Chemistry

Seton Home Study School

Lesson Plan ◆ Answer Keys ◆ Tests ◆ Quarter Report Forms

Course Manual

SCI401_20A

Revised July 2018
Outer Cover: *Portrait of Antoine-Laurent Lavoisier and His Wife*, by Jacques-Louis David
Inner Cover: *Saints Cosmas and Damian before Lisius*, by Fra Angelico

Day 3

Read and study pages 84-89. Stop at the section entitled **Electrical Charge and Atomic Structure**. Keep notes in your notebook.

Day 4

Read and study pages 89-93. Start at the section entitled **Electrical Charge and Atomic Structure**. Stop at the section entitled **Atomic Structure in More Detail**. Keep notes in your notebook.

Day 5

Read and study pages 93-98. Start at the section entitled **Atomic Structure in More Detail**. Stop at the section entitled **The Nature of Light**. Keep notes in your notebook.

WEEK SIX

Module 3 > Atomic Structure (Chapter 3)

Day 1

Read and study pages 98-104. Start at the section entitled **The Nature of Light**. Stop at the section entitled **The Electromagnetic Spectrum**. Keep notes in your notebook.

NOTE: The numbers given on the bottom of Figure 3.10 on p. 100 in the textbook are the wavelengths of the visible light spectrum. The following chart shows the relationships of wavelength, frequency, and energy for the visible light spectrum.

Wavelength	Violet	Indigo	Blue	Green	Yellow	Orange	Red
Frequency	Red	Orange	Yellow	Green	Blue	Indigo	Violet
Energy	Red	Orange	Yellow	Green	Blue	Indigo	Violet
	Lowest	→	→	→	→	→	**Highest**

The amplitude for every color is the same for light of the same brightness. The amplitude is low when the light is dim. The amplitude is high when the light is bright. Thus, all the colors of sunlight have the same amplitude, since the sunlight is of one brightness at any given point in time.

Day 2

Read and study pages 104-110. Start at the section entitled **The Electromagnetic Spectrum**. Stop at the section entitled **The Bohr Model of the Atom**. Keep notes in your notebook.

Day 3

Read and study pages 110-117. Start at the section entitled **The Bohr Model of the Atom**. Stop at the section entitled **Building Atoms in the Quantum Mechanical Model**. Keep notes in your notebook.

Day 4

Read and study pages 117-125. Start at the section entitled **Building Atoms in the Quantum Mechanical Model**. Keep notes in your notebook.

NOTE: In the example given on p. 122, the last two orbitals in the electron configuration for Ag should be $5s^1\ 4d^{10}$, not $5s^2\ 4d^9$ as given in the textbook. The reason is that there is extra stability in an atom when orbitals are either completely filled or half filled. So, when two orbitals (such as s and d) are close in energy, and it is possible for one orbital to be completely filled, that is what happens. In this example, therefore, since the d orbital requires only one more electron to be filled, the s orbital ends up having one less electron so that the d orbital can be filled. Therefore, the last two orbitals become $5s^1\ 4d^{10}$.

Day 5

Review the answers to the **ON YOUR OWN** exercises on pages 126-129. For additional preparation, you may want to work through the **STUDY GUIDE FOR MODULE 3** on page 130.

WEEK SEVEN

Day 1

For additional preparation, you may want to work through the **PRACTICE PROBLEMS** on page 131. Study for the Chapter 3 Test. Make sure you understand the relationships of frequency, wavelength, and energy given on page 106, and the chart on the visible light spectrum shown above (Week Six, Day 1).

Day 2

For additional preparation, you may want to work through the **Extra Practice Problems for Module 3** in **Appendix B**, on page 617. Study for the Chapter 3 Test. There are **Chapter 3 Study Problems** to help you study for some of the questions on the test. Review the sample problems and do the Practice Problems. There is an Answer Key to the Practice Problems after the Lesson Plan.

Chapter 3 Study Problems

(You may use the Periodic Table.)

NOTE: The atom of a normal element has an equal number of protons and electrons. The protons are positively charged, and the electrons have a negative charge. The strength of each charge is equal, so they cancel each other out, and the atom has a net charge of zero. If the atom gains an electron, there is one more electron than the offsetting protons, so the atom will have a net charge of –1. If an atom loses an electron, there will be one more proton than the total number of electrons, and the atom will have a net charge of +1.

1. **What is the net charge of a Nitrogen atom with 7 protons, 7 neutrons, and 10 electrons?**

   A Nitrogen atom has 7 protons, 7 neutrons, and 7 electrons, so the net charge would be 0. However, since this Nitrogen atom has 10 electrons, it has a –3 charge.

   Net charge = 7 protons – 10 electrons = –3 **Answer = –3**

2. **How many electrons does a Magnesium atom have if it has a +2 charge?**

   Since a Magnesium atom has 12 protons, 12 neutrons, and 12 electrons, the net charge would be 0. The number of protons does not change, so there will always be 12 protons in a Magnesium atom.

   However, since this Magnesium atom has a +2 charge, there are 2 more positive protons than negative electrons. Therefore, there must be 10 electrons.

   12 protons – 10 electrons = +2 **Answer = 10 electron**s

3. **Platinum (Pt) has an Atomic Number of 78, an Atomic Mass of 195, and a neutral charge. This atom has how many neutrons?**

   The Atomic Number of any atom is the number of protons that atom contains.

   The Atomic Mass is the total number of protons and neutrons added together. The Atomic Number of 78 indicates that there are 78 protons; therefore, Platinum has 117 neutrons.

   195 – 78 = 117 **Answer = 117 neutrons**

4. **The Platinum atom described above has how many electrons?**

   Since the problem states that the atom has a neutral charge, the number of protons and electrons must be equal. The Atomic Number of 78 indicates that there are 78 protons, so there must be 78 electrons. **Answer = 78 electrons**

Chapter 3 Practice Problems

1. **What is the Atomic Mass of Nickel (Ni), and how many protons, neutrons, and electrons does it have?**

2. **What is the net charge of a Chlorine atom with 17 protons, 18 neutrons, and 18 electrons?**

3. **The Gallium (Ga) atom has an Atomic Mass of 70, 28 electrons, and a charge of +3. How many protons does it have?**

4. **The Atomic Mass of Gold (Au) is 197. How many neutrons does it have?**

Day 3

Take the Chapter 3 Test (Module 3).

Module 4 > Molecular Structure (Chapter 4)

REMINDER: Do the **ON YOUR OWN** exercises as you come to them throughout the module.

Day 4

Read and study pages 132-136. Stop at the section entitled **Lewis Structures for Ionic Compounds**. Keep notes in your notebook.

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Updated 6/29/2020