

# **International Conference on Ammonia Refrigeration Technology 2011**

**Refrigeration Science and Technology Proceedings 2011-2**

**Ohrid, Macedonia  
14 – 16 April 2011**

**ISBN: 978-1-61782-949-9  
ISSN: 0151-1637**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2011) by the International Institute of Refrigeration  
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the International Institute of Refrigeration  
at the address below.

International Institute of Refrigeration  
177 Boulevard Malesherbes  
F 75017 Paris France

Phone: 33 1 422 73 235  
Fax: 33 1 422 31 798

[iifiir@iifiir.org](mailto:iifiir@iifiir.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

<b>The Formation Of Non-Condensable Gases In Ammonia/Water Absorption Heat Pumps Made Of Stainless Steel - Literature Review And Experimental Investigation.....</b>	1
<i>H. Moser, G. Zotter, O. Kotenko, R. Rieberer</i>	
<b>A Conceptual Study Of An Inverse NH<sub>3</sub> To CO<sub>2</sub> Cascade For Simultaneous Cooling And Heating .....</b>	9
<i>K. Visser</i>	
<b>The Climate Imperative Of Basing Policies On The 20 Year GWP Of HFC Refrigerants .....</b>	17
<i>J. Mate, D. Kanter</i>	
<b>Two-Phase Flow And Boiling Of Ammonia In Horizontal Smooth Tubes .....</b>	23
<i>J. Thome, R. Lima</i>	
<b>Experimental Investigation Of A New Resorption Cycle Using Ammonia As Refrigerant.....</b>	37
<i>K. Helle, M. Morschel, S. Peil, T. Weimer, S. Haep</i>	
<b>Air-Cooled Condensers In NH<sub>3</sub> Refrigerating Plants As An Alternative To Evaporative Condensers.....</b>	47
<i>I. Josef Riha, H. Jackmann</i>	
<b>Thermodynamic Properties Of Ammonia By Molecular Simulation.....</b>	55
<i>J. Vrabec, G. Guevara-Carrion, C. Engin, T. Merker, B. Eckl, H. Hasse</i>	
<b>Utilization Of Industrial Low-Grade Waste Heat By Means Of New Emerging High-Temperature Heat Pumps .....</b>	63
<i>P. Brondum, M. Markussen, L. Reinholdt</i>	
<b>Elimination Of Wet Return Lines In Ammonia Systems: High-Efficiency Systems For Energy Reduction In Industrial Refrigeration Plants With Ammonia .....</b>	71
<i>A. Monsted, C. Madsen, L. Reinholdt, P. Schneider</i>	
<b>Industrial Ammonia Heat Pumps And Their Challenges.....</b>	79
<i>A. Pachai</i>	
<b>Thermal Conductivity Of Ammonia-Water .....</b>	86
<i>Y. Cuenca, A. Vernet, M. Valles</i>	
<b>A New Ammonia/Lithium Nitrate Absorption Chiller For Solar Cooling Applications.....</b>	94
<i>M. Zamora, M. Bourouis, M. Valles, A. Coronas</i>	
<b>Energy Saving Technologies In Ammonia Refrigeration Applications Using Well Designed Pump Circulation Systems.....</b>	102
<i>R. Paranjipey</i>	
<b>Low Charge Ammonia Air-Cooled Chillers With Microchannel Condenser .....</b>	112
<i>F. Aloisio, G. Gobbo</i>	
<b>Dry &amp; Spray Technology: High Efficient Heat Exchanger For Liquid Cooler, CO<sub>2</sub> Gas Cooler, NH<sub>3</sub> Condenser.....</b>	118
<i>S. Filippini</i>	
<b>Ammonia Heat Pump Package Using Waste Heat As Source.....</b>	125
<i>S. Fukano, T. Kudo, N. Arata</i>	
<b>Two-Phase Flow Heat Transfer During NH<sub>3</sub> Vaporization In Horizontal Smooth Minichannels .....</b>	133
<i>K. Choi, M. Rifaldi, J. Oh, K. Saito, J. Jeong</i>	
<b>The Use Of The GWP Indicator In Refrigerant Selection .....</b>	143
<i>L. Kuipers</i>	
<b>Energy And CO<sub>2</sub>-Emission Reduction In Industrial Ammonia Refrigeration: An End-User Perspective.....</b>	155
<i>R. Gerven</i>	
<b>Safe Use Of Ammonia As A Refrigerant In Urban Areas .....</b>	163
<i>H. Haukas</i>	
<b>Economic Optimisation Of Refrigeration Systems At The Design Phase .....</b>	172
<i>J. Pietrzak</i>	
<b>Using Ammonia-Water Absorption Cooling Subsystem In BCCHP .....</b>	180
<i>V. Popa, C. Popa, A. Serban</i>	
<b>A Thermodynamic Approach of Mechanical Vapor Compression Refrigeration COP Increase. Part I: Methods and Ideal Limits .....</b>	186
<i>M. Staicovici</i>	
<b>A Thermodynamic Approach of Mechanical Vapor Compression Refrigeration COP Increase. Part II: Thermal to Work Recovery Method Applications .....</b>	194
<i>M. Staicovici</i>	

<b>Romania – Ammonia Traditional User - Barriers &amp; Opportunities Eu Refrigeration And Air Conditioning Legislation Implementation .....</b>	201
<i>G. Tarlea</i>	
<b>Design And Test Of A Domestic Heat Pump With Ammonia As Refrigerant.....</b>	207
<i>B. Monfared, B. Palm</i>	
<b>Compact, Energy Efficient, Low Charge Ammonia Evaporator With Separator Vessel.....</b>	215
<i>R. Christensen, B. Sollie</i>	
<b>Opportunities For Combined Heating And Cooling.....</b>	223
<i>A. Pearson</i>	
<b>Low Charged Hermetic Ammonia Chillers Are Excellent Opportunity For Air Conditioning And Indirect Refrigeration .....</b>	230
<i>P. Hrnjak</i>	
<b>Designing Ammonia Systems For Maintenance And Safety .....</b>	240
<i>G. Webster</i>	
<b>Recent Developments in Plate Exchangers – Ammonia/Carbon Dioxide Cascade Condensers.....</b>	251
<i>Z. Ayub, M. Khan, A. Jokar, T. Khan, N. Hayes</i>	
<b>Author Index</b>	