

# Does the heat from my hand affect the wine in my glass?

Questions should be of general interest and be about temperature measurement techniques and/or heat transfer.

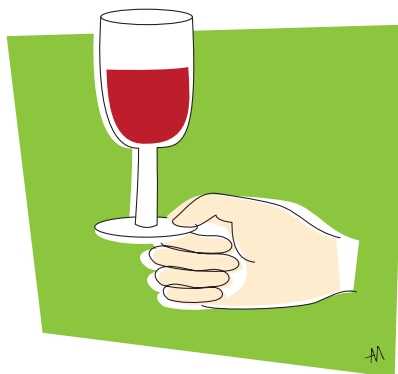
QUESTIONS? ANSWERS!

**QUESTION:** We continue with our traditional focus on food and drink at Christmas time, and have asked Professor Dan Loyd to explain the thermo-technical background to the following question: "We're told that we should hold the foot of a wine glass to avoid heating up the wine inside. That's hard to do – is it really necessary?"

Per A

**ANSWER:** Wine experts say that dry white wines should normally be served at a temperature of 8–12 °C, whilst medium sweet and sweet wines should be served at 6–8 °C. When the wine is poured into the glass, at first the glass cools down and the wine heats up. When the surface temperature of the glass falls below the room temperature, which is often 20–22 °C, heat is transferred to the glass by natural convection and radiation. Within the glass material, heat transfer occurs by heat conduction. Heat transfer between the inner surface of the glass and the wine occurs by natural convection. Heat is supplied from the room to the surface of the liquid by natural convection and radiation.

A small amount of this heat supply to the wine comes from the glass's foot and stem, which in their turn are affected by the ambient air and the table. For an ordinary kind of wine glass containing 15 cl of wine, we can estimate this heat flow to be approximately 2% of the total heat flow to the wine. In such a glass, the temperature rises by 2–3 °C for a ten-minute period if the glass is not moved. The speed of this increase is greatest at the beginning of this period. For red wines




(12–18 °C) there is a lower rate of increase. These figures are only an example – other conditions will give different results.

When the stem of the glass is held, the temperature at the area of contact becomes approximately 30 °C and heat will now be transferred within the cylindrical stem by heat conduction. The majority of this extra heat flow will be transferred from the surface of the stem and foot to the colder surroundings by natural convection and radiation. A very small amount of heat from the holder's fingers will reach the wine. Holding the foot of the glass will further reduce the heat supply to the wine.

The heat supply from the fingers is not constant; instead, it only occurs when the holder picks up the glass to take a sip of the wine. Each time, the glass's stem or foot is heated up for 10–20 seconds. The rest of the time the wine is heated in the "normal" way. You can delay this normal heating process by chilling the glass before serving the wine. Lit candles on the table will increase the rate at which the temperature

increases. The difference between holding the cylindrical stem and the foot of the glass should normally be almost non-existent, but it looks so elegant if you do hold it by the foot. However, if you hold the bowl of the glass for a long time, this would increase the heat supply.

## The wine temperature varies

Heat is supplied to the wine from the surface of the liquid and from the area of contact between the wine and the glass. This means that the wine will have some variations of temperature. When measuring the temperature of liquids, you should always be aware of the temperature differences that can occur in stationary or almost stationary liquids. One way to get around this problem is either to measure the temperature at several places within the liquid or to make the liquid move around if possible. 

If you have comments or questions, contact Professor Dan Loyd at the Institute of Technology at Linköping University: [dan.loyd@liu.se](mailto:dan.loyd@liu.se)