The change in enthalpy upon reaction of 51.90 g of $Cu_2O(s)$ is −52.96 kJ. Calculate the work, w, and energy change, ΔU_{rxn}, when 51.90 g of $Cu_2O(s)$ is oxidized at a constant pressure of 1.00 bar and a constant temperature of 25°C.
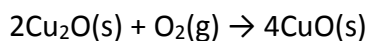
Solution.
$2Cu_2O(s) + O_2(g) \rightarrow 4CuO(s)$
$n(Cu_2O) = m(Cu_2O)/M(Cu_2O) = 51.9/144 = 0.36$ mol
2 mol Cu_2O − 1 mol O_2
0.36 mol Cu_2O − x mol O_2
x = 0.18 mol O_2
$w = P \times \Delta V$
$\Delta V = \Delta n \times RT/P$
$w = P \times \Delta n \times RT/P = \Delta nRT = (0–0.18 \text{ mol}) \times (8.31 \text{ J/(mol*K)}) \times (25+273) = −445.75 \text{ J} = −0.44575$ kJ
$\Delta U_{rxn} = \Delta H_{rxn} − w = −52.96 \text{ kJ} + 0.44575 \text{ kJ} = −52.51$ kJ
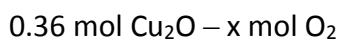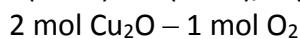
Answer: w = −0.44575 kJ
$\quad\quad\quad \Delta U_{rxn} = −52.51$ kJ