ABSTRACT
A confined space is a space with limited entry. In case of concentric spherical shells heat transfer takes place. At present in this work Thermal analysis on non metals subjected to confined space, where air is taken as common confined gas. Whereas for the spherical shell two different shell materials has been chosen from the families of non metals. The outer shell and inner shell are maintained at several temperature sources namely: 335K, 364K, 395K & 424K. Diamond (C) and Silica Aero-Gel are considered as non metals. For analyzing thermal analysis ANSYS software is used.

Keywords: ANSYS, Confined gas, Non-Metals, Spherical Shell, Temperature

I. INTRODUCTION
Convective heat transfer is the transfer of heat from one place to another place by the movement of fluids. Heat transfer by means of convection combines the processes of unknown conduction (heat diffusion) and advection (heat transfer by bulk fluid flow). To refer cumulative transport the term convection is used and to refer the transport due to bulk fluid motion the term advection is used. The properties of convective heat transfer can be evaluated at one convenient reference point, that point is called average fluid temperature or bulk temperature.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Materials</th>
<th>Thermal Conductivity (K) (W/m K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diamond</td>
<td>2000</td>
</tr>
<tr>
<td>2</td>
<td>Silica Aero-Gel</td>
<td>0.024</td>
</tr>
</tbody>
</table>

Table No: 1 K Values

Fig No: 1 Mesh Geometry
Nodal Solutions for Steady State Temperature Distribution in Case of Diamond Material

Fig No: 2a  
\( t = 335K \)

Fig No: 2b  
\( t = 364K \)

Fig No: 2c  
\( t = 395K \)

Fig No: 2d  
\( t = 424K \)
Nodal Solutions for Steady State Temperature Distribution in Case of Silica Aero-Gel Material

Graph No: 1 Relations B/w Temperature & Total Q Value (Material is Aero – Gel)

Graph No: 2 Relations B/w Temperature & Total Q Value (Material is Diamond)
III. CONCLUSIONS

1. Thermal conductivity of metals is high as compared with non-metals, but Diamond is a non-metal and has the highest thermal conductivity than metals. Since, structure of Diamond is macro-molecule that is there are many atoms which have strong covalent bond in between them. As a result, it requires a lot of heat to break the inter-molecular force between them.

2. In non-metals expect diamond all has least thermal conductivity, among non-metals Silica Aero-Gel has the least thermal conductivity of 0.024 W/m K. Due to its least thermal conductivity of silica aero-gel, it works as a best insulator.

3. In non-metals also the rate of heat transfer decreases from non-metals having high thermal conductivity to the non-metals having least thermal conductivity. From Diamond (C) Silica Aero-Gel, the fall in rate of heat transfer at temperature 335K is 68.593 W to 1.33744 W respectively.

4. As observed that, compared to metals the rate of heat transfer is not decreasing gradually for the above considered non-metals. Because of the highest thermal conductivity of diamond there is a large variation in heat transfer rate of diamond and silica aero-gel.

REFERENCES


