APPLIED COAL PETROLOGY: THE ROLE OF COAL PETROLOGY IN COAL UTILIZATION. Isabel Suárez-Ruiz and John C. Crelling (Eds.), Elsevier, Academic Press (2008), 388+xviii pages, Price: GBP 100, USD195.00, EUR 143.00

The timely publication of this reference book is to provide extensive, compiled information on the application of coal petrology and the significance of coal characteri-zation for assessment of coal quality for prediction of coal behaviour during utilization. It has made available background information with an integrated approach on coal characteristics and properties determining technological behaviour. The book is divided into 11 chapters followed by bibliography and index. The first chapter starts with an introduction to coal petrology outlining the fundamental concepts imparting acquaintance of general subject aspects to a simple reader. The authors have presented a synthesis of the geographical distribution of coal resources and reserves. Recent estimates for world coal mining, coal production, consumption and future trends with some environmental issues are sketched out. The second chapter deals with description of the basic factors related to coal composition and rank which affect coal properties, coal quality and technological behaviour in different processes. This chapter emphasizes on coal composition in view of organic / inorganic constituents including trace elements, shaping of coal quality during coalification. The significance of blending coals to obtain the required quality using coal petrography is stressed. The third chapter discusses coal mining issues and coal beneficiation processes for coal utilization. The authors have described the controls of coal composition during mining and beneficiation in detail and they have also furnished effect of these processes on coal products. The fourth to seventh chapters share out major technological processes viz. combustion, gasification, liquefaction and carbonization. The fourth chapter deals in coal combustion highlighting combustion processes and technology, coal behaviour in pulverization and combustion properties of coal (coal characteristics: basic combustion / maceral relationships, mineral matter and trace elements behaviour, ash formation, emissions of particulates < 10 mm, fly ash, dioxins, NO_x, CO_2, SO_2). Here, authors have also stressed on importance of fly ash characteristics mainly on manifestation of carbon, glass and minerals in fly ash. The fifth chapter is dedicated to coal gasification laying emphasis on processes and methods, characteristics and properties of coals, gasification residues and advanced gasification (integrated gasification combined cycle (IGCC); hydrogen production via cogasification; air blown gasification cycle (ABGC); underground coal gasification (UCG); biomass gasification and plasma gasification). The sixth chapter accentuates direct coal liquefaction playing up process and methods, coal characteristics, liquefaction residues and role of vitrinite, liptinite, inertinite macerals, mineral matter, reactor solids and applied petrology. The seventh chapter devoted to coal carbonization stressing coal to coke transformation, coke petrology classification, coke strength prediction, quinoline insolubles, petroleum coke and weathering. Coals are precursors of carbon materials. Recently coal petrography have been applied to the characterization of synthetic carbon products. These facets are dealt in eighth chapter giving importance to raw materials and precursors of carbon materials, optical microscopy of coal derived carbon materials, carbon based materials from coal (carbon fibers and carbon-carbon composites, graphites, activated carbons, carbon foams, carbon blacks, synthetic diamond, glassy carbon, carbon nanotubes, carbon gels, carbon nanofoam, carbines and fullerenes) and others not originated from coal. But the authors have allocated one brief paragraph to very important carbon nanotubes which appear to be unjustified. It is hoped this point will be taken up in subsequent editions. Two vital aspects of coal viz. its significance as a petroleum source rock and its role as a reservoir rock are allocated in ninth chapter. Here, authors have discussed mainly kerogen and macerals, hydrocarbon generation, coal bearing petroleum systems, adsorption and gas capacity, gas content, porosity and permeability, reservoir pressure, reservoir temperature and gas–phase relationships and formation water chemistry and basin hydrology. Chapter ten covers environmental and health impacts with coal as a material resource and coal utilization. This chapter has provided some good examples of the influence of coal on health and the environment in relation to coal mining and coal utilization in different parts of the world. Authors have discussed in-ground coal environmental and health issues, coal processing and mining, miner's health, water quality: acid drainage, mine fires and emissions like SOx, NO_x, particulate matter, trace element, carbon dioxide, coal combustion by products, radionuclides and radioactivity. Chapter eleven has taken up other applications like archaeology, environmental recovery studies, spontaneous combustion, forensic geology and automobile brakes. The missing topics not dealt in this book are: shale gas,

fuel cell, magneto hydrodynamics (MHD), coal for fertilizer and coal for chemicals besides methods and procedures of organic petrology for applications in coal utilization.

The book is very rich in bibliography containing 1253 references. The large number of illustrations and tables add to its value. Typographical mistakes are negligible. The print quality of the book is of high standard. The figures and photographs are of good standard. Colour plates of coal, lignite, oil shales and other organo-petrographic constituents are required but which might have increased the price of the book. The book will be a reference and source book to geologists, technologists, fuel scientists, explorationists' engaged in applied aspects of coal and other conventional hydrocarbon resources besides teachers and students. The price of the book is beyond the capacity of individuals but must find its place as a significant reference book in geological, fuel science and technology libraries. Publisher and Editors have done a commendable job in editing the book in present form focussing the applications of coal (organic) petrology to our modern society deserves our congratulations.

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