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Influence of H2O on SF6 Discharge and Decomposition Characteristics Under Low Moisture Conditions

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The detection of gas decomposition products is an effective method to diagnose the partial discharge in SF6 insulated electric power equipment for its anti-interference ability and high sensitivity. However, there inevitably exists trace level of water in the SF6 insulated equipment. In order to study the influence of moisture under low volume fraction (<1350×10-6) on discharge and decomposition characteristics of SF6. An experimental and testing platform for SF6 gas-insulated electrical equipment was designed in this paper under different moisture contents (147μL/L, 347μL/L, 681μL/L, 909μL/L, and 1340μL/L). The influence of moisture on the magnitude of partial discharge caused by metal protrusions defects and content variation of SOF2、SO2F2、SO2、CO2 was observed in detail. The results indicate that average discharge amount and overall magnitude of charge decrease first and then increase with increasing volume fraction of moisture. H2O will promote the formation of all the four products, with a stronger influence on the sulfur-containing products than CO2. Besides, the value of φ(SOF2+SO2)/φ(SO2F2) maintains stable with the variation of moisture. It is about 3-4 after 9h. The value of φ(SOF2+SO2+SO2F2)/φ(CO2) presents overall increasing trend with moisture content. It ultimately increases to a stable value about 2.5-3 under low moisture condition (<681 μL/L). Thus, the detection method of SF6 decomposition products should be utilized with the consideration of moisture content.

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