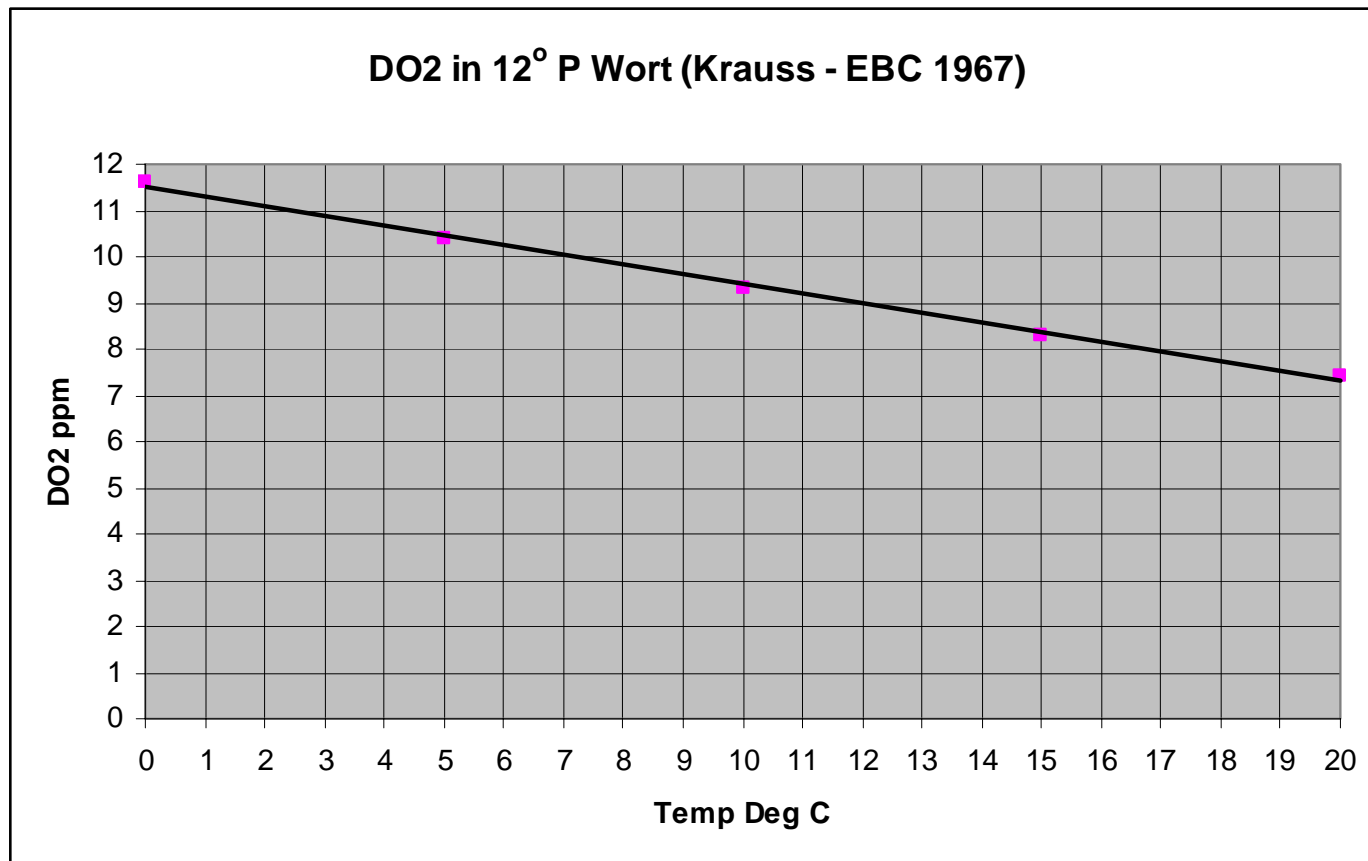


Oxygen solubility in wort

The following data, and derived graph has been taken from "Worts & Coolers" by Moll, from a lecture Krauss, EBC conference 1967

Temperature °C	0	5	10	15	20
O ₂ dissolved in water	14.5	12.7	11.2	10.0	9.9
O ₂ dissolved in 12% wort	11.6	10.4	9.3	8.3	7.4



Notes regarding oxygen measurement

The principle of oxygen measurement of many common instruments is the electrochemical reduction of oxygen that diffuses over a semi permeable membrane. The diffusion rate is a measure of the oxygen concentration in the liquid. The diffusion rate is determined by the difference in partial pressures of oxygen on either side of the membrane.

Partial pressures of gases in solution are related to Henry's law and the activities of the compounds in the solution, and therefore dependent on the concentration as well their activity coefficients. The activity coefficients are related to the matrix (the total complex of solute and solubles.) This means the main solute as well as other solubilised compounds may influence the partial pressure. The calibration of the electrode should always be coupled to the solution in which the measurement was carried out.

The solubility of oxygen (from air) is well defined by tables as a function of temperature and pressure. However it is known that the solubility in wort is reduced by any sugar in solution.

The relation is given by the following formula -

$$C_{O_2 \text{ wort}} = CF * C_{O_2 \text{ water}}$$

Where

$$CF = \text{correction factor}$$

$$C_{O_2 \text{ wort}} = \text{equilibrium concentration of oxygen in wort when aerated with air}$$

$$C_{O_2 \text{ water}} = \text{equilibrium concentration of oxygen in water when aerated with air}$$

When using instruments where the calibration was performed in water or air, a correction of the reading has to be made if the true dissolved oxygen level is to be known.

However, it is believed most, if not all suppliers, and most brewers, make no such correction. Although not technically accurate, consistent use of the uncorrected value has been proven to help achieve accurate control of fermentation and yeast growth and minimal differences when measuring parts per billion in bright beer.