



Clayton Cone's Fermentation Hints

Temperature Due to the lag phase when the yeast cells prepare for budding, fermentation takes a while to get going. Usually, after 12 to 24 hours it should be quite active. The lower the initial temperature, the slower the start of active fermentation. Depending upon the winemaker's philosophy or ambient temperature, most starting fermentation temperatures may average anywhere from 10°C (50°F) to 30°C (86°F). If you decide to start below 15°C (59°F), adjust the yeast suspension temperature to prevent yeast cold shock by slowly (over 30 to 60 seconds) mixing an equal amount of juice to be fermented with the rehydrated yeast suspension. Also, try to avoid fermentation temperatures above 35°C (95°F) since most yeast strains cannot tolerate higher temperatures and tend to burn out, especially towards the end of fermentation when the alcohol levels are high.

Water

It is preferable to rehydrate in water rather than in must. The must contains sugars which improve dispersion, however it may also contain SO₂ or residual fungicides that could be lethal during the rehydration stage. Once rehydrated, the yeast cells can resist SO₂ and low levels of fungicides, but not during water uptake.

Nutrients

The principal nutrient deficiency affecting fermentation is a lack of usable nitrogen. Various sources of nitrogen are already available in the must, but not all are accessible to the growing yeast cells. During growth, the yeast cells must consume nitrogen to reproduce nuclear protein and cell protein. They also need nitrogen to produce enzymes.

While the importance of nitrogen is known, it has not been given the proper attention in the wine community. Many winemakers fail to add a usable amount of nitrogen; indeed, nitrogen is often added only when problems arise, which is usually too late. The best form of usable nitrogen seems to be a combination of di-ammonium phosphate (DAP) and yeast extract. The practice of adding nitrogen is very helpful, as it has no negative effects, promotes a clean, complete fermentation and prevents the occurrence of unwanted by-products.

A good balance of vitamins and minerals, such as thiamin, niacin, folic acid and calcium

pantothenate, are also necessary for good yeast growth and fermentation. Lipids are an essential component of the yeast cell membrane, necessary for the budding and growth of the yeast cells in the early stage of fermentation and for the protection of the yeast cell from alcohol toxicity in the latter stage of fermentation. Once the yeast enters the anaerobic growth phase, each budding cycle depletes the amount of lipids by half. If insufficient lipids are available, the cell's semi-permeable membrane does not function properly, restricting the growth cycle. The membrane cannot maintain the osmotic balance of nutrients (sugar) inside the yeast cell and the by-products (alcohol) outside.

Allowing the yeast access to oxygen at the beginning of fermentation during the growth phase helps the yeast produce its own lipids. Another way to prevent the depletion of lipids is to add them just after the yeast inoculation in the form of yeast hulls. The cell wall portion of the yeast hulls not only contains lipids but significant amounts of polysaccharides, including chitin, as well. Chitin increases the surface area in the must, which helps keep the yeast cells from settling to the bottom of the fermenter where they may become weak and stressed. Improving the yeast's ability to stay in suspension is especially important if you are fermenting clear juices or musts from concentrates, or in bentonite settling, high ameliorating or very cool fermentations.