

Preface

Originally, humankind used wood as their fuel source and later discovered fossil fuels, bringing about the industrial revolution as a starting point of technology developments. Since then, humankind has striven for greater prosperity and better wealth.

Energy-hungry devices, ranging from airplanes to mobile phones, are introduced to the consumers at a brisk rate to meet their perceived need for better lifestyle. The extensive use of fossil fuels has been influential in changing the weather patterns and climatic cycles, due to the enormously increasing CO₂ emissions, resulting in harsher summers and winters around the globe. The earth's average temperature has constantly been increasing at a constant rate over the past few decades due to the extensive use of fossil fuels. The use of air-conditioning systems for the provision of heating and cooling has also increased due to the harsher climates with the drawback of a dependency on the energy-hungry technology. This increase has resulted in a sudden surge in peak electricity demand and government and private sector alike are unable to meet this demand. Extensive fossil fuel usage and environmental problems have drawn researcher focus to new refrigeration technology that can offset the use of fossil fuels and provide heating and cooling in a comparatively environmentally friendly manner.

The current book presents an overview of all the alternative refrigeration technologies that are either available on the market or are in the research phase, with a focus on an absorption refrigeration systems. An absorption refrigeration system is an attractive alternative to the conventional air-conditioning system, as it is mainly waste heat or low-grade heat dependent. However, as with all other technologies, absorption refrigeration systems also have some drawbacks that cannot be ignored.

The present book consists of eight chapters. Absorption refrigeration system background, components, operating principles, usage, and fundamentals are presented in Chap. 1. Also, the comparison of absorption refrigeration systems with other innovative refrigeration systems is presented in this chapter. Chapter 2 aims at helping the reader understand how to perform an in-depth energy, exergy, exergoeconomic, exergoenvironmental, and optimization analyses of a basic absorption

refrigeration system. Detailed system description, energy, exergy, exergoeconomic, exergoenvironmental, and optimization studies of the single effect absorption refrigeration system with numerical values are presented in Chap. 3. Chapter 4 offers comprehensive system description alongside numerical energy, exergy, exergoeconomic, exergoenvironmental, and optimization analyses of the double effect absorption refrigeration system. A thorough system description of more advanced triple effect absorption refrigeration system with numerical energy, exergy, exergoeconomic, exergoenvironmental, and optimization analyses is presented in Chap. 5. The system description with numerical energy, exergy, exergoeconomic, exergoenvironmental, and optimization studies of the most advanced and novel quadruple effect absorption refrigeration system is provided in Chap. 6. Chapter 7 presents different case studies related to the integrated absorption refrigeration system. This chapter also presents analysis and results of the multi-generation systems shedding light on the usage of absorption refrigeration systems in different walks of life. Chapter 8 highlights recent developments in an area of absorption refrigeration systems. Also presented in this chapter are different energy sources based absorption refrigeration systems, novel designs, advanced numerical and optimization models, and unique working mixtures of the absorption refrigeration systems.

Detailed references are provided to direct the readers that require more information in the correct direction. We sincerely hope that this book provides an in-depth knowledge in the area of absorption refrigeration systems so that the world can move towards more environmentally friendly, cost-efficient, and sustainable heating and cooling technologies in near future. The book is written in a way that it can be helpful to undergraduate students, postgraduate students, as well as people requiring advanced knowledge, governmental organizations, and industries alike.

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