

particles can also be leached. Surface runoff is not filtered, so suspended particles such as soil colloids are transported with it.

Subsurface Movement

Since only dissolved materials usually move in percolating water, the soluble forms of nitrogen and phosphorus will be most likely to move downwards. For nitrogen, important soluble forms are nitrate, ammonium, and soluble organic nitrogen. For phosphorus, the important soluble forms are ortho-phosphate and soluble organic phosphorus. The relative abundance of these forms is dependent on soil properties, vegetation, climate, and fertilization.

Nitrate is by far the most abundant soluble form of nutrient found in soil-water. Since most agricultural soils are well aerated, other forms of nitrogen, such as ammonium, are quickly oxidized — with the help of bacteria and the nitrification process — to nitrate. Nitrate, which is readily taken up by plants and microorganisms, also has a very low affinity, or ability to bond, to either soil particles or organic matter. Therefore, once dissolved in water, nitrate will remain dissolved until biologically removed, either by plants or by anaerobic microbial conversion to nitrogen gas, through denitrification. When nitrate is moved below the root zone into the less biologically-active lower soil profile, it is not likely to be altered, and may eventually reach groundwater supplies or move laterally to surface waters.

***Nitrate dissolved in water will remain
dissolved until biologically removed.***

Soluble organic nitrogen is typically the second most plentiful form of nitrogen transported to groundwater. It has a low affinity for soil particles and appears to be less stable in the groundwater than nitrate, and therefore is less persistent.

Ammonium ions have an affinity for soil particles so that adsorption in addition to nitrification results in very little ammonium reaching groundwater. The adsorption process in this case occurs when positively charged ammonium ions are attracted to negatively charged surfaces in the soil. Organic matter and clay particles have strong negatively charged surfaces, therefore increases in either organic matter or clay content will increase ammonium retention in soil.

Phosphate, the most common form of phosphorus, has a much lower solubility than nitrate, which means a smaller portion of