

Physics 102Rec
Quiz#4
Chapter 19

Name:

Key

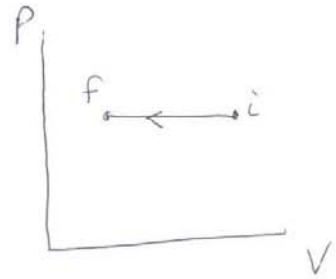
Id#:

Sect#:

In a constant pressure process, heat is removed from 5 mole of oxygen gas (diatomic) initially at 300 °C. The final temperature of the gas is 100 °C. Find;

(a) The work done on the gas

$$\begin{aligned} W &= P \Delta V = n R \Delta T \\ &= 5 \times 8.31 \times (100 - 300) \\ &= \boxed{-8310 \text{ J}} \end{aligned}$$



(b) The change in internal energy of the gas

$$\begin{aligned} \Delta E_{\text{int}} &= n C_v \Delta T = n \frac{5}{2} R \Delta T \\ &= 5 \times \frac{5}{2} \times 8.31 \times (-200) \\ &= \boxed{-20775 \text{ J}} \end{aligned}$$

(c) The heat removed from the gas.

$$\begin{aligned} Q &= n C_p \Delta T = n \frac{7}{2} R \Delta T \\ &= 5 \times \frac{7}{2} \times 8.31 \times (-200) \\ &= \boxed{-29085 \text{ J}} \end{aligned}$$

or

$$\begin{aligned} Q &= \Delta E_{\text{int}} + W \\ &= -20775 - 8310 \\ &= \boxed{-29085 \text{ J}} \end{aligned}$$