially produced isotope of chlorine, only
	2. The relative abundance of each naturally occurring isotope of chlorine only
	3. The atomic mass and the relative abundance of each naturally occurring isotope of chlorine
	4. The atomic mass and the relative abundance of each naturally occurring and artificially produced isotope of chlorine
2. What is the total number of neutrons in an atom of O-18?
	1. 18
	2. 16
	3. 10
	4. 8
3. The atomic mass of titanium is 47.88 atomic mass units. This atomic mass represents the
	1. Total mass of all the protons and neutrons in an atom of Ti
	2. Total mass of all the protons, neutrons and electrons in an atom of Ti
	3. Weighted average mass of the most abundant isotope of Ti
	4. Weighted average mass of all the naturally occurring isotopes of Ti
4. Which notations represent different isotopes of the element sodium?
	1. 32S and 34S
	2. S2- and S6+
	3. Na+ and Na0
	4. 22Na and 23Na
5. An atom that has 13 protons and 15 neutrons is an isotope of the element
	1. Nickel
	2. Silicon
	3. Aluminum
	4. Phosphorus
6. The atomic masses and the natural abundances of the two naturally occurring isotopes of lithium are shown in the table below:



Which numerical setup can be used to determine the atomic mass of lithium?

* 1. (0.075)(6.02 u) + (0.925)(7.02 u)
	2. (0.925)(6.02 u) + (0.075)(7.02 u)
	3. (7.5)(6.02 u) + (92.5)(7.02 u)
	4. (92.6=5)(6.02 u) + (7.5)(7.02 u)
1. The total number of protons, electrons and neutrons in each of four different atoms are shown in the table below. Which two atoms are isotopes of the same element?

**Subatomic Particles in Four Different Atoms**

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| **Atom** | **Total Number of Protons** | **Total Number of Electrons** | **Total Number of Neutrons** |
| A | 5 | 5 | 7 |
| D | 6 | 6 | 8 |
| X | 7 | 7 | 8 |
| Z | 7 | 7 | 9 |

* 1. A and D
	2. A and Z
	3. X and D
	4. X and Z