

Heat Transfer of Ca (NO₃)₂-KNO₃ Molten Salt Mixtures for Austempering and Martempering Processes of Steels

By Quadros, JD (Quadros, Jaimon D.) ; Khan, SA (Khan, Sher Afghan) ; Mohin, M (Mohin, Ma) ; Mogul, YI (Mogul, Yakub I.) ; Aabid, A (Aabid, Abdul) ; Baig, M (Baig, Muneer) ; Ahmed, OS (Ahmed, Omar Shabbir)

[View Web of Science ResearcherID and ORCID](#) (provided by Clarivate)

Source [ACS OMEGA](#) ▾

DOI: 10.1021/acsomega.3c10262

Early Access APR 2024

Indexed 2024-04-16

Document Type Article; Early Access

Abstract Molten salts are highly effective as a quenching medium for austempering and martempering processes, enabling precise control of cooling rates to achieve the desired microstructures and mechanical characteristics in steel components. One such promising molten salt is a multicomponent Ca (NO₃)₂-KNO₃ molten salt. The current work explores the cooling severity of molten Ca (NO₃)₂-KNO₃ mixtures, which are commonly used for such purposes. The said mixture, with varying concentrations and bath temperatures was used for quenching the Inconel probe with thermocouples. The temperature data extracted was used to determine the transient heat flux developed at the metal-quenchant interface. A set of critical points were assessed against the peak heat extraction rates. Additionally, the fluctuation of mean heat flux and surface temperature in relation to these crucial points were plotted, along with changes in composition and bath temperature of the quench media. The cooling intensity of these quench solutions, as measured by Inconel probes, correlated well with the average hardness values observed in steel



MENU



probes. The level of homogeneity in heat transmission, as measured by the spatial variance of the normalized heat energy, decreased as the percentage of KNO3 in the quench medium increased.

Keywords

Keywords Plus: COOLING PERFORMANCE; QUENCH MEDIUM; TEMPERATURE; WATER; OIL

Addresses

- ¹ Univ Bolton, RAK Acad Ctr, Dept Mech Engn, Ras Al Khaymah 16038, U Arab Emirates:
- ² Int Islamic Univ Malaysia, Dept Mech & Aerosp Engn, Kuala Lumpur 53100, Selangor, Malaysia:
- ³ Univ Bolton, Sch Engn, Bolton BL3 5AB, England:
- ⁴ Univ Bolton, Natl Ctr Motorsport Engn, Bolton BL3 5AB, England:
- ⁵ Prince Sultan Univ, Coll Engn, Dept Engn Management, Riyadh 11586, Saudi Arabia:

**Categories/
Classification**

Research Areas: Chemistry
 Citation [7 Engineering & 7.12 Metallurgical > 7.12.417 Retained](#)
 Topics: [Materials Science](#) [Engineering](#) [Austenite](#)
 Sustainable Development Goals: [11 Sustainable Cities and Communities](#)

**Web of Science
Categories**

[Chemistry, Multidisciplinary](#)

Language

English

Accession Number

WOS:001200609900001

PubMed ID

38645353

ISSN

2470-1343

IDS Number

NL4Z6

[– See fewer data fields](#)

Citation Network

Use in Web of Science

In Web of Science Core Collection

2

2

0 Citations

How does this document's citation performance compare to peers?

[← Open comparison metrics panel](#)

Data is from InCites Benchmarking & Analytics

This record is from:

Web of Science Core Collection

- Science Citation Index Expanded (SCI-EXPANDED)

Suggest a correction

If you would like to improve the quality of the data in this record, please [Suggest a correction](#)



Accelerating innovation

© 2024 Clarivate Data Correction Copyright Notice [Manage cookie preferences](#) [Follow Us](#)

[Training Portal](#) [Privacy Statement](#) [Cookie Policy](#)

[Product Support](#) [Newsletter](#)

[Terms of Use](#)

