CHAPTER-8

CONCLUSIONS AND FUTURE SCOPE OF THE WORK

The experimental studies and the detailed discussion of the results obtained on the green and sintered Al-Pb/fly-ash composites have been presented in the earlier chapters. From the discussion of the results the following conclusions are drawn:

(1) Characteristics of green briquettes like ejection pressure, density, spring back, hardness and strength are increased with increasing compaction pressure while the porosity of green briquettes is decreased with increasing compaction pressure. The ejection pressure is increased from 21.01 to 50.22MPa, the green density from 19.79 to 26.97KN/m$^3$, spring back from 0.1614 to 0.6174% and the green hardness from 48 to 109.4 BHN with increase in the compaction pressure from 200 to 400MPa respectively. There is a significant increase in the green strength from 14.03 to 62.84MPa with increase in the compaction pressure from 200 to 400MPa.

(2) For Al-15wt% Pb briquettes, increase of fly-ash content upto 20wt% results in substantial increase in the hardness from 48 to 109.4 BHN and decrease in the green density from 26.97 to 20.88KN/m$^3$. Fly-ash being hard and light constituent, increase in its proportion increases the hardness and reduces the density. With increase in the fly-ash content, there is an increase in the spring back and porosity. The addition of fly-ash reduces the galling and seizing effect of aluminum and thereby reduces the ejection pressure. The addition of fly-ash decreases the green compressive strength.
(3) The addition of Pb upto 20wt% in Al-10wt% fly-ash composite increases the green density from 19.79 to 26.70KN/m³ and the hardness from 63 to 92.5BHN. The lead has high specific gravity; therefore, the addition of Pb increases the density. The ejection pressure decreases with the addition of Pb on account of its lubricating action. The green porosity decreases with the addition of Pb owing to softness and easy flow of Pb into the pores present inside the briquettes. The addition of Pb decreases the green compressive strength of composites.

(4) For Al-15wt% Pb/fly-ash composites, the sintered density is nearly constant in the temperature range of 500 to 560°C and beyond 560°C a small increase is observed for fly-ash upto 10wt%. The sintered hardness is almost constant up to 560°C followed by marginal decrease. In the temperature range of 500 to 560°C there is not much change in the compressive strength but beyond 560°C a considerable rise is noticed.

(5) In case of Al-Pb/10wt % fly-ash composites, the sintered density is nearly constant upto 560°C and beyond 560°C a slight increase is observed. The change in the sintered porosity between 500 to 560°C is less but beyond 560°C it decreases. There is a slight increase in the sintered hardness from 500 to 560°C and beyond 560°C it decreases. The sintered compressive strength changes marginally upto 560°C and beyond 560°C it increases.

(6) The sintering of green composites results in decrease of density and hardness and increase of porosity and compressive strength.
FUTURE SCOPE OF THE WORK

Based on the present work, the following suggestions are made for future work.

(1) In the present experimental investigation, the Al-Pb/fly-ash composites are prepared by the single action die compaction process. However, other powder metallurgical techniques can also be tried for the preparation of these composites.

(2) The effect of magnesium on the Al-Pb/fly-ash composite system can also be studied.

(3) The fly-ash used in the present work consists of both precipitator and cenospheres. Further studies can be done by using only cenosphere fly-ash particles for better properties of composites.