

The gas constant for a particular gas is found by dividing the universal gas constant ( $\bar{R}_u = 8.314 \frac{\text{kJ}}{\text{kmol}\cdot\text{K}}$ ) by the gas's molecular weight. What is the gas constant for  $\text{CO}_2$ ?

SOLUTION:

The molecular weight of  $\text{CO}_2$  is,

$$M_{\text{CO}_2} = M_C + 2M_O = 12.01 \text{ g/mol} + 2(16.00 \text{ g/mol}) = 44.01 \text{ g/mol} = 44.01 \text{ kg/kmol.} \quad (1)$$

The gas constant for  $\text{CO}_2$  is then,

$$R_{\text{CO}_2} = \frac{\bar{R}_u}{M_{\text{CO}_2}} = \frac{8.314 \frac{\text{kJ}}{\text{kmol}\cdot\text{K}}}{44.01 \frac{\text{kg}}{\text{kmol}}}, \quad (2)$$

$R_{\text{CO}_2} = 0.1889 \frac{\text{kJ}}{\text{kg}\cdot\text{K}}$