

## Study Guide: Atoms and the Periodic Table Answer Key

How are the rows and columns in the periodic table of elements arranged?

- Rows (periods) atomic number order
- columns (family) are based on how is going to react- because of valence electrons ,
  - Columns are arranged by the number of electrons in the outer energy level
  - This determines how elements will bond with other atoms to form compounds (example:  $\text{Na} + \text{Cl} \rightarrow \text{NaCl}$  (table salt))

How is the periodic table used to determine the amount of protons, neutrons and electrons in each element?

**NOTE:** each element has a unique number of protons, each has a unique name and a symbol **FIRST LETTER CAPITALIZED**, second and third letter are lower case

- protons = atomic number (smaller whole number in box)
- electrons = protons (protons are positive, electrons are negative – cancel each other out)
- neutrons = atomic mass minus atomic number, **ROUND!**

How is the periodic table used to determine the atomic number, atomic mass, chemical symbol and name of elements?

- atomic number- smaller/whole number, **THIS IS WHAT MAKES AN ATOM WHAT IT IS!!!!**
- atomic mass- larger number/ usually has decimals, the protons plus the average of all the possible variations of neutrons
- elements-each boxes gives us the name and symbol of an element

What is the placement of metals, non-metals, metalloids on the periodic table?

- metals-everything to the left of the stair step except hydrogen,
- non-metals- to the right of the stair step,
- metalloids- stair step (starts below boron → over, down, over, down)
  - touch the stair step right left top and bottom except Al
  - (if they touch at the corner they are not metalloids)

What elements solids, liquid, gasses in their natural state? (Memorize liquids and gasses)

- solids - everything except liquids and gasses
- liquids - memorize Hg and Br
- gasses - H , N, O, F, Cl, column 18(noble gases)

Which elements are synthetic / man-made? What does synthetic mean?

- everything from 93 and higher are manmade,
- elements created in a lab/not found in nature

How many valence (outer electrons) do columns # 1, 2, 13, 14, 15, 16, 17, 18 have?

- can hook up with other atoms to make molecules

Create a Bohr Model for Magnesium. How did you use the periodic table to do this?

- How to determine the number of electrons in the outer energy level: (determines how many electrons are available to hook up with other atoms)
  - 2 in the first level
  - Outer level – column 1 = 1, 2 = 2, 13 = 3, 14 = 4, 15=5, 16 = 6, 17 = 7, 18 = 8
  - Outer level determined by the column number (see above)

- Levels in between first and outer will be 8 for elements up to Calcium (atomic # 20) second level one through eight
- MAKE SURE TO MAKE A CIRCLE FOR THE NUCLEUS, PUT THE NUMBER OF PROTONS AND A + symbol (This circle is NOT the first level!)

What is a period, group, family? What information can be gained from these?

- Periods- a row → # of rings or energy levels ,
- group/ family- column → number of valence (outer-available to bond) electrons

What are the main properties (characteristics) of metals? Non-metals? Metalloids?

- Metals-usually good conductors of heat and electricity,
  - shiny (luster),
  - magnetic, malleable, ductile
  - malleable pound into flat sheets,
  - ductile stretch into wire,
  - magnetism
- non-metals – not good conductors, many are gasses,
- metalloids – behave somewhat like metals and somewhat like non-metals, these are often used in electronics (semiconductors) SEE YOUR BOOKS

What are the names and characteristics of group # 1, 2, 17, 18

- Alkali metals – most reactive metal/highly reactive (1 outer electron), not found in nature in pure form COLUMN 1,
- alkaline earth metals – reactive, but less than alkali metals, 2 outer electrons COLUMN 2,
- halogens – most reactive non-metal/very reactive, 7 outer electrons COLUMN 17,
- noble gasses – non reactive, 8 outer electrons so they are FULL, almost always found in pure form COLUMN 18

What is the structure of atoms? Create a drawing and label it.

- proton and neutron in nucleus,
- electrons in “cloud” around the nucleus.
- MASS is in the nucleus, electrons are so small they do not count,
- electrons are very far away from the nucleus, most of the atom is made of NOTHING/empty space!!

What are the charges of the atomic particles?

- proton → positive,
- electron → negative,
- neutron → neutral (no charge)

Why atoms are electrically neutral?

- The positive protons cancel out the negative electrons because they are equal in number, the neutrons have no effect since they are neutral (no charge)

What is Mendeleev famous for?

- first periodic table based on atomic mass, said the gaps would be filled in as more elements were discovered

How did Mosley perfect Mendeleev’s ideas about the periodic table?

- improved the periodic table by organizing it by atomic number (discovered positive charges) and added some elements

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