**Unit 3: Quantities in Chemistry**

**Atomic Mass and Molecular Mass**

* All matter is made up of atoms
* Covalent compounds are made of particles called MOLECULES (nonmetal and nonmetal)
* Ionic compounds are made of particles called FORMULA UNITS (metal and nonmetal)

The sum of individual atoms can be used to find the mass (m) of particles.

**Atomic mass** – the mass of one atom of an element (u)

**Molecular mass** – the mass of one molecule (u)

**Formula unit mass** – the mass of one formula unit of an ionic compound (u)

u = atomic mass units – the mass of 1/12 of a carbon-12 atom

Ex. 1 Find the atomic mass of red #s on the PT (3 decimal places)

1. One hydrogen atom 1.008 u
2. One oxygen atom 15.999 u

Ex. 2 Find the molecular mass of hydrogen peroxide (H2O2)

 MH2O2 = 2xMH + 2xMO

 = 2(1.008) + 2(15.999)

= 34.014 u

Ex. 3 Find the formula unit mass of calcium phosphate.

 MCa3(PO4)2 = 3(40.078) + 2(30.974) + 8(15.999)

= 310.174 u

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| **Atomic Mass and Molecular Mass Practice**  |
| 1.    | State the full meaning of the following: Example: 3 Na – 3 sodium atoms 4 KCl – 4 formula units of potassium chloride |
|  | a)    Fe        b)    CuCl2        c)    2 Ca        d)    4 Fe2(SO4)3 |
| 2. | How many atoms of hydrogen are represented in each of the following molecules? |
|  | a)    KHCO3    b)    H2SO4    c)    C3H8   d)    HC2H3O2    e)    (NH4)2SO4    f)    (CH3)3COH |
| 3. | Asbestos, a known cancer-causing agent, has a typical formula, Ca3Mg5(Si4O11)2(OH)2.  How many atoms of each element are given in the formula? |
| 4. | How many atoms of each kind are represented in the following formulas? |
|  | a)    Na3PO4          b)    Ca(H2PO4)2       c)    C4H10 |
|  | d)    Fe3(AsO4)2   e)    Cu(NO3)2          f)   MgSO4•7H2O |
| 5. | Calculate the molecular mass of H3PO4 and HClO4. |
| 6. | Calculate the molecular masses of: |
|  | a)   SO2     b)   P4O10        c)   UF6         d)   NH3        e)   CCl4 |
| 7. | Determine the molecular mass of these compounds: |
|  | a) methane, CH4  b)  potassium perchlorate c) phosphorus trichloride d)  sulfuric acid |
|  | e) silicon dioxide f)  nitrogen dioxide g) dinitrogen pentoxide  h)  glucose, C6H12O6 |
| 8. | What is the molecular mass of each of these common chemicals compounds? |
|  | a)   sodium bicarbonate, NaHCO3            b)   laughing gas, N2O |
|  | c)   Potassium permanganate, KMnO4         d)    limestone, CaCO3 |
|  | e)   Epsom salts, MgSO4•7H2O                    f)    ozone, O3 |