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LITHIUM COMPATIBILITY RESEARCH — STATUS AND REQUIREMENTS FOR FERROUS MATERIALS*

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ABSTRACT

A brief historical review and a description of the present status of the knowledge accumulated on lithium-ferrous alloy corrosion research are presented and discussed. The effects of various parameters are discussed and the future requirements of lithium corrosion research are presented and discussed.

INTRODUCTION

The potential importance of liquid lithium metal in modern technology has been increasing in recent years, primarily because it is under serious consideration for both the coolant and blanket material for fusion reactor materials. This results from its neutronic properties and the reactions:

$$^{6}Li + {}^{1}n \rightarrow {}^{4}He + {}^{3}T \ ,$$

$$^{7}Li + {}^{1}n \rightarrow {}^{4}He + {}^{3}T + {}^{1}n \ .$$

Tritium produced by these reactions is a primary constituent (along with deuterium) of the fuel in a fusion reactor and it is this breeding potential that makes the fusion reactor so attractive. The lithium atom is essential for the breeding of tritium and although various designs have been proposed in which Li_2O (1), Li-Al alloy (2), or Li_2BeF_4 (3) are considered, pure lithium gives the greatest neutron efficiency and is generally favored as the blanket material (4–8). While the corrosiveness of lithium may limit its usefulness as a coolant, its breeding potential looms very important.

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