KING FAHD UNIVERSITY OF PERTOLEUM & MINERALS
PHYSICS DEPARTMENT
QUIZ #3- CHAPTER 18

NAME: Key ID# SECTION# 16

A glass window has an area of 0.50 m^2 and a thickness of 0.60 cm. If the rate of heat flow between the faces is 500 kJ/hour, find the temperature difference between the window's faces. K(glass) = 0.80 W/m C^0.

$$P = \frac{Q}{t} = k \frac{A \Delta T}{L}$$

$$\Rightarrow \frac{500 \times 10^3}{3600} = \frac{0.8 \times 0.5 \times \Delta T}{0.006}$$

$$\Delta T = 2.1\ C^\circ = 2.1\ K$$

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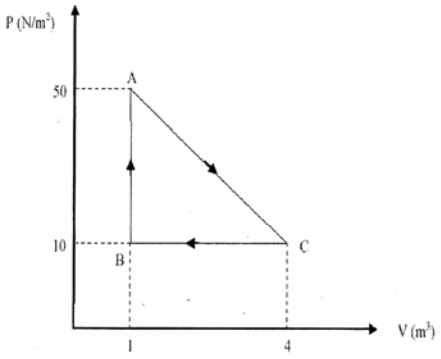
Consider a gas taken through the cyclic process shown in the figure. Calculate the

(a) change in internal energy of the gas during the cycle.

$$\Delta E_{int} = 0$$



(b) work done by the gas during the cycle.

W = area enclosed

$$= 40 \times 3 \times \frac{1}{2} = 60\ J$$

(c) heat transfer during the cycle.

Since $\Delta E_{int} = Q - W = 0$

$$\Rightarrow Q = W = 60\ J$$

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How much ice at −20 ^{0}C must be mixed with 0.25 kg of water, initially at 20 ^{0}C, in order for the final temperature to be 0 ^{0}C with the ice all melted? Given: c_{ice} = 0.53 cal/gK, c_{water} = 1 cal/gK.

$$Q_{ice} + Q_{water} = 0$$

$$\underbrace{(m_{ice}\, C_{ice}\, \Delta T + m_{ice} L_f)}_{Q_{ice}} + \underbrace{(m_w C_w \Delta T)}_{Q_{water}} = 0$$

$$m_{ice}\left(2219\times(0+20) + 333\times10^3\right) + 0.25 \times 4186 \times (0-20) = 0$$

$$m_{ice} = \frac{20930}{377380} = 0.055\,kg = \boxed{55\,g}$$