

Answer on the question #65813, Chemistry / Physical Chemistry

Question:

Question 7 : One mole of an ideal gas is heated at a constant pressure of 101300 N

m

2

m²

, from 273.2 K to 373 K. Calculate the work involved R = 8.314 J/mol/K).

8.314 J/mol

831.4 J/mol

83.14 J/mol

8314 J/mol

Question 8 : Which of the following expressions is associated with the law of conservation of energy?

dE = q + w

q = mCdT

dG = dH – TdS

H = E + PV

Solution:

Question 7.

The work is:

$$W = p(V_2 - V_1)$$

There, using the equation of ideal gas, we calculate the volume:

$$V_2 = \frac{nRT_2}{p} = \frac{8.31 \text{ (J mol}^{-1}\text{K}^{-1})373 \text{ (K)}}{101300 \text{ (N m}^{-2})}; V_2 = 0.03060 \text{ m}^3$$

$$V_1 = \frac{nRT_1}{p} = \frac{8.31 \text{ (J mol}^{-1}\text{K}^{-1})273.2 \text{ (K)}}{101300 \text{ (N m}^{-2})}; V_1 = 0.02241 \text{ m}^3$$

$$W = 101300 \text{ (N m}^{-2}) \cdot (0.03060 - 0.02241) \text{ (m}^3) \\ = 829.74 \text{ J. As we have 1 mole, the work per mole is } W = 829.74 \text{ J/mol}$$

Question 8.

dE = q + w

This expression shows that the change in the internal energy of the system is equal to sum of the quantity of energy added to the system by a heating process and the quantity of energy added to system due to the work done on the system.

Answer: Q.7 829.74 J/mol (choose 831, as the closest) Q.8 dE = q + w