

Sudan University of Science and Technology
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Dissolved Gas Analysis for Transformer Oil

تحليل الغازات الذائبة في زيت المحول

**A Project Submitted In Partial Fulfillment for the Requirements of
the Degree of B.Sc. (Honor) In Electrical Engineering**

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الآية:

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (1) خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ (2) اقْرَأْ وَرَبُّكَ الْأَكْرَمُ (3) الَّذِي عَلَّمَ بِالْقَلَمِ (4) عَلَّمَ
الْإِنْسَانَ مَا لَمْ يَعْلَمْ (5) كَلَّا إِنَّ الْإِنْسَانَ لِرَبِّهِ لَكَن لِيْقَى (6) أَنْ رَأَاهُ اسْتَعْنَى (7) إِنَّ إِلَى رَبِّكَ الرُّجْعَى (8) أَرَأَيْتَ
الَّذِي يُنْهَى (9) عَبْدًا إِذَا صَلَّى (10) أَرَأَيْتَ إِنْ كَانَ عَلَى الْهُدَى (11) أَوْ أَمَرَ بِالْتَّقْوَى (12) أَرَأَيْتَ إِنْ
كَذَّبَ وَتَوَلَّى (13) أَلَمْ يَعْلَمْ بِأَنَّ اللَّهَ يَرَى (14) كَلَّا لَئِنْ لَمْ يَنْتَهِ لَنَسْفَعُنَّ بِالْأَنفِيسِ (15) نَاصِيَةً كَاطِبَةً
خَاطِبَةً (16) فَلْيَدْعُ نَادِيَهُ (17) سَنَدْعُ الزَّبَانِيَةَ (18) كَلَّا لَا تَطْعُهُ وَاسْجُدْ وَاقْتَرِبْ (19) صدق الله العظيم

سورة العلق.

Dedication:

To

Endless love

Our mothers

To

Man who teach me to be man

Our fathers

To

Our teacher & our colleagues.

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We thank very much Ust. Maha Othman, a professor who oversaw the end of this research, which we did not disturb the awareness was heavy but not her time until he became this research to It's shape humble.

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Abstract

Transformer oil is one of the most common materials used for transformers. The oil has two important functions. The oil need to provide cooling and electrical insulation for the transformer. Any deterioration in the oil can lead to the premature failure of the transformer. When the mineral oil is subjected to high thermal and electrical stress, gases are generated from the decomposition of the mineral oil.

Different type of faults will generate different gases, and the analysis of these gases will provide useful information about the condition of the oil and the identification of the type of fault in the transformer. The chemical analysis of these gases is called dissolved gas analysis or DGA. The DGA will require the removal of an oil sample from the transformer and this can be done without de-energized of the transformer. The oil sample is analyzed in the laboratory using gas chromatography technique.

Many standards were established for assessing conditions of mineral oil filled transformers, such as IEC 60599 and IEEE C57.104 Among all kinds of, Dissolved Gas Analysis (DGA) interpretation methods listed in the above guide, the most comprehensive one is Duval triangle which was established by Michal Duval offering graphical interpretation.

المُستخلص:

زيوت المحولات هي واحدة من أكثر المواد استخداما في المحولات، وهذا الزيت لديه وظيفتين مهمتين تتمثل في: العزل الكهربائي والتبريد ، وعندما تتعرض الزيوت المعدنية للإجهاد الحراري والكهربائي العالي تتبعث غازات ناتجة عن تحلل الزيت، و تحليل هذه الغازات يوفر معلومات مفيدة عن حالة الزيت وتحديد نوع العطل في المحول، ويُسمى التحليل الكيميائي لهذه الغازات بتحليل الغازات المُذابه أو DGA. ويتطلب تحليل الغازات الذائبة (DGA) أخذ عينة من زيت المحول وتتم هذه العملية والمحول قيد الخدمة، وتحليل العينة المأخوذة من زيت المحول في المختبر يتم باستخدام تقنية كروماتوغرافيا الغاز.

هنالك عدة معايير وضعت لمعايرة الغازات الذائبة في زيت المحول، مثل IEC 60599 و IEEE

. C57.104

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