

Model Problem for Extractive Metallurgy

Write and test a "**Model on the Heat Loss from a Reverberatory Furnace Roof**". You need to provide the flow diagram and the assumptions considered taking into consideration of heat loss by convection, conduction and radiation from the appropriate surfaces or materials. It is desired to produce the amount of heat loss from the roof into the atmosphere for different outside temperatures of the roof (say at increment of 100°C starting from 100 °C to 900 °C, considering steady state). You may assume that the roof is made of silica and use the standard properties of silica and air (and other required values) pertaining to the problem.

Suggested conditions for the furnace operations:

1. Furnace temperature=1300 °C,
2. Surrounding air temperature = 40 °C,
3. Roof size= 16 m x 8 m,
4. Thickness of silica: 0.3 m,
5. Thermal conductivity of silica = 1.4 W/m °K
6. Emissivity of silica = 0.8
7. Convective heat transfer coefficient from silica to air = 10.5 W/m² °K