ABG temp correction: PCO2 (+ PaO2)

As the temperature of blood decreases, the solubility of O2 and CO2 increases, which consequently lowers their partial pressures (decreases PaO2 and PaCO2). This especially becomes important during cold cardiopulmonary bypass.

For each 1°C change in temperature from 37°C, PaO2 changes by approximately 5 mm Hg and PaCO2 by approximately 2 mm Hg. Therefore if an ABG at 37°C showed a PaCO2 of 40 mmHg and a PaO2 of 100 mm Hg, at 27°C it would be approximately a PaCO2 of 20 mm Hg and a PaO2 of 50 mm Hg.

There are many long and complicated formulas for making this correction, one of the easier ones is taken from J Appl Physiol 9: 201-204, 195: Calculations based on the known temperature factors for blood gases suggest that a 1°C fall in the temperature of blood sealed in an anaerobic environment will lower the CO2 tension 4.4% and the O2 tension 6%. This tension change is approximately exponential, and is computed from the formula \(Pb/Pm = 10^f(b–m)\) to correct values from temperature of measurement (m) to that of the body (b). In the normal range, ‘f’ is 0.0247 for oxygen and 0.0185 for carbon dioxide.

Ref: openanesthesia.org