Acetone in Heat Pipe

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At what pressure does acetone boil?
108 torr
Acetone can be made to boil at 20°C with a pressure of 108 torr (0.141 atm). The normal boiling point of acetone (at 1 atm) is 56.5°C. As the acetone boils, its temperature can be reduced to about 10°C.

When Motor pumps at higher Speed, it generates more pressure in acetone. It vaporizes at lower temperature.

Can you touch 100% acetone?
If people get acetone on their skin it may cause skin irritation; skin may be dry, red and inflamed. Eye contact with liquid and acetone vapours can lead to irritation or eye damage. Exposure to the eyes for a long time may cause permanent damage.

Acetone, on the other hand, is a volatile organic compound commonly used as a solvent in various industrial applications. While it has a relatively low boiling point, it is not typically used as a working fluid in heat pipes due to its flammability and potential safety risks. Acetone is highly flammable and has a low flash point, which means it can ignite easily when exposed to an open flame or spark.

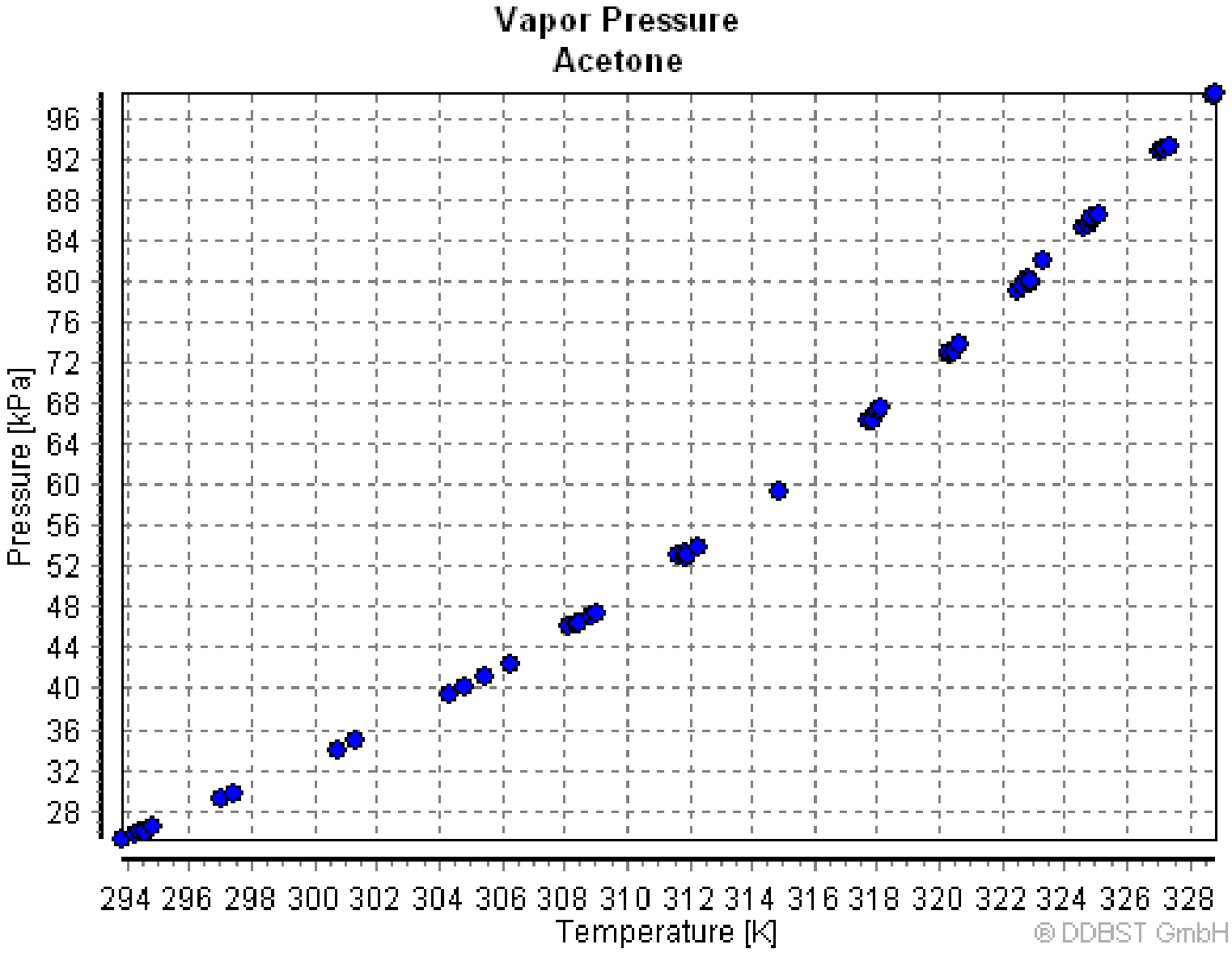
Acetone's low boiling point and high heat of vaporization allow it to absorb significant amounts of heat energy during evaporation and release it during condensation. This makes it an efficient heat transfer medium in specific temperature ranges.

Latent heat of vaporization (liquid to vapor): Around 30-32 kJ/mol or 540-580 kJ/kg at atmospheric pressure (1 atm) and near its boiling point of 56 degrees Celsius (133 degrees Fahrenheit).
Latent heat of condensation (vapor to liquid): The same amount of heat is released during condensation as is absorbed during vaporization. Therefore, the latent heat of condensation for acetone is also approximately 30-32 kJ/mol or 540-580 kJ/kg.

These values indicate that a significant amount of heat energy is absorbed or released during the phase change of acetone. This property makes it useful in heat transfer applications where rapid heat transfer is required at relatively low temperatures.

At lower temperatures, the latent heat of acetone will be somewhat reduced due to the decreased energy required for the phase change. However, the exact value depends on the specific temperature and pressure conditions.
For example, at a temperature of around 20 degrees Celsius (68 degrees Fahrenheit), which is significantly lower than the boiling point of acetone, the latent heat of vaporization could be around 25-28 kJ/mol or 450-500 kJ/kg. The latent heat of condensation would be the same amount but released during the transition from vapor to liquid.

At standard atmospheric pressure (1 atm or 101.325 kPa), acetone boils at approximately 56 degrees Celsius (133 degrees Fahrenheit). However, at different pressures, the boiling point will be different. Here are some approximate boiling points of acetone at various pressures:
0.1 atm (vacuum): Around -21 degrees Celsius (-6 degrees Fahrenheit)
0.5 atm: Around 31 degrees Celsius (88 degrees Fahrenheit)
1 atm: Around 56 degrees Celsius (133 degrees Fahrenheit)
2 atm: Around 71 degrees Celsius (160 degrees Fahrenheit)
5 atm: Around 92 degrees Celsius (198 degrees Fahrenheit)
10 atm: Around 107 degrees Celsius (225 degrees Fahrenheit)


Vapor Pressure
Acetone
Pressure [kPa]
96
92
88
84
80
76
72
68
64
60
56
52
48
44
40
36
32
28
294 296 298 300 302 304 306 308 310 312 314 316 318 320 322 324 326 328
Temperature [K]
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When the pressure in acetone rises, the vaporization rate generally increases. This is because an increase in pressure raises the boiling point of acetone, making it easier for the liquid to transition into a vapor state.

In general, vaporization occurs when the vapor pressure of the liquid exceeds the pressure exerted on the liquid's surface. By increasing the pressure, the difference between the vapor pressure and the external pressure decreases. As a result, more molecules in the liquid have enough energy to overcome the increased pressure and transition into the vapor phase.

This higher vaporization rate can be observed through a faster evaporation of the acetone. More molecules escape from the liquid surface and enter the vapor phase per unit of time. It's important to note that the specific relationship between pressure and vaporization rate can be influenced by factors such as temperature, intermolecular forces, and the specific properties of the system.

Keep in mind that working with pressurized systems or manipulating pressure conditions requires appropriate equipment and precautions to ensure safety.