Institute of
Engineering Thermodynamics

Influence of different atmospheres on molten salt chemistry and its effect on steel corrosion

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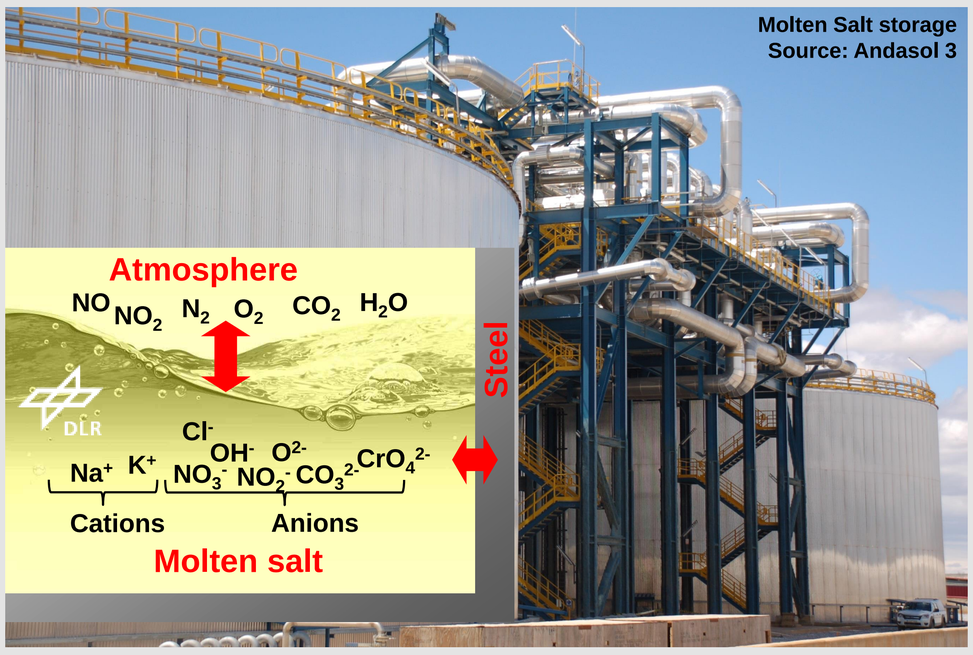
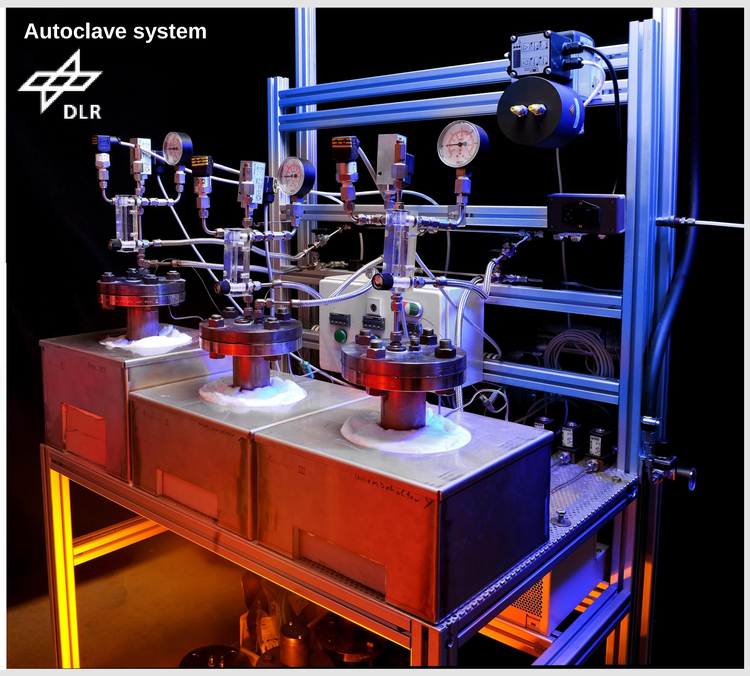
Introduction

- **Reliable long-term operation of thermal energy storage is essential**
- **Special emphasis is placed on high-temperature molten salt operation**
- **The presented work focuses on interaction of**
  - **metallic corrosion**
  - **molten nitrate salt chemistry**
  - **and atmospheric conditions**



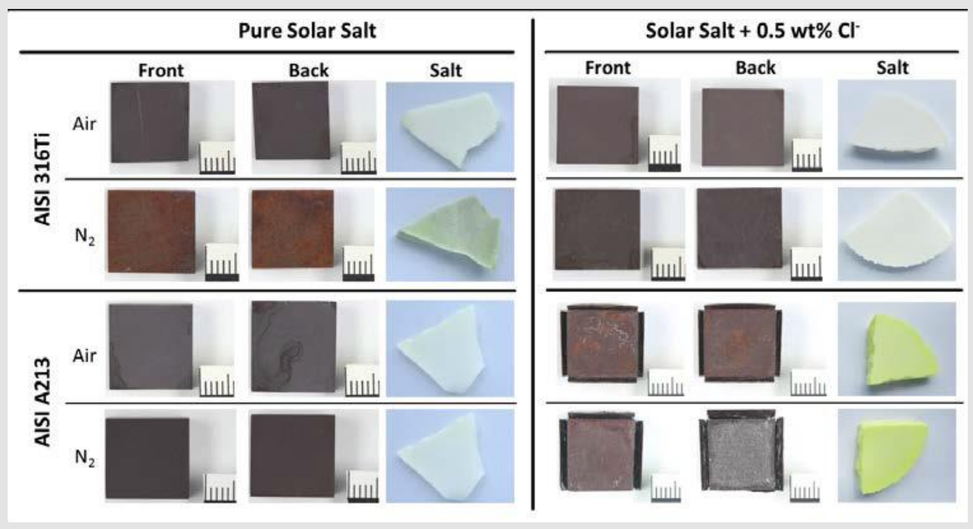
Method

- **Metallic corrosion experiments in autoclaves with Solar Salt at 560 °C for 1200 h**
- **Parameters:**
  - **Impurities (with / without 0.5 wt% Clorides)**
  - **Steel type (AISI 316Ti / AISI A213)**
  - **Atmosphere (synthetic Air / N_2)**
- **Post-analysis of**
  - **Salt (ion chromatography, acid-base titration)**
  - **Steel (mass gain, macro-images)**



Results and conclusions

- **Analytic post analysis methods for oxide, carbonate, nitrate, nitrite and chromate ions were established**
- **Simultaneous post analysis of salts and metals gave insight into corrosion mechanisms**
- **Serve corrosion of AISI A213 in Solar Salt at 560 °C with 0.5 wt% Cl^- was found**
- **The oxide ion level was dependent on the atmosphere and higher levels increased corrosion**



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