

# Abstract

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## **Power Transformer Fault Diagnosis using Fuzzy Logic Technique Based on Dissolved Gas Analysis**

Abstract— the most common fault diagnosis method of power transformer is based on the Dissolved Gas-in-oil Analysis (DGA) of transformer oil. It is a sensitive and reliable technique for the detection of incipient fault condition within oil-immersed transformers. There are a number of methods developed for analyzing these gases and interpreting their significance such as Key Gas, Roger gas ratio, Doernenburg, IEC gas ratio and Duval Triangle. Although DGA has widely been used in the industry, this conventional method fails to diagnosis in some cases. This normally happens for those transformers which have more than one type of fault at the same time [6, 7]. To overcome this limitation, an expert system based on DGA for diagnosis of power transformer condition is proposed in this paper. The proposed technique combines three different DGA methods in one diagnosis scheme in order to overcome the limitation of each method stand alone. The three Selected methods are Rogers, IEC and Duval. Moreover, this paper investigates the accuracy and consistency of three methods in interpreting the transformer condition by applying fuzzy logic technique in addition to a new final combined fuzzy system. The evaluation is carried out on DGA test data obtained from different literatures as a test data with size 100 cases. Finally, test was applied on DGA data of utility power transformers of MIDOR Refinery Company located in Alexandria, Egypt.