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Worksheets

Concept by Concept

Set A: Historical atomic models ***Objective:*** *To test your knowledge of historical atomic models*

Draw and briefly describe each historical model of the atom.

1. Hard sphere model

2. Plum-pudding model

3. Empty space model

4. Bohr's model

5. Wave mechanical model

6. State two conclusions of the Gold foil experiment.

7. State conclusions of the Cathode ray experiment.

Set A: Terms and definitions

Objective: *By defining these words, you will become more familiar with atomic structure related terms and their definitions.*

Define, neatly and clearly, the following atomic structure related terms.

1. Nucleus

2. Neutron

3. Proton

4. Electron

5. Nucleons

6. Atomic number

7. Mass number

8. Atomic mass

9. Isotopes

10. Atomic mass unit

Set B: The Subatomic Particles

Objective: *To test your knowledge of facts related to the three subatomic particles*

Complete the table below

	Subatomic particles	*Symbol*	*Mass*	*Charge*	*Location*
11.	Proton				
12.	Electron				
13.	Neutron				

Set C: Determining number of atomic particles

Objective: *To test your ability to determine number of particles in an atom .*

14. Complete the table below based on information provided for each atom. All the atoms are neutral.

	Protons	*electrons*	*Neutrons*	*Mass Number*	*Atomic number*	*Nuclear charge*	*Nucleons*	*Element's symbol*
Atom A	44			102				
Atom B		84	125					
Atom C				56				Mn
Atom D					89		229	
Atom E			30			+28		
Atom F		92					233	
Atom G			82					Ba

Set D: Isotope symbols

Objective: *To test your ability to relate isotope symbol to number of particles in an atom*

15. Complete the table below based on information provided for each atom/ All the atoms are neutral.

	Isotope symbol	*Protons*	*electrons*	*neutrons*	*Mass number*	*Atomic number*	*Nuclear charge*	*Nucleons*	*Nucleus Diagram*
Atom H	$^{142}_{59}\mathrm{Pr}$								
Atom I				31			+27		
Atom J	$^{243}_{95}\mathrm{Am}$								
Atom K		77						194	
Atom L	$^{80}\mathrm{Se}$								
Atom M									**22 p 26 n**

Set A: Calculating atomic mass ***Objective:*** *To test your ability to calculate atomic mass of an element from relative abundance and mass numbers of its isotopes*

Calculate the atomic mass for each element given the relative percentages and the mass numbers of the isotopes. Show ALL set up and work.

1) 19.78 % of ^{10}B

80.22% of ^{11}B

2) 93.12 % of ^{39}K

6.88 % of ^{41}K

3) 78.70 % of ^{24}Mg

10.13 % of ^{25}Mg

11.17 % of ^{26}Mg

4) 80.0% of ^{70}X

12.25% of ^{69}X

7.75% of ^{68}X

5) A sample of chlorine contains 75% of chlorine-35 and 25% of chlorine-37. What is the atomic mass of chlorine? show work.

6) Element X has two naturally occurring isotopes. If 72% of the atoms have a mass of 85 amu and 28% of the atoms have a mass of 87 amu, what is the atomic mass of element X. Show work.

7) The atomic mass of an element is dependent upon what two factors?

Set A: Drawing Bohr's atomic model

Objective: *To test your ability to obtain information from electron configuration, and to draw Bohr's atomic model.*

Based on information from the Periodic Table, answer questions in each box about the given element. Then draw Bohr's atomic model for the element.

1. Magnesium - 25

Electron configuration:

Number of electron shells: ____

Valance shell: : ____

Number of valance electrons: ____

Draw Bohr's atomic model for magnesium-25.
Indicate appropriate number of particles in the nucleus, and electrons (-) in electron shells.

2. Neon - 21

Electron configuration:

Number of electron shells: ____

Valance shell: : ____

Number of valance electrons: ____

Draw Bohr's atomic model for neon-21.
Indicate appropriate number of particles in the nucleus, and electrons (-) in electron shells.

3. Rubidium - 86

Electron configuration:

Number of electron shells: ____

Valance shell: : ____

Number of valance electrons: ____

Draw Bohr's atomic model for rubidium-86.
Indicate appropriate number of particles in the nucleus, and electrons (-) in electron shells.

4. Selenium - 78

Electron configuration:

Number of electron shells: ____

Valance shell: : ____

Number of valance electrons: ____

Draw Bohr's atomic model for selenium-78.
Indicate appropriate number of particles in the nucleus, and electrons (-) in electron shells.

Set B: Electron configurations Excited and Ground States

Objective: *To test your ability to interpret electron configuration*

Electron configurations for six atoms are given. Complete information about each neutral atom on the table .

		Electron configuration	*Total number of electrons*	*Total number of electron shells*	*Electron shell with the highest energy electrons*	*Excited or ground state*	Atom's symbol
5.	***Atom A***	2 – 8 – 4					
6.	***Atom B***	2 – 3 – 1					
7.	***Atom C***	2 – 8 – 7 – 1					
8.	***Atom D***	2 – 8 – 18 – 6					
9.	***Atom E***	2 – 8 – 18 – 17 – 5					
10.	***Atom F***	1- 7					

Set C: Electron transition

Objective: *To test your ability to interpret electron transition in atoms*

Below, electron transitions from one electron shell to another are given for four different atoms.

Answer questions 11 - 16 based on the electron transition in these atoms.

Atom G: 3^{rd} shell ----------> 2^{nd} shell

Atom H: 1^{st} shell ----------> 4^{th} shell

Atom I: 4^{th} shell----------> 6^{th} shell

Atom J: 5^{th} shell ----------> 3^{rd} shell

11. In which atom or atoms are energy absorbed during the electron transition?

12. In which atom or atoms are energy released during the electron transition?

13. In which atom or atoms are spectral lines observed?

14. In which atom is the greatest amount of energy absorbed?

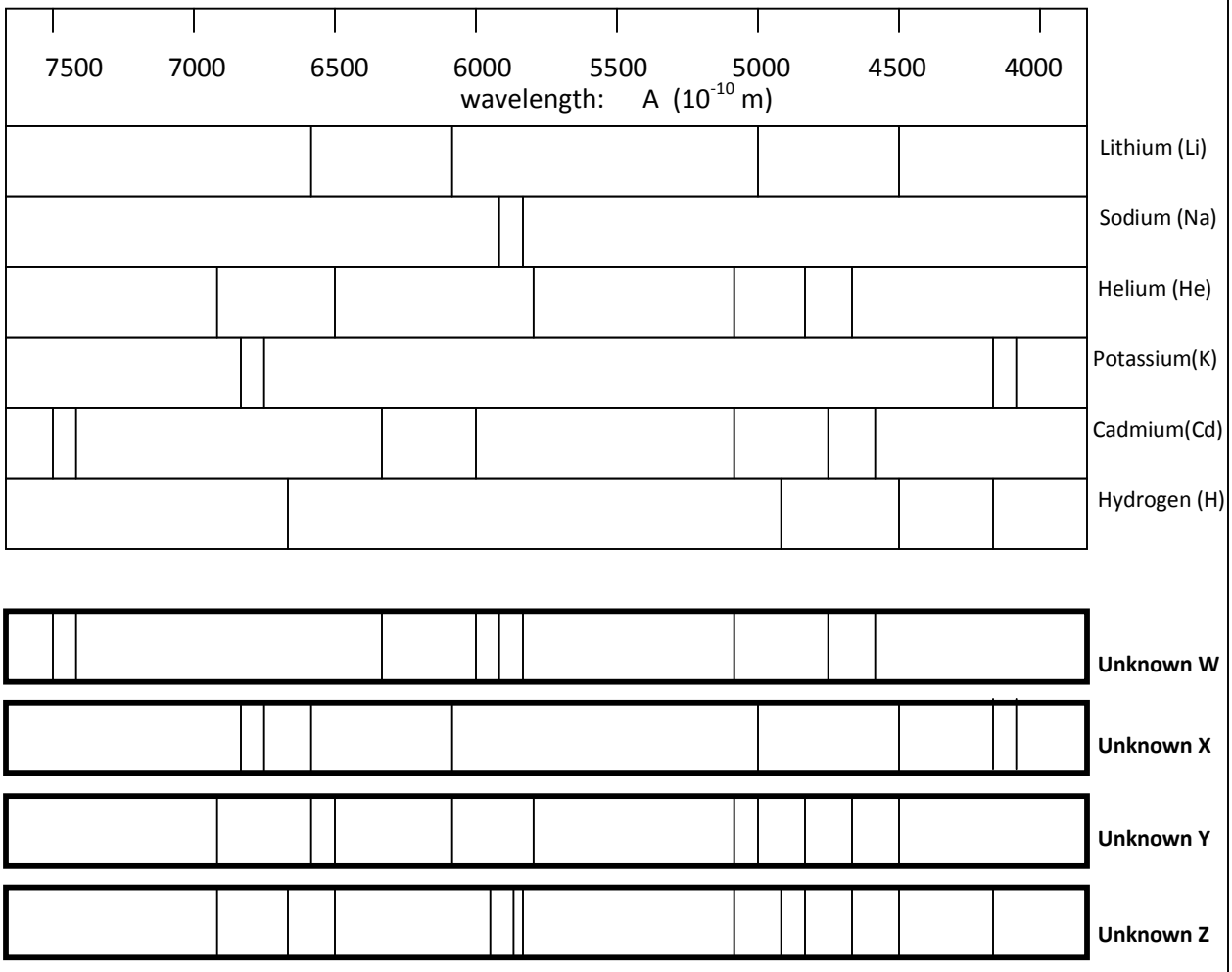
15. In which atom is the greatest amount of energy released?

16. In atom G, compare the energy of the electron in the 3^{rd} shell to that of the electron in the 2^{nd} shell.

Set D: Bright-line spectra ***Objective:*** *To test your ability to analyze bright-line spectra chart*

Below, bright-line spectral chart for five elements and four unknown samples are given.

Answer questions 17 - 21 based on the information given in the chart.



17. List all elements present in unknown sample W .

18. List all elements present in unknown sample X .

19. List all elements present in unknown sample Y.

20. List all elements present in unknown sample Z.

21. Explain, in terms of electron transition, how bright-line spectra are produced by atoms.

Set A: Terms and definitions

Objective: *By defining these words , you'll become more familiar with terms and definitions related to ions and neutral atoms.*

Define the terms and answer questions below. Be neat and clear.

1. Neutral atom

2. Ion

3. Positive ion

4. Negative ion

5. Valance electron

Set B: Comparisons in ions and neutral atoms

Objective: *To test your knowledge of facts related of ions and neutral atoms*

Answer the followings in one clear sentence.

6. Compare the number of electrons to the number of protons in a neutral atom.

7. Compare the number of electrons of a positive ion to that of the neutral atom.
   Include both positive ion and neutral atom in your answer.

8. Compare the number of electrons of a negative ion to that of the neutral atom.
   Include both negative ion and neutral atom in your answer.

9. Compare the number of protons to the number of electrons in a positive ion.
   Include both protons and electrons in your answer.

10. Compare the number of protons to the number of electrons in a negative ion.
    Include both protons and electrons in your answer.

11. Compare the size of a positive ion to that of the neutral atom.
    Include both positive ion and neutral atom in your answer.

12. Compare the size of a negative ion to that of the neutral atom.
    Include both negative ion and neutral atom in your answer.

Set C: Particles in atoms and ions

Objective: *To test your ability to determine information from atomic and ionic symbols.*

Below, symbol of an atom or ion is given. Complete the table below based on the symbol given

	Atom and Ion symbols	*Atomic number*	*Number of protons*	*Number of electrons*	*Number of neutrons*	*Electron configuration*
13.	C					
14.	C^{4-}					
15.	Sr					
16.	Sr^{2+}					
17.	^{27}Al					
18.	$^{27}Al^{3+}$					
19.	^{31}P					
20.	$^{31}P^{-3}$					

Set D: Determining charge of atom.

Objective: *To test your ability to determine charge of atoms based on the number of subatomic particles*

Determine the charge of each atom based on information given.

21. ***Atom A:*** 46 protons, 61 neutrons, 42 electrons. Charge =

22. ***Atom B:*** mass number of 209, nuclear charge of 83, and 81 electrons: Charge =

23. ***Atoms C:*** nuclear charge of 32, 36 electrons , 39 neutron Charge =

24. ***Atoms D:*** 54 electrons, 122 nucleons, atomic number 51 Charge =

25. ***Atom E:*** 28 neutrons, nuclear charge of 22, 20 electrons Charge =

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