1.

## SUMMARY:

Convection is one of the basic ways of heat transfer.

Relying on the macroscopic relative displacement of an object is a phenomenon of transferring heat from one place to another. There is no simple process of convective exchange, and convection is always accompanied by heat conduction.

Due to the different causes of flow, convective heat transfer usually divides convective heat transfer into forced convection heat transfer and natural convection heat transfer.

Convection is the relative displacement of a fluid, such as the relative displacement of a gas and a liquid, with space and media in the process of convection. The factors associated with convective heat transfer include the thermal conductivity of the solid and the fluid itself, etc., in addition to the velocity of the fluid, the way the flow also affects the heat transferred.

## EXPLAIN:

In the air layer, the thermal resistance is mainly determined by the thickness of the air boundary layer on the two interfaces and the heat transfer intensity between the interfaces. Therefore, there is no proportional increase in the relationship between the resistance and thickness of the air layer.

The thermal resistance of the glass is relatively small compared to the thermal resistance of convection with air. However, increasing the thickness of the glass can make the resistance of the glass larger, but this change has little effect on the total resistance.

2.

## MISTAKES:

1. The data after retaining the decimal point in the calculation result is not accurate enough.
2. Confusing the calculation of the thermal resistance of the glass with the result of the thermal resistance of the wall, so that the calculation is an error.

**3.**

A=0.5*1.5=1.2

$$R_{glass1} = R_{glass2} = \frac{L_{glass}}{(K_{glass} * A} = \frac{0.006}{0.78*1.2} = 0.0056°C/W$$

$$R_{\mathrm{airgap}} = \frac{L_{airgap}}{(K_{airgap} * A)} = \frac{0.013}{0.026*1.2} = 0.4167°C/W$$

$$R_1 = \frac{1}{\mathrm{h}_1 * A} = \frac{1}{10*1.2} = 0.0833°C/W$$

$$R_2 = \frac{1}{\mathrm{h}_2 * A} = \frac{1}{40*1.2} = 0.0208°C/W$$

$$R_{\mathrm{total}} = R_1 + R_{glass1} + R_{airgap} + R_{glass2} + R_2 = 0.0833 + 0.0056 + 0.4167 + 0.0056 + 0.0208 = 0.532°C/W$$

$$\dot{Q} = \frac{T_{\infty 1} - T_{\infty 2}}{R_{\mathrm{total}}} = \frac{20°C - (-10°C)}{0.532°C/W} = 56.39W$$

$$T_1 = T_{\infty 1} - \dot{Q} * R_1 = 20°C - 56.39 * 0{,}0833°C/W = 15.303°\mathrm{C}$$

When the air gap is less than 13mm, the radiation of one glass will affect another glass. When the air gap exceeds 13mm, the internal gas itself will bring heat loss, so 13mm is the most suitable air gap value.