**Worksheet 4: What compounds do we need to grow plants?**

Now we have learned the essential elements that plants need to grow and what forms those elements take in water, let’s start to think about how to make the solution. Remember cations and anions do not exist on their own. Cations and anions make up ionic compounds through chemical bonding with anions and cations respectively, which are thus electronically neutral. Ta-dah, we have identified cations and anions that plants need, so we can put them together to identify ionic compounds that need to be dissolved in water. Fill out the following table as instructed below and gather additional information that need to be collected.

|  |  |
| --- | --- |
| Metals (Positive ions) | Nonmetals (Polyatomic negative ions) |
| *Nitrate (NO3-)* | *Sulfate (SO42-)* | *Phosphate (H2PO4-)* |
| Formula | Molar mass | Solubility | Formula | Molar mass | Solubility | Formula | Molar mass | Solubility |
| *Potassium (K+)* |  |  |  |  |  |  |  |  |  |
| *Calcium (Ca2+)* |  |  |  |  |  |  |  |  |  |
| *Magnesium (Mg2+)* |  |  |  |  |  |  |  |  |  |

1. What is the chemical formula for each ionic compound? Identify nine ionic compounds that can be used for hydroponic solutions. Remember the compound should be electronically neutral!
2. Calculate molar mass of each compound. To calculate the molar mass of each compound, fill out the following table and use the data.

|  |
| --- |
| Atomic Mass |
| K |  |  | S |  |  | Fe |  |
| Ca |  |  | P |  |  | Mn |  |
| Mg |  |  | O |  |  | Cu |  |
| N |  |  | H |  |  | Zn |  |

In the space below, show your calculation to find the molar mass of each compound.

1. Here is a caveat. Not all compounds dissolve well in water! If some compounds do not dissolve in water, we would like to avoid them. Conduct online research to find out solubility of each compound in water. Collect solubility information at room temperature (25oC) with the unit of g/L.