



FAQs about YAN*

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**Frequently-Asked Questions about Yeast Assimilable Nitrogen*

Q: What does YAN stand for?

A: YAN stands for Yeast Assimilable Nitrogen. Nitrogen is probably the most important macronutrient for yeast after sugar. Some amino acids- most notably Proline- are not metabolized by yeast under normal fermentation conditions so they're not part of the measurement. We're interested in the nitrogen the yeast can use (hence the "assimilable" part). The other major idea to keep in mind is that YAN is a different idea from nitrogen status in a vineyard. These two aspects, and the management required, are pretty much distinct- at least so far. Stay tuned.

Q: What are the components of the YAN measurement?

A: There are two parts of YAN- 1.) Primary Amino Nitrogen (PAN), aka Free Amino Nitrogen (FAN) and 2.) Ammonia. PAN (or FAN), as the name suggests, refers to the organic amino acid portion. Ammonia is, well, ammonia, and is inorganic. Here we're referring to organic in the chemical sense of the word, meaning containing carbon. This designation has no bearing on which type of YAN would be more likely to be spotted at Whole Foods. YAN is expressed in mg/L.

Q: Are Primary Amino Nitrogen (PAN) and Free Amino Nitrogen (FAN) the same?

A: For our purposes FAN and PAN are interchangeable since the vast majority (99% or so) of the free alpha amino nitrogen compounds (FAN) come from the primary amino acids (PAN).

Q: How much YAN does my yeast need?

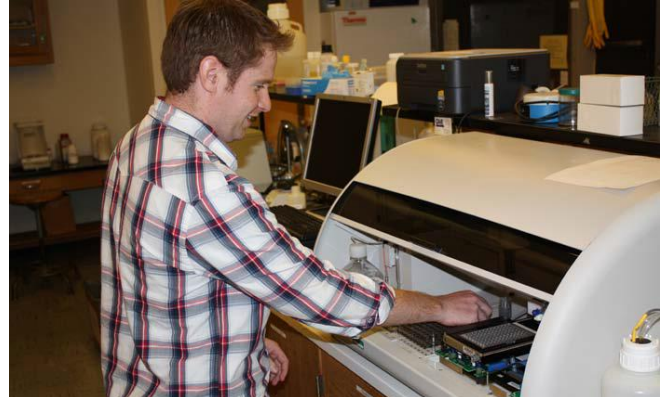
A: It depends. Yeast strain, brix, temperature and lots of other factors will have an impact on one tank's specific nitrogen requirements. Generally it's believed that 150 mg/L is a baseline and 200-250 mg/L is preferred. As potential stressors accumulate (high brix/ alcohol, very high/ low temperatures, etc.) the nitrogen need will climb. At 27° Brix, for instance, Scott Labs recommends a YAN concentration of 350 mg/L.

Q: How do PAN and Ammonia relate to the powders I add to wine?

A: Ammonia is almost always added as diammonium phosphate, or DAP. The organic nitrogen comes from products like Fermaid and other formulated concoctions, which may also contain DAP.

Q: My vineyard N looks pretty good according to petiole tests. Will I need to add more?

A: Extremely hard to say. There seems to be a loose correlation between vineyard nutrition and YAN in the winery, but as of yet we really don't have any predictive ability (see Tim's article). The problem with YAN is that it can vary widely even in seemingly similar vineyards. There's also no way to get any kind of relative gauge without measuring (see 2009 V to H #6). At this point it still seems cheaper and easier to manage YAN in the winery, although current projects may change that thinking.



Enology graduate student Mark Nisbet is running hundreds of YAN analyses on the ChemWell medical analyzer this harvest season, under the direction of Anna Katharine Mansfield, as part of the YAN project.

Photo by Tim Martinson

Q: Do yeast treat organic and inorganic nitrogen differently?

A: Yes- yeast prefer the simpler ammonia. If given the choice, they would sit around all day eating ammonia and watching reality shows on TV. More complex nutrition (sources rich in amino acids) may not be consumed with the same speed or enthusiasm, but should help ensure a steadier, healthier fermentation throughout. People and yeast have a lot in common.

Q: What happens if I don't have enough YAN?

A: Nitrogen deficiency is associated with a couple of fermentation difficulties. The two major problems we can expect are a failure to metabolize all sugar, or at least to do so in a timely manner, and off-aromas- especially H₂S.

Q: How and when should I add nitrogen?

A: A lot of recent recommendations suggest staggering the additions when possible. Current thinking is that too much DAP too early may actually cause later deficiencies because it encourages a large biomass buildup, and then the biomass cleans out all available nutrients before fermentation is complete. Additions too near the end of fermentation are associated with higher H₂S.

Q: That sounds complicated.

A: Well, we're dealing with a biological system with a lot of moving parts. I think of it like situations where you have some species of animal running amok, so you introduce another species to try and bring the first population into balance. Inevitably there are problems with the new species. There are always going to be unintended consequences when intervening with ecosystems. (Think soybean aphids and MALB.)

Q: What if I add too much or my initial YAN is too high?

A: There are a few potential problems with very high YAN. First and foremost, there's the cost of the nitrogen. Next, if the yeast don't consume all of the YAN, there's food remaining for spoilage organisms. TTB regulations limit the amount of Fermaid-K that may be added due to the thiamin content. There are also potential health concerns relating to the increased potential for precursors of ethyl carbamate and certain amines.

Note: See Anna Katharine Mansfield article from last year entitled "*Yan - the other harvest parameter (that we mostly pretend doesn't exist)*" for more information: http://www.cals.cornell.edu/cals/grapesandwine/veraison-to-harvest/upload/Veraison-to-Harvest-2009_6.pdf

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