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boiler basics an overview of boiler water troubles and treatment programs ===== part i boiler basics chapter 1 boiler an introduction chapter 2 classification of boilers chapter 3 common terms and explanation part ii boiler water troubles chapter 4 impurities in water and their effects chapter 5 boiler water troubles a prelude chapter 6 scale formation chapter 7 silica carryover chapter 8 scale formation in economizers chapter 9 super heater and turbine deposits chapter 10 corrosion basic information chapter 11 general corrosion overall corrosion acidic corrosion chapter 12 dissolved oxygen corrosion pitting corrosion chapter 13 carbon dioxide corrosion chapter 14 corrosion caused by unstable salts chapter 15 corrosion caused by other substances chapter 16 corrosion caused by chelants chelant corrosion chapter 17 caustic embrittlement and caustic gouging chapter 18 hydrogen embrittlement chapter 19 condensate corrosion chapter 20 preboiler corrosion chapter 21 economizer corrosion chapter 22 super heater and turbine corrosion chapter 23 foaming priming carryover part iii water quality requirements and treatment programs chapter 24 quality requirements for feed water and boiler water chapter 25 objectives of boiler water treatment chapter 26 external treatment and internal treatment chapter 27 water treatment programs guidelines part iv external treatment chapter 28 external treatment a prelude chapter 29 coagulation removal of color turbidity and suspended matter chapter 30 filtration chapter 31 softening by chemical method lime soda softening chapter 32 ion exchange resins and treatment methods chapter 33 softening by ion exchange method chapter 34 dealkalization chapter 35 demineralization deionization chapter 36 mixed bed deionization chapter 37 reverse osmosis chapter 38 evaporation chapter 39 silica removal chapter 40 oil removal chapter 41 condensate treatment condensate polishing chapter 42 deaeration mechanical removal of oxygen part v internal treatment chapter 43 internal boiler water treatment a prelude chapter 44 organic polymers and their role as scale inhibitors dispersants and sludge conditioners in boiler water treatment chapter 45 internal treatment chemical feeding chapter 46 prevention of scale formation chapter 47 sludge conditioning chapter 48 prevention of corrosion introduction chapter 49 prevention of corrosion due low ph chapter 50 prevention of pitting corrosion using oxygen scavengers chemical removal of oxygen chapter 51 prevention of caustic embrittlement and caustic gouging chapter 52 prevention of chelant corrosion chapter 53 prevention of condensate corrosion chapter 54 prevention of preboiler corrosion chapter 55 prevention of economizer corrosion chapter 56 prevention of foaming priming carryover chapter 57 prevention of silica carryover chapter 58 boiler blow down part vi boiler water treatment important calculations chapter 59 basic conversion factors chapter 60 water softening calculations chapter 61 cycles concentration blowdown feed water and makeup water calculations chapter 62 determination dosage chemicals part vii boiler startup cleaning lay up and maintenance chapter 63 boiler startup pre operational cleaning chapter 64 descaling boiler cleaning chapter 65 boiler layup chapter 66 boiler maintenance part viii chemicals handling solution preparation and feeders chapter 67 chemicals handling storage chapter 68 preparation solutions suspensions chapter 69 chemical feeders part ix analysis of water and steam chapter 70 control parameters testing schedule chapter 71 collection samples chapter 72 sampling boiler water chapter 73 expression results chapter 74 electrical conductivity chapter 75 dissolved solids chapter 76 ph value chapter 77 acidity chapter 78 free carbon dioxide chapter 79 equivalent mineral acidity chapter 80 alkalinity chapter 81 hardness total chapter 82 calcium chapter 83 magnesium chapter 84 sodium chapter 85 iron total chapter 86 copper chapter 87 sulfate chapter 88 chloride chapter 89 silica chapter 90 dissolved oxygen chapter 91 oxygenThe world of boiler water treatment is a complex one, comprising multiple chapters that delve into the intricacies of scaling, corrosion, and water quality requirements. ===== This extensive guide covers various aspects of boiler operation, including boiler basics, external treatment methods, internal treatment techniques, and important calculations. It also provides an overview of chemicals handling, solution preparation, and feeders, as well as analysis of water and steam. The book is divided into eight parts, each addressing a specific aspect of boiler water treatment. Part I covers boiler basics, including an introduction to boilers, classification, common terms, and explanations. Part II focuses on boiler water troubles, such as impurities, scale formation, and corrosion. Part III explores water quality requirements and treatment programs, including feed water and boiler water standards. Part IV delves into external treatment methods, including coagulation, filtration, softening, ion exchange, and dealkalization. Part V focuses on internal treatment techniques, including chemical feeding, prevention of scale formation, sludge conditioning, and corrosion control. Part VI discusses important calculations, such as conversion factors, water softening, and dosage calculations. The final parts cover boiler startup, cleaning, layup, and maintenance, as well as chemicals handling, solution preparation, and analysis of water and steam. Throughout the guide, various chapters provide in-depth information on specific topics, including permanganate value, oils and grease, phosphate, sulfite, hydrazine, residual chelant (EDTA), Langelier saturation index, Ryznar stability index, and Puckorius scaling index. The comprehensive nature of this guide makes it an invaluable resource for professionals in the field of boiler water treatment.