



## Isobar in a vT-diagram

The slope of the isobar in a vT-diagram ( $T$  on the horizontal axis) given by the partial derivative  $\left(\frac{\partial v}{\partial T}\right)_P$  for an ideal gas is:  
The equation of state for an ideal gas is:

$$Pv = RT \rightarrow v = \frac{RT}{P} \quad (1)$$

$$\left(\frac{\partial v}{\partial T}\right)_P = \frac{R}{P} = \frac{v}{T} \quad (2)$$

$P$  and  $R$  are always positive, so  $\frac{R}{P}$  is always positive (in diagram it has a rising slope, the smaller  $P$  the steeper the slope) and also  $\frac{v}{T}$  is always positive as  $v$  and  $T$  are also always positive (in a diagram the positive slope gets steeper if  $T$  gets smaller).