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12. Making red wine

The primary characteristic of red wine vinification is that the must ferments in contact with the solid parts of the bunch: the skin and pips. It is during this period of contact, a true maceration of the different solid parts of the grape, that the colorants, tannins, and mineral and aromatic matter transfer to the must to make a red wine. In order to obtain the wine and encourage the maceration and fermentation, the grapes first undergo some mechanical treatments – crush and destemming – prior to being sent to the fermentation tank.

The crush consists of breaking the grape berries to blend their various parts, liberate the juice, and aerate the must before alcoholic fermentation. This achieves a good maceration of the entire mass and helps distribute the yeasts attached to the skins. The stems are usually separated out; otherwise the wine would have more astringent tannins and a herbaceous taste. The crushing machines separate the stems and then the must is pumped to the fermentation tanks. This is the vatting process, which lasts from the moment that the must reaches the tank until alcoholic fermentation has completed, when the wine is then devatted. Important physical and chemical phenomena take place during this period:

- *Transformation of sugar into alcohol, CO₂ and other byproducts;*
- *CO₂ is released;*
- *Rapid rise in temperature of the fermenting must;*
- *Skin and pomace dissolve. Maceration is a fractioned extraction; it is necessary to extract all of the grape's useful components, which is to say those with good aroma and good flavour. Maceration contributes its specific characteristics to the wine such as colour, tannins, extracted compounds, and aroma;*



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- *Formation of a cap at the surface of the tank due to the rising CO₂ that carries solid matter to the top. During alcoholic fermentation, the must is submitted to the following practices:*
 - *Control of density and temperature: as the alcoholic fermentation progresses, the amount of sugar in the must decreases and the alcohol increases; the density therefore decreases progressively, and faster still if the fermentation is more active. This drop in density and the more or less rapid rise in temperature make it possible to follow the progress of the alcoholic fermentation and to intervene when necessary. During the entire fermentation process, density and temperature should be measured below the cap 2-3 times per day and recorded on the vinification sheet. Temperatures may vary between 77° and 88° F.*
 - *Pumpovers are used to aerate the must. The first is always done after filling the tank in order to homogenize the mass. Selected yeasts are normally added at the end of this first pumpover.*
 - *Punch down: this operation consists of breaking the cap formed at the top of the fermenting mass and sinking it into the liquid as a way of renewing the contact of the skins with the fermenting liquid. Facilitating the solubilization of the substances contained in the skins.*
 - *Chilling: daily temperature controls make it possible to determine the time to cool the must if it exceeds the temperature established for vinifying each type of wine.*
 - *Devatting: consists of separating the pomace or solids from the wine in the tank or fermentation vat by racking the wine to another container where the alcoholic fermentation will finish and the wine will be conserved. The wine racked from the fermentation tank is called “free run wine”. The duration of the vat time should be adapted to the type of wine desired and will depend upon the year’s harvest conditions (ripeness and health of the grapes) and the variety. The total vat time influences the body, the amount of tannins, astringency, evolution, and longevity of the wine. There are three specific moments that determine the end of the vat time.*
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1. *Before finalizing the alcoholic fermentation, when the wine still contains sugar. This method of using a short, 3-4 day maceration is generally used for wines made for quick consumption. The wine is devatted with densities around 1010 when the wine has extracted enough colour but not a lot of tannins. This is the “early devatting”*
2. *Immediately after the alcoholic fermentation, with a density between 995 and 994, the wine is dry, meaning it has no remaining fermentable sugars. This is referred to as a “hot devatting”. This method is used for quality wines to avoid excessive harshness and favoring a rapid commercialization. It is also used for wines that will be aged.*
3. *If the maceration is prolonged for several days after the alcoholic fermentation has finished, it is referred to as a “cold devatting”. This method is used for wines with great colour and rich tannins that will be aged. In this case the post fermentation maceration usually lasts 4 to 20 days. After devatting, which is usually aerated, the wine will finish its alcoholic fermentation if it is still sweet and begin a secondary or malolactic fermentation that takes place via specific microorganisms call lactic bacteria. Malolactic fermentation adds softness to the taste, aromatic complexity, and improves the stability of the wine by turning malic acid, which is unstable and has a harsh green taste, into lactic acid, which is stable and has a delicate flavour, thereby increasing the product’s harmony and approachability. This is why it is said that malolactic fermentation deacidifies and softens new wines, which benefit from the process and increase in quality. After racking and obtaining the free run wine, the drained pomace is removed from the tank and pressed to extract the wine contained in the pomace. This is called press wine and it has different physical-chemical and gustatory characteristics than free run wine. Press wine is usually darker, harsher, and more astringent, and its aromas are usually unpleasant. Press wines obtained from a pneumatic or bladder press do not usually have these negative characteristics and can be used with the free run wine.*