

Preface

Methane clathrate ($\text{CH}_4 \cdot 5.75\text{H}_2\text{O}$) or ($4\text{CH}_4 \cdot 23\text{H}_2\text{O}$), also called methane hydrate, hydromethane, methane ice, fire ice, natural gas hydrate, or gas hydrate, is a solid clathrate compound (more specifically, a clathrate hydrate) in which a large amount of methane is trapped within a crystal structure of water, forming a solid similar to ice.[1][2][3][4][5][6] Originally thought to occur only in the outer regions of the Solar System, where temperatures are low and water ice is common, significant deposits of methane clathrate have been found under sediments on the ocean floors of the Earth (around 1100 m below the sea level).[7] Methane hydrate is formed when hydrogen-bonded water and methane gas come into contact at high pressures and low temperatures in oceans.

Methane clathrates are common constituents of the shallow marine geosphere and they occur in deep sedimentary structures and form outcrops on the ocean floor. Methane hydrates are believed to form by the precipitation or crystallisation of methane migrating from deep along geological faults. Precipitation occurs when the methane comes in contact with water within the sea bed subject to temperature and pressure. In 2008, research on Antarctic Vostok Station and EPICA Dome C ice cores revealed that methane clathrates were also present in deep Antarctic ice cores and record a history of atmospheric methane concentrations, dating to 800,000 years ago.[8] The ice-core methane clathrate record is a primary source of data for global warming research, along with oxygen and carbon dioxide.¹

In the present book, twelve typical literatures about Methane clathrates published on international authoritative journals were selected to introduce the worldwide newest progress, which contains reviews or original researches on Methane clathrates. We hope this book can demonstrate advances in Methane clathrates as well as give references to the researchers, students and other related people.

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¹ https://en.wikipedia.org/wiki/Methane_clathrate