

## Answer on Question #37942, Physics - Thermodynamics

### Question:

A person has a metabolic rate of about  $7.84 \times 10^5$  joules per hour. The person is submerged neck-deep into a tub containing  $2.06 \times 10^3$  kg of water at  $20.9^\circ\text{C}$ . If the heat from the person goes only into the water, find the water temperature in degrees Celsius after half an hour.

### Answer:

$$Q = cm(T_2 - T_1)$$

where  $T_2 - T_1$  – change of temperature,  $Q$  is amount of heat,  $m$  is mass.

Amount of heat equals:

$$Q = 7.84 \cdot 10^5 \frac{J}{h} \cdot 0.5 h = 3.92 \cdot 10^5 J$$

Therefore, final temperature equals:

$$T_2 = T_1 + \frac{Q}{cm}$$

Finally:

$$T_2 = T_1 + \frac{Q}{cm} = 20.9 + \frac{3.92 \cdot 10^5}{4183 \cdot 2.06 \cdot 10^3} = 21.16^\circ\text{C}$$

Answer:  $21.16^\circ\text{C}$