

Preface

Concrete is the most widely used construction material because of its versatility, economy, availability of raw materials, strength, and durability. Concrete can be designed to withstand the harshest environmental conditions while taking on the most inspirational and imaginable shapes and forms. Scientist/Engineers and academicians are continuously working for better concrete from strength and durability standpoint with the help of innovative chemical admixtures and supplementary cementing materials (SCMs). In addition, the use of SCMs conserves energy and has environmental benefits because of reduction in carbon dioxide emission as a result of reduction in manufacture of Portland cement. Strict air-pollution controls and regulations have produced an abundance of industrial byproducts that can be used as supplementary cementitious materials. Typical examples are fly ash, silica fume, ground granulated blastfurnace slag, metakaolin, rice husk ash and natural pozzolans which can be used incorporated in concrete addition or as partial cement replacement.

Supplementary cementing materials are often used in concrete mixes to reduce cement contents, improve workability, increase strength and enhance durability through hydraulic or pozzolanic activity. Utilization of these byproducts in cement/concrete not only prevents them from being land-filled but also enhances the properties of concrete in the fresh and hardened states.

This book is an attempt to consolidate the published research related to the use of SCMs in cement and concrete. This book is intended to cater to the needs of graduate students, researchers, concrete technologists and practicing engineers.

The book comprises of five chapters. Each chapter is devoted to a particular supplementing cementing material. It is based on the literature/research findings published in journals/conference proceeding, etc. Topics covered in the book are; coal fly ash, silica fume (SF), granulated blast furnace slag (GGBS), metakaolin (MK), and rice husk ash (RHA). Each chapter contains introduction, properties of the waste material/by-product, its potential usage, and its effect on the properties of fresh and hardened concrete and other cement based materials.

We would like to place on record our immense sense of gratitude to academicians, scientists, concrete technologists, and our colleagues and friends globally

who have contributed significantly in the broader area of concrete technology, and our sincere appreciation and acknowledgement to the published work of the researchers on the subject, which has been referred in this book.

We are also extremely grateful to Springer for publishing the book in an excellent form in the shortest possible time.

We owe our sincere thanks and irrepayable gratitude to our families and friends whose consistent encouragement and love have been a tremendous impetus for the completion of this book.

Dr. Rafat Siddique
Dr. Mohammad Iqbal Khan

Supplementary Cementing Materials

Siddique, R.; Khan, M.I.

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