B2 · Temperature, kelvin and absolute zero; STP and SATP · Worked examples and practice

Name: _____ Date: _____

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Change degrees Celsius to kelvin

Use T (K) = t (°C) + 273. Convert 18 °C to kelvin.

1. Read the unit you are given: °C.
2. Add 273 to go from °C to K: 18 + 273 = 291 K.
3. Check: the kelvin value is the bigger one, and it is not negative.

Answer: The temperature is 291 K.

Example 2 · Change kelvin to degrees Celsius

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

1. Read the unit you are given: K.
2. Subtract 273 to go from K to °C: 350 − 273 = 77 °C.
3. Check: the kelvin value, 350, is the bigger one.

Answer: The temperature is 77 °C.

Example 3 · Give the conditions of STP or SATP

Name the temperature and pressure of SATP. Give the temperature in kelvin too.

1. SATP is 25 °C and 100 kPa.
2. 25 + 273 = 298 K.

Answer: SATP is 25 °C, which is 298 K, and 100 kPa.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. Use T (K) = t (°C) + 273. Convert 40 °C to kelvin. What is the temperature in K?

EASY

2. Use T (K) = t (°C) + 273. Convert 300 K to degrees Celsius. What is the temperature in °C?

EASY

3. A gas is warmed. Explain what happens to its particles.

EASY

4. Use T (K) = t (°C) + 273. Name the temperature and pressure of STP. Give the temperature in degrees Celsius and in kelvin.

MEDIUM

5. Use T (K) = t (°C) + 273. A winter night is −40 °C. What is this temperature in kelvin?

MEDIUM

6. Use T (K) = t (°C) + 273. Dry ice is at 195 K. What is this temperature in degrees Celsius?

MEDIUM

7. Use T (K) = t (°C) + 273. Which is colder, 250 K or −30 °C? Show your work.

MEDIUM

8. Use 1 atm = 101.325 kPa = 760 mm Hg. Use T (K) = t (°C) + 273. A lab is at SATP. SATP is 25 °C and 100 kPa. Give its temperature in kelvin and its pressure in atmospheres.

HARDER

9. Use T (K) = t (°C) + 273. The air warms from −12 °C in the morning to 9 °C in the afternoon. Give both temperatures in kelvin. Then find how many kelvin the air warmed.

HARDER

10. Use T (K) = t (°C) + 273. A student says a gas at 20 °C is twice as hot as a gas at 10 °C. Change both temperatures to kelvin. Then say whether the student is right.