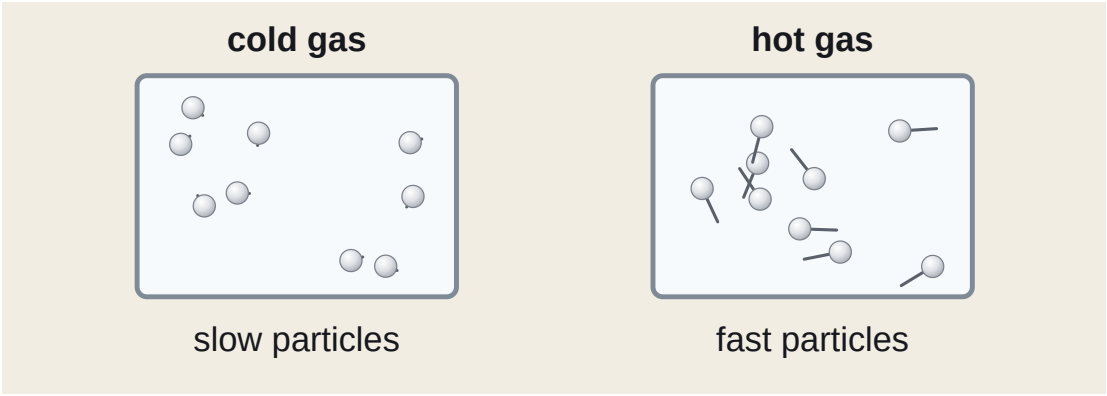
B2 · Temperature, kelvin and absolute zero; STP and SATP · Notes

Goals: Explain temperature as how fast particles move. Change a temperature between degrees Celsius and kelvin. State the conditions called STP and SATP.

Name: _____ Date: _____

Slide 1 of 6 · Temperature and moving particles

Lesson B1 named four things we measure about a gas. One of them was temperature. Today you learn what it measures.



Key ideas

_____ tells you how fast the particles move.

In a hot gas the particles move _____.

In a cold gas the particles move _____.

Heating a sealed gas raises its _____.

Example

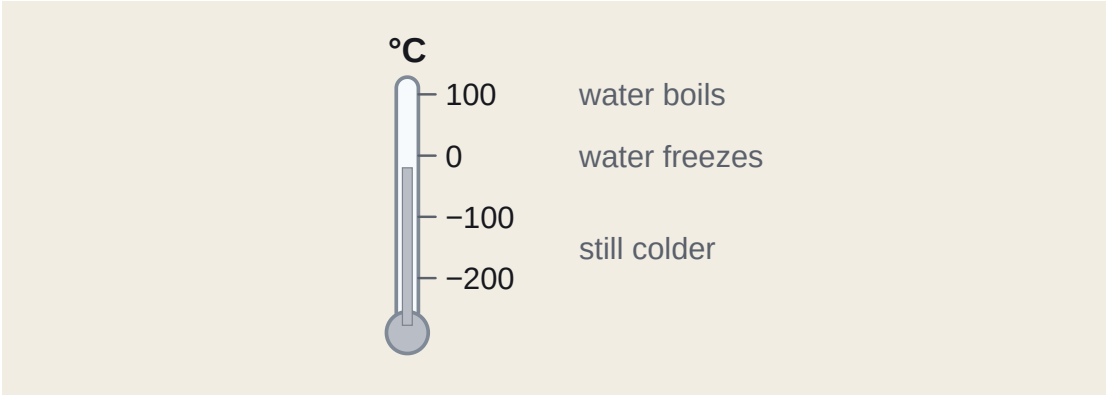
A sealed can of gas is heated. What happens to its pressure, and why?

Try it

A gas is cooled. What happens to its particles?

Slide 2 of 6 · Why the Celsius scale does not work for gases

The last slide said temperature measures how fast particles move. The Celsius scale has a problem with that.



Key ideas

On the Celsius scale, water _____ at 0 °C.

Water _____ at 100 °C.

At 0 °C the particles are _____.

Gas questions need a scale where _____ means the particles have stopped.

Example

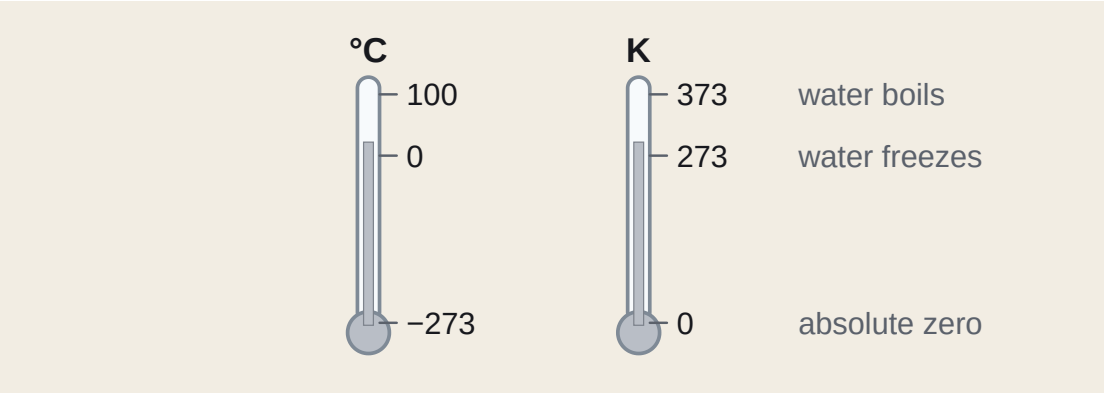
Is 0 °C the lowest temperature there is? How do you know?

Try it

What should zero mean on a temperature scale used for gases?

Slide 3 of 6 · The Kelvin scale and absolute zero

The last slide asked for a scale where zero means the particles have stopped. This slide gives it.



Key ideas

The unit of the Kelvin scale is the _____, K.

Zero kelvin is called _____.

On the Celsius scale, absolute zero is −_____ °C.

A kelvin temperature is never _____.

Example

What is absolute zero, in kelvin and in degrees Celsius?

Try it

Why can a temperature in kelvin never be negative?

Slide 4 of 6 · Changing between degrees Celsius and kelvin

The last slide showed that the two scales are always 273 apart. That makes changing between them one step.

A room is at 35 °C.

T = 35 + 273

Kelvin is always the bigger number, so add.

T = 308 K

Key ideas

To go from degrees Celsius to kelvin, _____ 273.

To go from kelvin to degrees Celsius, _____ 273.

The _____ value is always the bigger one.

Example

Use T (K) = t (°C) + 273. Convert 18 °C to kelvin. What is the temperature in K?

Try it

Use T (K) = t (°C) + 273. Convert 200 K to degrees Celsius. What is the temperature in °C?

Slide 5 of 6 · STP and SATP

You can now give any temperature in kelvin. Chemists have agreed on two temperatures and pressures to use.

name	temperature	in kelvin	pressure
STP	0 °C	273 K	101.325 kPa
SATP	25 °C	298 K	100 kPa

SATP is close to a normal room.

Key ideas

_____ means standard temperature and pressure.

STP is 0 °C and _____ kPa.

_____ means standard ambient temperature and pressure.

SATP is _____ °C and 100 kPa.

Example

Name the temperature and pressure of STP. Give the temperature in kelvin as well.

Try it

Name the temperature and pressure of SATP. Give the temperature in kelvin as well.

Slide 6 of 6 · Method: how to change a temperature between °C and K

Two slides ago you changed two temperatures. Here is what you did, as steps.

1. **Read** the unit you are given.
2. **Add** 273 to go from °C to K.
3. **Subtract** 273 to go from K to °C.



Check: the kelvin value is the bigger one, and it is never negative.

Used again in: lessons B4, B5 and B8

Key ideas

Step 1: _____ the unit you are given.

Step 2: _____ 273 to go from °C to K.

Step 3: _____ 273 to go from K to °C.

Example

Use T (K) = t (°C) + 273. Use the steps to convert −10 °C to kelvin.

Try it

Use T (K) = t (°C) + 273. Use the steps to convert 350 K to degrees Celsius.