Modeling of Industrial Hemidihydrate Phosphoric Acid Plant with Diagnostic Rule-Base System

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A steady-state model for the industrial hemidihydrate phosphoric acid plant was developed as well as the diagnostic rule-base which has a simple hierarchical diagnostic structure. The plant model consists of grinding unit, digestion section, filtration section and hydration unit. The model computes values of key variables from which possible causes or symptoms of faults can be deduced by the diagnostic rule-base. It was found that temperatures at the digestion section and hydration unit could be regulated by slurry recycle ratio. Also we could see that the specific breakage rate should be maintained at its maximum value for optimal operation and that the phosphoric acid with high P_2O_5 concentration could be produced without being affected significantly by the recycle ratios. Because most of key variables cannot be measured and checked during operation, the present plant model can be effectively used to achieve safe operation of the plant.