

The slope of an isochoor (constant volume) in a us-diagram (s on the horizontal axis) is

The slope of an isochoor in a us-diagram (s on the horizontal axis) is given by: $\left(\frac{\partial u}{\partial s}\right)_v$. From $du = TdS - Pdv$ it follows that this is equal to T. The temperature in (in Kelvin) is always positive. Therefore the slope of the isochoor is always rising