

Chapter 3 Practice Study Guide

1. What was each scientist given credit for discovering? What experiment was used? Give details of the experiment.
 - a. John Dalton:
 - b. JJ Thompson:
 - c. Ernest Rutherford:
 - d. James Chadwick (only discovery):
 - e. Niels Bohr:
2. What is an isotope?
3. Fill in the following chart regarding subatomic particles:

Particle	Symbol	Location	Charge	Relative Mass (amu)

4. Provide atomic notation for the following isotopes:

a. aluminum-26

b. Ba-135

c. ^{34}S

Label atomic number, mass number, and how many neutrons are in each.

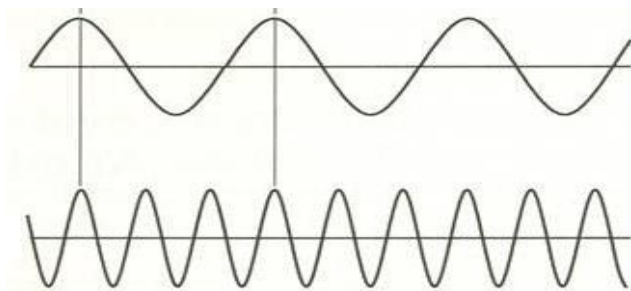
5. Fill in the missing information for isotopes.

Isotope	Mass # (A)	Atomic # (Z)	Protons, p^+	Neutrons, n^0	Electrons, e^-
^{15}O					
tellurium -131					
	79			45	36
			15	17	18
		56		77	54

6. Silicon (Si) has three isotopes with an average atomic mass of 28.086 amu. Si-28 has a mass of 27.976927 amu and a natural abundance of 92.2297%. Si – 29 has a mass of 28.976495 amu with a natural abundance of 4.6832%. What would the last isotopes mass and natural abundance be?

7. Boron has two isotopes, B-10 and B-11. Which isotope has a higher percentage of natural abundance? Why?

8. Label each wave as high or low energy, frequency, and wavelength.



9. Fill in the missing electromagnetic waves:

--	--	--	--	--	--	--

Name _____

Chemistry, Period ____

High Energy

Low Energy

Draw a wave above from high energy and show it changes as it loses energy. Make sure you show the difference in wavelength and frequency.

10. What range (in nm) is visible light? _____
What color is highest in energy and why?

11. How did Bohr prove that electrons are quantized and have discrete levels of energy?

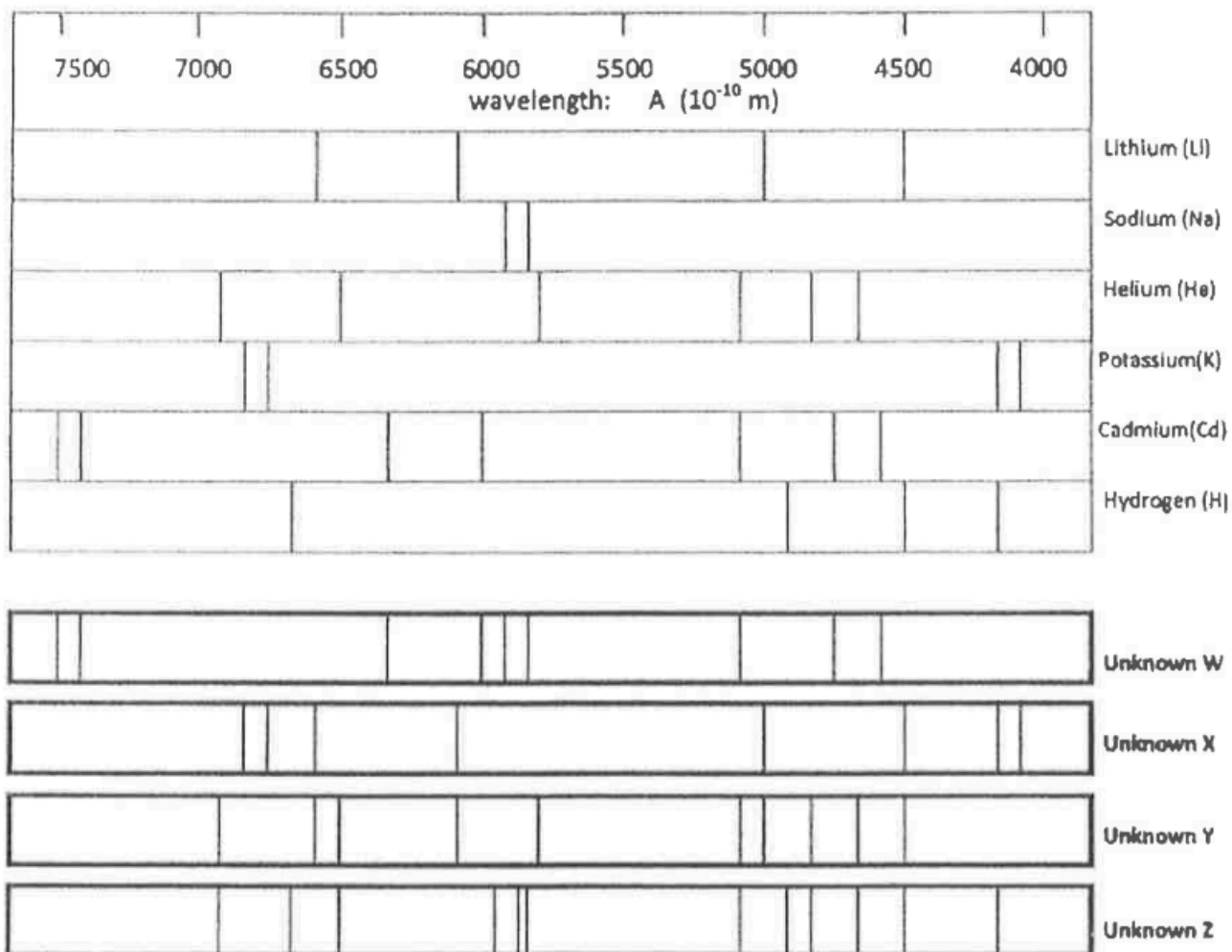
12. What is an emission line spectrum?

13. How is a continuous spectrum different from a quantized spectrum?

The line emission spectra for five elements and four unknown elements are given below. Answer questions 13-16 based on the information given in the chart.

Name _____

Chemistry, Period ____



14. List all elements present in unknown sample W.

15. List all elements present in unknown sample X.

16. List all elements present in unknown sample Y.

17. List all elements present in unknown sample Z.

18. Pick a number between 3 and 20 (not 10 or 18). This number now represents protons. a.
How many protons did you pick? _____

Name _____

Chemistry, Period ____

- b. What element has that many protons? This is now your element. _____
- c. How many electrons are in an atom of your element? _____
- d. Is your element a metal, nonmetal, or semi-metal? _____
- e. What is the electron configuration for your element? _____
- f. How many valence electrons does your element have? _____
- g. How many core electrons does your element have? _____
- h. What is the most stable ionic charge for your element? _____
- i. When an atom of your element becomes an ion, does it gain or lose electrons? _____
- j. How many electrons does your element gain or lose to become an ion? _____
- k. What is the electron configuration for that ion? _____

19. Provide the following electron configurations

- a. aluminum (Al) _____
- b. iron (Fe) _____
- c. silver (Ag) _____
- d. osmium (Os) _____

20. How many valence electrons are in the following elements:

- | | |
|-------------|-------------|
| a. S _____ | d. Sr _____ |
| b. Br _____ | e. C _____ |
| c. He _____ | f. Ar _____ |

21. What would be the ionic charge of the following elements if they lost or gained electrons?

- | | |
|------------|-------------|
| a. V _____ | d. Ba _____ |
| b. N _____ | e. Kr _____ |
| c. I _____ | f. K _____ |

22. Answer the following regarding sublevels, orbitals, and electrons in an atom.

Name _____

Chemistry, Period _____

- a. What is the maximum number of **electrons** that can fit into just the 4th energy level?

- b. How many **orbitals** are in the third energy level? _____
- c. How many **electrons** can fit into a 3p sublevel? _____
- d. Which energy level and sublevel does the last electron of sulfur have? _____
- e. Identify the element that has 15 p electrons _____

23. Show an orbital filling diagram for a neutral nitrogen atom and a neutral vanadium atom using Aufbau Principle, Hund's Rule, and Pauli Exclusion Principle.

nitrogen

vanadium

24. Looking at the nitrogen atoms orbital filling diagram, what might you assume about its stability and why?
25. What is the molar mass of magnesium acetate: $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$?
26. How many moles of carbon dioxide are in 3.75 g of CO_2 ?
27. How many grams of Au are in a 9.86 mol sample of gold?
28. What is the mass of 2.23×10^{24} formula units of potassium phosphate, K_3PO_4 ?

Name _____ Chemistry, Period _____

29. How many oxygen atoms are in 5.78 g of magnesium acetate, $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$?

30. How many bromide ions are in 2.50 g of CaBr_2 ?

31. What is the mass of NO_2 that contains 3.56×10^{24} oxygen atoms?

32.

Bohr Model

Worksheet

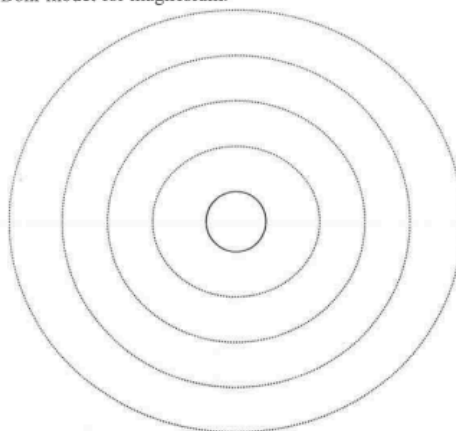


Niels Bohr

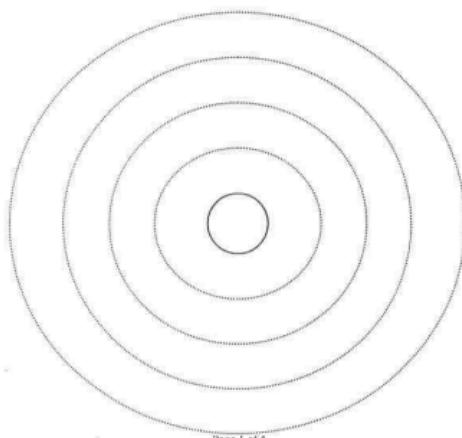
Directions

Draw the Bohr Models showing all the electrons in each energy level.

1. Magnesium compounds are used in the production of uranium for nuclear reactors. Draw the Bohr model for magnesium.

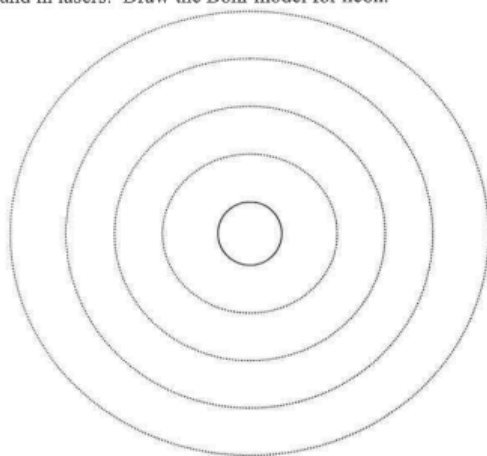


2. Sodium is found in salts that can be used to seed clouds to increase rainfall. Draw the Bohr model for sodium.

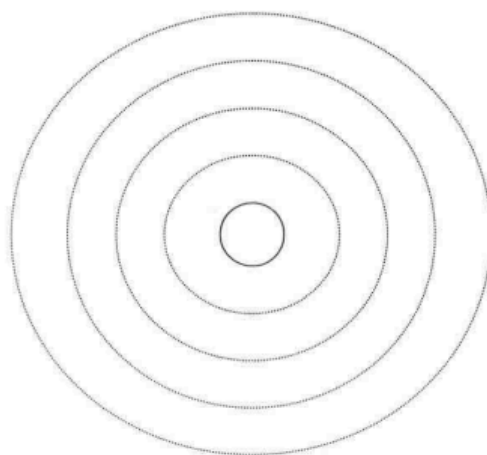


33.

3. Neon is often found in lasers. Draw the Bohr model for neon.



4. Argon gas can be found in Geiger counters which are used to detect radiation. Draw the Bohr model for argon.



34. Using the Bohr models above, explain why Ne and Ar are stable and inert. Why is Na and Mg reactive?