Answer on Question #72257, Physics / Molecular Physics | Thermodynamics

1. A hot block of iron does 50 kJ of work on a cold floor. The block of iron also transfers 20 kJ of heat energy to the air. Calculate the change in energy (in kJ) of the iron block.

Solution:

The q and w are negative when the system loses heat to the surroundings.

$\Delta E = w + q$
$w = - 50$ kJ
$q = - 20$ kJ

$\Delta E = (- 20 \text{ kJ}) + (- 50 \text{ kJ}) = - 70$ kJ

Answer: - 70 kJ

2. A chef vigorously stirs a pot of cold water and does 150 J of work on the water. The water also gains 75 J of thermal energy from the surroundings. Calculate the change in energy of the water.

Solution:

The q and w are positive when the system receives heat to the surroundings.

$\Delta E = w + q$
$\Delta E = 150 \text{ J} + 75 \text{ J} = 150 \text{ J} + 75 \text{ J} = 225 \text{ J}$

Answer: 225 J