

## Nomenclature for Analyzing the Physical and Chemical Forms of N and P in Water

Nutrient analysis literature contains an alphabet soup of acronyms for various forms of nitrogen and phosphorus. Without delving into the reasons for all of the classifications, the following represents the standard nomenclature used in most laboratories.

### Nitrogen

1. dissolved = soluble = filtered (“filtrate” water)
2. total = unfiltered = filtered + particulate (“raw” water)
3. total-N (TN) = particulate-N (PN) + dissolved-N (DN)
4. total-N (TN) = inorganic-N + organic-N
5. total-N (TN) = dissolved inorganic-N (DIN) + dissolved organic-N (DON) + particulate organic-N (PON); assumes particulate inorganic-N always = 0 therefore,  $TN = DIN + DON + PN$  , where:
6.  $DIN = \text{nitrate-N} + \text{nitrite-N} + \text{ammonium-N}$  ( $DIN = [NO_3^- + NO_2^-]\text{-N} + [NH_4^+\text{-N}]$ )
7. “nitrate-N” usually refers to a combined analysis of [nitrate + nitrite] - N
8. ammonium-N ( $NH_4^+\text{-N}$ ) is the predominant form of “ammonia” at the typical pH’s encountered in natural waters (it is also often referred to as “ $NH_3\text{-N}$ ”).
9. DON is determined by digesting and analyzing a filtrate as per TN and then subtracting DIN.
10. Total Kjeldahl Nitrogen (TKN) =  $PN + DON + NH_4^+\text{-N}$  and so we can also calculate TKN as  $TN - [NO_3^- + NO_2^-]\text{-N}$  . The term “Kjeldahl” refers to a method that converts organic-N to ammonia that is removed via steam distillation and then analyzed to estimate all chemically reduced N. It is mostly used in wastewater laboratories.
11. Similarly, we can estimate total-N as  $TN = TKN + [NO_3^- + NO_2^-]\text{-N}$
12. dissolved-N (DN) =  $DON + DIN$  (but not very common nor very useful since DON is often  $\gg$  DIN and most of it is not useable by algae or plants.

## Phosphorus

1. dissolved = soluble = filtered (“filtrate” water)
2. total = unfiltered = filtered + particulate (“raw” water)
3. dissolved inorganic-P (DIP) = ortho-P (OP) = soluble reactive-P (SRP) = dissolved reactive-P (DRP as in Standard Methods, 1995) = molybdenum reactive-P (MRP) -Lots of names for the same thing
4. Total-P (TP) = dissolved-P (DP) + particulate-P (PP)
5. Dissolved-P = filtrate digested as per TP for analysis
6. TP = OP + DOP + PP (total = ortho + dissolved organic + particulate)
7. Particulate-P can be analyzed directly from the residue on a glass fiber filter (Whatman GF/C or GF/F, Gelman A/E, RA 984 or equivalent), adding deionized water and digesting it as as TP sample; or by calculation as TP – DP but this may be problematic in unpolluted water because PP is often a small difference between two larger number