Answer on Question 58121, Physics, Other

Question:

1. An ideal gas is in equilibrium at initial state with temperature $T = 137$ ℃, pressure $P = 0.75\ Pa$ and volume $V = 0.75\ m^3$. If there is a change in state in which the gas undergoes an isothermal process to a final state of equilibrium during which the volume is doubled. Calculate the temperature and pressure of the gas at this final state.

Solution:

a) As we know, an isothermal process is a change of a thermodynamic system, in which the temperature remains constant ($\Delta T = 0$). Hence, $T_1 = T_2 = 137$ ℃ .

b) As we know, for an ideal gas the product of pressure and volume is a constant if the gas is kept at isothermal conditions. Thus, we can use the Boyle's law:

$$P_1 V_1 = P_2 V_2.$$

From this equation we can find pressure of the gas at the final state. Because the volume is doubled, we get:

$$P_1 V_1 = P_2 \cdot 2V_1,$$

$$P_2 = \frac{P_1}{2} = \frac{0.75\ Pa}{2} = 0.375\ Pa.$$

Answer:

a) $T_2 = 137$ ℃.

b) $P_2 = 0.375\ Pa$.

2. Which of the following is not an equation of state of a thermodynamic system?

a) Charles law

b) Ideal gas law

c) Van der Waals equation

d) Kirchoff's junction rule

Solution:

Since the Kirchoff's junction rule is used in electrical engineering and not in thermodynamics, the correct answer is d) Kirchoff's junction rule.

Answer:

d) Kirchoff's junction rule