Atoms & the Periodic Table Review

Matter has mass and takes up space. Atoms are basic building blocks of matter, and cannot be chemically subdivided by ordinary means. What's an atom made of? Even though an atom is really small, it is made of even smaller particles. It's basically made of 3 tiny subatomic particles:

Parts of an Atom

: in the nucleus + (positive) charge 1 amu
: in the nucleus 0 (no) charge 1 amu
: in the electron cloud – (negative) charge 0 amu
The center of an atom is called the
The nucleus contains 2 types of particles:
= positive (+) charge = no charge, neutral
This means the nucleus is always positive.
The Outside of the Atom: Surrounding the nucleus is a cloud of electrons spin quickly. Are negatively (-) charged are very small.
Have a mass of 0 AMU.

Overall Balance

To review, an atom is made up of 3 types of particles which are:

proton, 2= He helium, for 2 protons... and so on. Argon: Ar is number 18). This procedure NEVER changes. The protons are the ______. They identify the element. The number of protons is equal to the number of electrons so that the element is electrically stable (or balanced).

(element hydrogen) = 1. The number of protons in an element is constant (H=1,for 1

The number of protons IS the Atomic Number

______: the sum of protons ADDED to the neutrons. Mass number can vary for the same element, if the element has different numbers of neutrons. When this happens, these forms of an element are called isotopes.



Atomic Mass is the weighted AVERAGE of the masses of ALL the natural occurring isotopes ______ The mass of an atom depends on the number of protons & neutrons it contains. It is the weighted <u>AVERAGE.</u> AMU = Atomic mass unit Mass number it is the sum of the protons + neutrons. Neutrons = mass number - atomic number Remember: Atomic Number = NUMBER of _____, which = NUMBER of _____

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Draw the: "It's like this" illustration:







What about electrons & shells?

The region around the nucleus is called the electron cloud. The electrons occupy certain energy levels.

The farther an energy level from the nucleus, the more energy the electrons will have in it. 1st level = ______ electrons 2nd level= ______ electrons 3rd level= ______ electrons Although the 3rd level CAN hold 18, it really only holds 8 to complete the octet and then goes to the 4th level.

Electron Shells

The orbits that electrons take around the nucleus fall into distinct orbital shells. These shells exist even when they are not occupied.

The shell nearest the nucleus (shell 1) has the tightest grip on its electron(s). The shell furthest from the nucleus has the weakest grip on its electron(s).

The number of electrons that can occupy a given shell increases with the distance of the shell from the nucleus.

The outermost occupied shell typically has fewer than its maximum number of electrons. Electrons in such underoccupied shells often pass between nearby atoms.

The number of electrons in the outer most occupied shell of an atom tends to determine many of the physical properties of substances composed of that atom.

Electrons can jump from one shell to the next but can never occupy a position between shells.



Shell 1 can hold up to 2 electrons.

Shell 2 can hold up to 8 electrons.

Shell 3 can hold up to up 18 electrons.

And so on.

The shells fill with electrons from the inside out. That is, given the total number of electrons associated with a particular atom in its <u>neutral state</u>, the shells nearer to the nucleus fill to their maximums before any surplus goes to the next shell.





Family #1 or 1A:

_____Metals

1 valence electron Very Reactive Li, Na, K, Rb, Cs, Fr

Group 13: The _____ Group 3 valence electrons in the outer energy level One metalloid and 4 metals Reactive Solid at room temperature Most common element in this group is aluminum B, Al, Ga, In, Tl

#15 or 5A: _____ Family 5 valence electrons

2 nonmetals, 2 metalloids, 1 metal Reactivity varies N, P, As, Sb, Bi

Family #17 or 78: _____

7 valence electrons F, Cl, Br, I, At very reactive Nonmetals They are very reactive because have 7 valence electrons, this means they are ALMOST full and can combine with many elements. Halogen elements combine with metals to form compounds called salts.

Family #3-12 (1B-8B):

_ Metals

1-2 valence electrons Less reactive than alkaline earth metals because they don't give away their electrons as easily Bottom 2 rows are the Lanthanide & Actinide series

_ Series:

shiny reactive metals Most found in nature

__ Series:

radioactive and unstable Most are man-made & not stable in nature

Space for Bohr Model Drawings



this is a Bohr model of Li



this is a Bohr model of B



this is a Bohr model of N



this is a Bohr model of F

Family #2 or 2A:

_____ Metals

2 valence electrons very reactive, but less than alkali metals Be, Mg, Ca, Sr, Ba, Ra

#14 or 4A: _____ Family

4 valence electrons 1 metal, 1 metalloid, 2 nonmetals. This family is incredibly important in the field of technology. C, Si, Ge, Sn, Pb

#16 or 6A: _____ Family

6 valence electrons O, S, Se, Te, Po 3 nonmetals, 1 metalloid, 1 metal Reactive. Most members form covalent (sharing bonds) compounds. Must share 2 electrons with other elements to form compounds.

Family #18 or 8A: _____Gases 8 valence electrons (except He which only has 2) "Happy" because their outer electron shell is filled! NON REACTIVE (inert) gases. Nonmetals NO bonding with other elements He, Ne, Ar, Kr, Xe







Hydrogen: stands alone Gas, reactive,

1 electron in outer level.

Hydrogen does not match properties of any single group so it is placed above Group 1. It can **give it's electron** away with **ionic bonding**, or **share** it's electron in **covalent bonding**





this is a Bohr model of Be







1-6: Fill in the blank. Circle the correct answers for charge, where it's	found, what the mass is.
1. Proton: <u>+ - 0</u> charge. <u>In or outside</u> the nucleus,	<u>1 or 0</u> amu (atomic mass unit)
2. Neutron: <u>+ - 0</u> charge. <u>In or outside</u> the nucleus,	<u>1 or 0</u> amu (atomic mass unit)
3. Electron: <u>+</u> - <u>O</u> charge. <u>In or outside</u> the nucleus,	<u>1 or 0</u> amu (atomic mass unit)
4. Atomic number is the number of	
5. Isotopes are the same number of <i>protons</i> , different number of	
6. The Mass number is equal to the number of	+ (number of)

Part 2) Complete the table.

Element	Protons	Neutrons	Total Electrons	Electrons in 1 st shell	Electrons in 2 nd shell	Electrons in 3 rd shell
Carbon						
Copper						
Calcium						
Krypton						
Neon						
Arsenic						
Sodium						
Potassium						

Part 3) Draw each Bohr Diagram for these elements in the space below.

Hydrogen	Beryllium	Fluorine	Argon		
Atomic #	Atomic #	Atomic #	Atomic #		
P+N	P+N	P+N	P+ E	N	
		Choose the correct l	etter that	corresponds:	
		Choices:			
1 2 A 3 4 5 6 7 8 9 R	13 14 15 16 17 C D 10 11 12 G E	Lanthanoid S Metalloid Carbon	Series	In addition: Label Hydrogen	
)	Shade a "period"	
		Indiogens Itransition Me Noble Gas Boron Group Actinoid Serie Oxygen Grou	tal es Jp	Shade "family/group" 4B	

The second period at the bottom of the table is called the	
11. The elements at the bottom of the table were pulled out to keep the table from	12.Where are the unreactive non-metals located on the periodic table?
10. Elements in group 8a are unreactive or "inert". They are the:	11.Which group of elements are all radioactive?
Elements in group 7a are known as "salt formers". They are called	10.Which metals are usually good conductors?
Elements in groups 3B through 12B have many properties and are called	9.Where are the most reactive non-metals located on the periodic table?
They're the:	8.Where are the most reactive metals located on the periodic table?
Elements in the 2nd group have 2 outer shell electrons and are also very reactive.	7.One row (across) on the periodic table is called a
They're the:	6.One column (up and down) on the periodic table is called a
Elements in the 1st group have _ outer shell electron and are extremely reactive.	5.What state of matter are most non-metals?
The elements in the far upper right corner are classified as	4.What state of matter (solid, liquid or gas) are most metals?
The elements that touch the zigzag line are classified as	3.What is the only non-metal that is not on the upper right side of the periodic table?
Most of the elements in the periodic table are classified as	2. Which category do most elements along the zig-zag line belong to?
The horizontal rows on the periodic table are called	1.Which category (metal, non-metal or metalloid) do most elements belong to?
 The vertical columns on the periodic table are called 	
stions below!	Answer the que
n temperature. All found in earth's atmosphere in small amounts. (8 outer level electrons)	Groups 18: Noble Gases – Unreactive nonmetals. All are colorless, odorless gases at root
Form salts with metals. Ex. NaCI: sodium chloride or table salt" (7 outer level electrons)	Groups 17: Halogens – All nonmetals. Very reactive. Poor conductors of heat & electricity.
tive group. (5 outer level electrons)	Group 16: Oxygen Group - Contains three nonmetals, one metalloid, and one metal. Rea
ad reactivity. (5 outer level electrons)	Group 15: Nitrogen Group - Contains two nonmetals, two metalloids, and one metal. Van
reactivity. (4 outer level electrons)	Group 14: Carbon Group - Contains on nonmetal, two metalloids, and two metals. Varied
his group. It is also the most abundant metal in the earth's crust. (3 outer level electrons)	Group 13: Boron Group - Contains one metalloid and 4 metals. Reactive. Aluminum is in
	in nature but have been manufactured in the lab.
ides are all radioactive and are therefore unstable. Elements 95 through 103 do not exist	these two periods share many properties. The lanthanides are shiny and reactive. The actin
ed at the bottom of the table so the table wouldn't be so wide. The elements in each of	Lanthanides and Actinides: These are also transition metals that were taken out and plac
er level electrons)	electricity. They also have higher densities and melting points than groups 1 & 2. (1 or 2 out
a wide range of properties. In general, they are shiny and good conductors of heat and	Groups 3 - 12: Transition Metals - These metals have a moderate range of reactivity and
olored and more dense than alkali metals. (2 outer level electrons)	Group 2: Alkaline-earth Metals – Slightly less reactive than alkali metals. They are silver of
e in mail pute lotin. They are sliver oxored and shirty. Their density is exitentiely low so	<u>Group 1. Aikan Metais – These filetais are extremely reactive and are never journal in nature that they are self-anotative to be out with a kode of outer level plantmax.</u>
a in the is a real from Theorem with our coloured and atting. The is demoked in automouth loss of	odorless gas at room temperature. (1 outer level electron)
e. It is placed above group 1 but it is not part of that group. It is a very reactive, colorless,	Hydrogen: This element does not match the properties of any other group so it stands alon
similar properties. They are as follows:	There are a number of major groups with
ISO 0N.	shell. The elements in period 2 all have 2 shells. The elements in period 3 have 3 shells and
heir outer shells. This gives them similar properties. Group 2 elements all have 2 however, hold true for this pattern. The elements in the first period or row all have one	vertical column or group have similar properties. Group 1 elements all have the electron in t electrons in their outer shells. This also gives them similar properties. Not all of the groups,
zontal rows called "periods." Each arrangement is significant. The elements in each	The table is also arranged in vertical columns called "groups" or "families" and hori
se they have both metallic and nonmetallic properties.	properties. A small group whose members touch the zigzag line are called metalloids becau
on" elements because they are changed from metallic properties to nonmetallic	the table consisting of nonmetals. The elements in the middle of the table are called "transit
ve from the left to the right, the elements become less metallic with the far right side of	The left side of the table contains elements with the greatest metallic properties. As you mo
atomic number. There are two main groups on the periodic table: metals and nonmetals.	The Periodic Table is a list of all the known elements. It is organized by increasing
Periodic Table	Color Coding the

Types of Elements: States of Matter : Periods: Families/Groups: Circle and Label:													
: colorall metals yellowall metalloids light greenall nonmetals light blu put a purple dot in room temp. liquidsput a red dot in the room tem outline 1 entire period in brown label the # of e cutline 1 entire family/group in orange label the # of o Alkali Metals in dark BlueAlkali Earth Metals in RedLanthanides in Purple	Metalloids Gas Transition metals	Nonmetals	KEY: Families/Groups:	VC F1 ING F11 S11 Eu VG I 90 91 92 93 94 95 96 97 Th Pa U Np Pu Am Cm Bł	58 59 60 61 62 63 64 65 70 70 71 70 71 70 71 71	Fr Ra Ac Rf Db Sg Bh Hs Mt	Cs Ba La Hf Ta W Re Os Ir Pt Au I 87 88 89 104 105 106 107 108 109 110 111	Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Q 35 36 57 72 73 74 75 76 77 78 79	K Ca Sc Ti V Cr Mn Fe Co Ni Cu Xi 37 38 39 40 41 42 43 44 45 46 47	Na Mg	Ji Be	H	Periodic Table of the E
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& nonmetals in black (no dots) e Gases in Yellow													