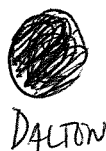


KEY

Atoms Unit Review

- The element boron, B, has an atomic mass of 10.81 amu according to the periodic table. However, no single isotope of boron has a mass of exactly 10.81 amu. How can you explain this difference?
weighted average of all the isotopes of Boron
- How did Rutherford show the existence of the nucleus with his gold-foil experiment?
alpha the deflections of the (+) alpha particles
- What did Chadwick contribute to the knowledge about the atom?
neutron
- Draw the models associated with the following scientists: Dalton, Thomson, Rutherford, Bohr, and the modern atomic model.



DALTON



Thomson



Rutherford



Bohr



Modern.

- How is the Modern Atomic Theory different from Dalton's Atomic Theory?

Dalton \rightarrow atoms indivisible; atoms of same element are *same* Modern \rightarrow P, N, E so not true \rightarrow 15 types - " " "

- Ibuprofen, $C_{13}H_{18}O_2$, that is manufactured in Michigan contains 75.69% by mass carbon, 8.80% hydrogen, and 15.51% oxygen. If you buy some ibuprofen for a headache while you are on vacation in Germany, how do you know that it has the same percentage composition as the ibuprofen you buy at home?

Law of Definite Composition \rightarrow always same formula

- Explain how CO and CO₂ follow the law of multiple proportions.
Same two elements 1 element same mass other multiple

- Complete the following table:

Element	Symbol	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons
Sodium	Na	11	22	11	11	11
Fluorine	F	9	19	9	10	9
Bromine	Br	35	80	35	45	35
Calcium	Ca	20	40	20	20	20
Hydrogen	H	1	1	1	0	1
			222			

Problems. Solve the following problems. Show correct conversion work, label answers in correct significant figures and correct unit and element.

- How many atoms are in 2.50 moles of hydrogen?

$$2.50 \text{ mol H} \left| \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol H}} \right| = 1.51 \times 10^{24} \text{ atoms H}$$

- How many atoms are in 67.98g of carbon?

$$67.98 \text{ g C} \left| \frac{1 \text{ mol C}}{12.011 \text{ g C}} \right| \left| \frac{6.02 \times 10^{23} \text{ atoms C}}{1 \text{ mol C}} \right| = 3.407 \times 10^{24} \text{ atoms C}$$

- How many moles are in 107.804g of sodium?

$$107.804 \text{ g Na} \left| \frac{1 \text{ mol Na}}{22.99 \text{ g Na}} \right| = 4.68917 \text{ mol Na}$$

12. A certain element exists as three natural isotopes, as shown in the table below.

Isotope	Mass	Percent abundance
1	19.99244	90.51
2	20.99395	0.27
3	21.99138	9.22

Calculate the average atomic mass of the element.

$$19.99244 (.9051) + 20.99395 (.0027) + 21.99138 (.0922) = \boxed{20.179}$$

Magic Square

Directions: Put the number of the definition from the list below into the square with the appropriate term. Check your answers by adding the numbers to see if all the sums of all rows, both across and down add up to the same number, the Magic #.

Democritus <u>2</u>	Dalton <u>7</u>	Thomson <u>18</u>	Chadwick <u>12</u>	Total <u>39</u>
Rutherford <u>8</u>	Proton <u>5</u>	Atom <u>11</u>	Bohr <u>15</u>	<u>39</u>
Wave Model <u>13</u>	Neutron <u>17</u>	Nucleus <u>6</u>	Alpha particle <u>3</u>	<u>39</u>
Electron <u>16</u>	Model <u>10</u>	Energy levels <u>4</u>	Electron cloud <u>9</u>	<u>39</u>
Total <u>39</u>	<u>39</u>	<u>39</u>	<u>39</u>	

1. Represented by a symbol; all are found on the Periodic Table
- ~~2~~ Made a mental model of the atom; Greek philosopher
- ~~3~~ Used by Rutherford in his experiment; made of two protons and two neutrons
4. The paths in which electrons circle the nucleus according to the Bohr model
- ~~5~~ The positive particle in the nucleus of an atom
- ~~6~~ The tiny positive core of an atom; contains protons and neutrons
- ~~7~~ Formed the atomic theory model of the atom; English schoolteacher
- ~~8~~ Discovered the nucleus using his gold foil experiment
9. Current explanation of where electrons might be found in the atom
- ~~10~~ Used by scientists to explain something we cannot see or understand
- ~~11~~ The smallest particle of an element that has the properties of that element
- ~~12~~ Discovered the neutron
- ~~13~~ Current model of the atom; proposed by Schrodinger
14. Mass of protons and neutrons
- ~~15~~ Developed the model of the atom in which electrons orbit the nucleus in energy levels
- ~~16~~ The negative particle that circles the nucleus
- ~~17~~ The neutral particle in the nucleus of an atom
- ~~18~~ Proposed the "plum-pudding" model of the atom; discovered the electron

Be sure to review Dalton's atomic theory and Modern atomic theory