

Name \_\_\_\_\_

## Unit 5: Atomic Theory Study Guide

If you can do all the things listed below, you are ready for the Unit 4 test. Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

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| <p>_____ 1. I can describe John Dalton's contribution to our understanding of the atom.</p>       | <p>Dalton's Model:</p> <p>What it looked like:</p>  |
| <p>_____ 2. I can describe JJ Thomson's contribution to our understanding of the atom.</p>        | <p>Thomson's Experiment:</p> <p>Thomson's Model:</p> <p>What it looked like:            —   —</p>   |
| <p>_____ 3. I can describe Ernest Rutherford's contribution to our understanding of the atom.</p> | <p>Rutherford's Experiment:</p> <p>Rutherford's Model:</p> <p>What it looked like:            —   —</p> <p>   —</p> |
| <p>_____ 4. I can describe Niels Bohr's contribution to our understanding of the atom.</p>        | <p>Bohr's Model:</p> <p>What it looked like:</p>  |

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| <p>_____ 5. I can describe James Chadwick's contribution to our understanding of the atom.</p>                                     | <p>What subatomic particle did Chadwick discover?</p>  |                           |                           |                           |  |
| <p>_____ 6. I can describe how Schrodinger, Heisenberg, Pauli, Dirac, and others contributed to our understanding of the atom.</p> | <p>What does the modern model of the atom look like?</p> <p>Where, in an atom, are electrons likely to be found according to the modern model?</p> |                           |                           |                           |  |
| <p>_____ 7. I can state the chronological order of atomic models.</p>  | <p>From oldest to newest, list the models that we have used to describe an atom.</p>   |                           |                           |                           |  |
| <p>_____ 8. I can state the three subatomic particles, their location in an atom, their charges, and their masses (in amu).</p>    |  | <p><b>Particle #1</b></p> | <p><b>Particle #2</b></p> | <p><b>Particle #3</b></p> |  |
|  | <p><b>Name</b></p>   | <p><i>proton</i></p>      | <p><i>neutron</i></p>     | <p><i>electron</i></p>    |  |
|  | <p><b>Charge</b></p>   |                           |                           |                           |  |
|  | <p><b>Mass</b></p>   |                           |                           |                           |  |
|  | <p><b>Location in Atom</b></p>   |                           |                           |                           |  |
| <p>_____ 9. I can explain why atoms are electrically neutral.</p>  | <p>Atoms are electrically neutral because the number of _____ is equal to the number of _____.</p>   |                           |                           |                           |  |
| <p>_____ 10. I can define mass number and atomic number.</p>   | <p><b>Definitions:</b><br/> mass number –<br/><br/> atomic number –</p>  |                           |                           |                           |  |

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| <p>____ 11. Given the mass number, I can determine the number of protons, neutron, and electrons in an atom.</p>  | <p>In an atom of <math>^{212}_{84}\text{Po}</math>, how many protons are present?<br/>84</p> <p>In an atom of <math>^{212}_{84}\text{Po}</math>, how many electrons are present?<br/>84</p> <p>In an atom of <math>^{212}_{84}\text{Po}</math>, how many neutrons are present?<br/>84</p> |
| <p>____ 12. I can use the Periodic Table to determine the atomic number of an element.</p>  | <p>How many protons are in an atom of selenium?</p> <p>How many protons are in an atom of silicon?</p>  |
| <p>____ 13. I can define isotope.</p>   | <p><b>Definition:</b><br/>isotope –</p>   |
| <p>____ 14. I can represent an atom in any of the four methods of isotopic notation.</p>  | <p>Write the four different methods of isotopic notation for an atom of bromine that has 45 neutrons.</p> <p>Method 1                  Method 2                  Method 3                  Method 4</p>   |
| <p>____ 15. I can calculate average atomic mass given the masses of the naturally occurring isotopes and the percent abundances.</p>                        | <p>Element Q has two isotopes. If 77% of the element has an isotopic mass of 83.7 amu and 23% of the element has an isotopic mass of 89.3 amu, what is the average atomic mass of the element?</p>  |
| <p>____ 16. I can determine the most and least abundant isotope from a series of given isotopes and the average atomic mass OR using the periodic table</p> | <p>What is the most abundant isotope of Oxygen? How did you know?</p> <p>Given the following isotopes of Carbon (12, 13, 14), which is the most abundant if the average atomic mass is 12.011amu?</p>   |

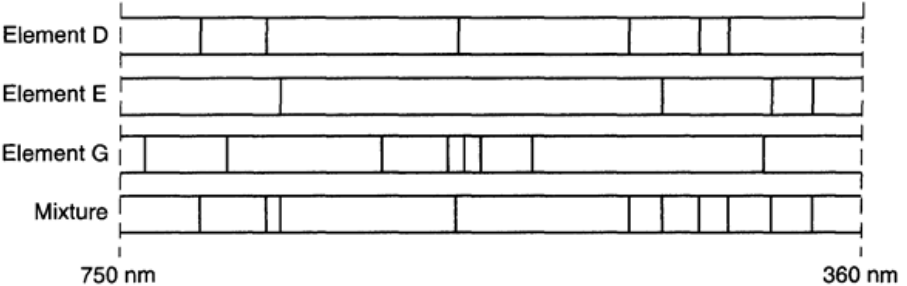
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| <p>_____18. I can recall the three isotopes of Hydrogen by name, mass number, and relative abundance</p>                        |  |
| <p>_____19. I can define ion, cation, and anion.</p>  | <p><b>Definitions:</b><br/>ion –<br/><br/>cation –<br/><br/>anion –</p>  |
| <p>_____20. Given the mass number and the charge, I can determine the number of protons, neutrons, and electrons in an ion.</p> | <p>How many protons are in <math>^{19}\text{F}^{1-}</math>?<br/>9</p> <p>How many neutrons are in <math>^{19}\text{F}^{1-}</math>?<br/>9</p> <p>How many electrons are in <math>^{19}\text{F}^{1-}</math>?<br/>9</p> |

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| <p>_____ 21. I can define principal energy level, orbital, ground state, excited state, electron configuration, and bright line spectrum.</p> | <p><b>Definitions:</b><br/>principal energy level (PEL)–<br/><br/>orbital –<br/><br/>ground state –<br/><br/>excited state –<br/><br/>electron configuration –<br/><br/>bright line spectrum –</p> |
| <p>_____ 22. I can state the maximum number of electrons that will fit into each of the first four principal energy levels.</p>               | <p>PEL 1 holds a maximum of _____ electrons.<br/>PEL 2 holds a maximum of _____ electrons.<br/>PEL 3 holds a maximum of _____ electrons.<br/>PEL 4 holds a maximum of _____ electrons.</p>         |
| <p>_____ 23. I can state the relationship between distance from the nucleus and energy of an electron.</p>                                    | <p>As the distance between the nucleus and the electron increases, the energy of the electron _____</p>  |
| <p>_____ 24. I can state the relationship between the number of the principal energy level and the distance to the atom's nucleus.</p>        | <p>As the number of the PEL increases, the distance to the nucleus _____</p>   |

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| <p>____ 25. I can explain, in terms of subatomic particles and energy states, how a bright line spectrum is created.</p> | <p>A bright line spectrum is created when <b>electrons in a high energy state release energy and return to a lower energy state</b></p>   |
| <p>____ 26. I can identify the elements shown in a bright line spectrum.</p>   | <p style="text-align: center;"><b>Bright-Line Spectra</b></p>  <p>Which element(s) is/are present in the mixture?</p> |
| <p>____ 27. I can define valence electrons.</p>  | <p><b>Definition:</b><br/>valence electron –</p>  |
| <p>____ 28. I can locate and interpret an element's electron configuration on the Periodic Table.</p>                    | <p>How many valence electrons does an atom of rubidium have in the ground state?</p> <p>How many principal energy levels contain electrons in an atom of iodine in the ground state?</p>                |
| <p>____ 29. I can identify an electron configuration that shows an atom in the excited state.</p>                        | <p>Which electron configuration represents an atom of potassium in the excited state?</p> <p>A) 2-8-7-1<br/>B) 2-8-8-1<br/>C) 2-8-7-2<br/>D) 2-8-8-2</p>  |
| <p>____ 30. I can draw Lewis electron dot diagrams for a given element.</p>  | <p>Draw the Lewis electron dot diagram for the following atoms:</p> <p style="text-align: center;">Li    Be    B    C    N    O    F    Ne</p>  |

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| <p>_____ 31. I can define and state the importance of “octet of valence electrons.”</p> | <p><b>Definition:</b><br/>octet of valence electrons –</p> <p>The importance of having a complete “octet of valence electrons” is</p> |
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