

ENHANCING CONCEPTUAL UNDERSTANDING OF THERMAL PARTICLE DYNAMICS AND PHASE TRANSITIONS THROUGH SIMULATION-BASED LEARNING

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ABSTRACT

This article examines the efficiency of the simulation model “Modello particellare” in the teaching of basic concepts related to the dynamics of matter and thermal particles using oxygen as a representative example. The simulation provides an interactive platform that allows students to visually and dynamically observe molecular behavior at the submicroscopic level. Illustration of phase transitions - for example, liquid and gas liquid - simulation allows students to concept of particle interactions, thermal dynamics and related phenomena more intuitively. The remarkable function includes an interactive phase diagram equipped with a dynamic brand that provides real - time feedback on temperature changes and physical condition. In addition, the simulation effectively demonstrates the irregular movement of particles caused by frequent molecular collisions, which illustrates the affordable concepts of complex concepts such as Brownian’s motion.

Keywords: Dynamics of thermal particles, phase transitions, interactive simulation, Brownian motion, submicroscopic visualization, simulation-based learning.