

CHAPTER (5)

CONCLUSIONS

The conclusions of the present study can be summarized in the following:

- The used transformer oil produced from Quaha electrical station is more deteriorated than oil produced from Egyptian petroleum research institute station.
- The acid/by-pass kiln dust technique is efficient treatment for recycling the used transformer oils under investigation.
- HPLC precise and efficient method to measure the levels of PAHs is of necessity both for the regulatory control of disposal of used oils.
- Infrared spectroscopy provides important information concerning the function groups and their structural features in the studied samples
- Gas chromatography (GC) plays an important role in the analysis of the used transformer oils components especially paraffinic hydrocarbons.
- The breakdown voltage was found to increase as the weight percentage of sulphuric acid increases up to 5wt%, then there is reverses in trend above this value.
- The optimum treated conditions were achieved by using sulphuric acid 5 wt%. Mixing Time 90 minute, by-pass kiln dust 7 wt%, and temperature 40°C.
- The treatment of acid sludge with different salt formulation provides a advantage for this method and also helps to reduce an environmental problem.
- Both sodium chloride and sodium silicate concentrations play important roles in the efficiency of the formulation in removing sulphuric acid and water.
- The acid/by-pass kiln dust technique is reduced environmental pollution and relieves some pressure on our petroleum shortage and attendant energy crisis.
- This technique is an economic process for treatment of both used transformer oils and its sludge.

REFERENCES

- [1] Mohamed A.A.Wahab., M.M.Hamada., A.G.Zeitoun and G. Ismail, conference of High voltage engineering symposium, Cairo,Egypt, IEEE, No. 467, August (1999).
- [2] Kanno M.Oota.,N.Suzuki and T.Ishii, Dielectrics and electrical insulation, IEEE Transactions, Tokyo, Japan, Dec. (2001).
- [3] Chon Y.K., Sun J.H., Izumi K. Takabashi., Chang S.J. and Yoom J.Y. Kweon, Conference of Electrical Insulation, Montreal ,Quebec, Canada, June 16-19, (1996).
- [4] Salah I. Al-Mously, and Ahmed Y. Ahmed Nasser University, Faculty of Electronics Engineering. Beni-Walid, Libya, IEEE, Oct. (1999).
- [5] Sabau J., Proceedings of Electrical Insulation Conference and Electrical Manufacturing & Coil Winding Conference, Canada, Oct. (2001).
- [6] Sjtahashi Y. Hayashi Umezu Takas-cho, M. Sone And Taamazutsumi Setagaya, 13th international conference on Dielectric liquids, Nara, Japan, July 20-25 (1999).
- [7] Fodor G.and Baur M., proceeding of 14th International conference on Dielectric liquids, Sulz, Austria, July (2002).
- [8] Frayssines P.E., Devaux F., Denat.A., Bonifaci N and Lesaint O., Dielectrics and Electrical Insulation, IEEE Transactions ,Grenoble-France, Dec. (2003).
- [9] Waldron W.,Greenway, W. Eylon., S. Henestroza, E. and Yu, S. Conference of Particle Accelerator, U.S.A, May12-16 (2003).
- [10] Lorthonglam C., Masarat K and Petcharakiz K. Conference on Electrical Insulation and Dielectric Phenomena, Mahanakorn University of Technology, Bangkok, Thailand 15-18 Nov. (1999).
- [11] Pompili, M. and Mazzetti C. Conference of Electrical Insulation, Rome-Italy, July 11-14. (2002).
- [12] Sayed A.Ward. Annual Report Conference on Electrical Insulation and Dielectric Phenomena. Egypt, (2003).

- [13] Sabau, J. and Stokhuyzen, R., Conference of Electrical Insulation and Dielectric Phenomena, Canada, 15-18 Oct. (2000).
- [14] da Silva, I.N. Imamura, M.M. and de Souza, A.N. Conference of Systems, Man, and Cybernetics, Brazil, 15-18 Oct. (2000).
- [15] Hanaoka, R. Murakumo, M. Anzai, H. and Sakurai, K. Electrical Insulation, IEEE Transactions, Ishikawa-Japan, Feb. (2002).
- [16] Lick, W. and Muhr, M., 14th International Conference of Dielectric Liquids, Graz-Austria, July 13-16, (2002).
- [17] Oinxue Yu, Hengkun Xie and Ningjuan Hao. 13th symposium on electrical insulating materials, Touhashi, Japan, 27-30 Sept., (1998).
- [18] Mohamed A.A. Wahab., Hamada M.M., Zeitoun A.G and Ismail G., Cairo-Egypt, IEEE Transaction on power delivery, 18(3), July 2003.
- [19] Ommen T. V and Grune G., Proceeding of the Electrical Electronics Insulation Conference, IEEE, Piscataway, USA, 107 (1995).
- [20] Ward B. W and Lewis T. J. Appl. Phys., vol. 14, p. 368 (1963).
- [21] Jezl J. L, Stuart A. P, and Ross E. S. AIEE Trans, Power App. Sys-77, 715, Oct (1958).
- [22] Trinh N, G, Olivier R, Vincent C and Regis J. Proc. of the IEEE Int. symp. on elect. Insul., New York, vol. 225, (1980).
- [23] Miners K, IEEE Trans, Power App. and Sys. vol.101, p. 751 (1982).
- [24] Buffam C. J and Brignell J. E, Electrostatics, vol. 7, p. 13 (1979).
- [25] Bland J. P. and Davidson R. L, "Petroleum Processing Handbook", McGraw-Hill, New York (1967).
- [26] Kako Y, Takahashi E, Okubo H, Kishi A. and Okamoto T. CIGRE., 1, p. 3-15, (1986).
- [27] Scatt J. W and Bridge A. G., Advances in Chemistry, Series 103. American Chemical Society, Washington, 113 (1971).
- [28] Sulthanor V. P, Petroleum Processing, Mir Publishing. Moscow, USSR (1982).
- [29] Clarke, S.A. and Reynolds, E.H: Dielectrics, 1, (26), 1963.
- [30] Waddington F. B, and Heighes J. J, Inst. Elec. Eng., 6, 175 (1960):
- [31] Melchiorre J. J and Mills I. W. J, Electrochem. Soc., 112, 390 (1965).

- [32] Frey R. M and Gedemer T. J, IEEE PES Summer Meeting, 75, 434, (1975).
- [33] Ishii T and Ueda M. Conf. Elec. Insul. Diel. Phenom, Nat. Acad. Sci., Washington, 175 (1975).
- [34] Yasuda M, Goto K, Okubo H, Isahii T and Mori E, IEEE PES, 82, (1982).
- [35] Duval M, Giguere Y and Lamarre C. J, Chrom, 284, (1984).
- [36] Lamarre C, Crine J. P and Duval M, IEEE trans. Elec. Insul., EI-22 (1), (1987).
- [37] Jansson L, The 7th International Seminar “New Developments in engine and Industrial Oils, Fuels and Additives”, Cairo, Mar. (1990).
- [38] Yilmaz H and Guler S, IEEE International Conference on Conduction and Breakdown in Dielectric Liquids, ICDL, 354, USA (1996).
- [39] Farooq K, IEEE Int. Symposium on Elect. Ins., New York, vol. 2, p. 728, (1996).
- [40] Golovan G. D, Zhilyaev T. B, Panckenko A. I and Kriven-Kaya V. S, Chemistry and Technology Of Fuels and Oils, vol.20, p.7-8, (1984).
- [41] Parkman N and Tillman J. R, IEE Electrical and Electronic Materials and Devices Series (1980).
- [42] Bondarenko P. N, Electroteknika, vol.1, p. 38, Russ (1973).
- [43] Kok J. A, “Electrical Breakdown of Insulating Liquids”, London Cleaver- Hume Press (1961).
- [44] Mottay J. R and Pisart S. A, The 7th international Seminar “New Developments in Engine and Industrial Oils, Fuels and Additives”, Cairo, Mar (1990).
- [45] Method For Assessing the Oxidation Stability of Insulating Oils, IEC Pub. No. 74 (1963).
- [46] Oxidation Stability of inhibited Mineral Insulating Oil by Rotating Bomb ASTM D - 2112(1976).
- [47] Lamarre C. and Crine J. P, IEEE Trans. Elec. Insul., vol. 20, p. 639 (1985).

- [48] Fournie R, Le Gall Y, Perret J., and Recoupe P, EDF Bull. Dir: Etudes et Recherches, Series B (1), 31 (1979).
- [49] South Australian Waste Management Commission 1985, The Metropolitan Adelaide Solid Waste Management Plan 1985-1994. Adelaide, Government
- [50] Queensland. Bureau of Emergency Services. Chem Unit., A Green Paper on contaminated land legislation. Brisbane, Chem Unit. (1991).
- [51] Institution of Engineers, Australia. Queensland Division. 24 July (1990). Waste Management - Disposal of Wastes: Threats and Opportunities. Brisbane, IEAQ. United States. Environmental Protection Agency. Environmental Stewardship, Washington, EPA, (1991).
- [52] Report on Industry Commission. 'Recycling in Australia'. Vol.1, No. 6, p17, (1991).
- [53] Report on Management and Environment. Vol.1 No.10, p 22 October 1990.
- [54] Abd El Hafez S. M. A study on the collection and recycling of used lubricating oil. M.Sc Thesis, Engineering Department, Institute Of Environmental Studies And Research, Ain Shams University, (1988).
- [55] Collection and Disposal of Used Lubricating Oil, Concawe Report 5, Brussels, (1996).
- [56] C. Kajdas, used oil re-refining., Overview of current technologies used, 3rd European Congress on re-refining, Lyon, (1996).
- [57] D. J. McKeagan, Economics of Re- Refining Used Lubricants. Lubrication Engineering, vol. p 418-423, (1992).
- [58] P. F. V. C. Oosterkamp, KTI Re-Refining Technology, Unido Workshop, Karachi, (1992).
- [59] D. W. Brinkman, Large Grassroots Lube Re-Refinery in Operation. Oils and Gas Journal, p.60-63, (1991).
- [60] D. Peel, Greening of America, World Base Oils '96 Conference, Elgin, (1996).
- [61] C. Schoen, Einrohrreaktorverfahren Zur Aufarbeitung von Altoel and fluessigen, bfallstoffen, Description of the ENTRA Technology ENTRA Ingenieur- und Handels GmbH, Achern, (1996).

- [62] Giovanna F. D., Tromeur P., Cohen C., Successful Re-Refining in Practice, International Used Oil Conference, Orlando, (1998).
- [63] Herchenbach H., Kiln, World cement, p 362-370, Dec. (1983).
- [64] Volkonskii B. V, Makashev S. S. and Shteiert N. P. Technical, Physic mechanical and physicochemical Studies of cement Materials, Russian, Leningrad (1972).
- [65] Daugherty, K.E. and Wist, A. O., Bull. Am. Ceram. Vol. 54, p. 189 (1975).
- [66] Kreh, W. Shenbel B. allr schutte. R. Clinkar quality polser economy and environmental load.Part11, Epenence in actual practice., Zement-Kalk-Gips, No.5, p 243-258, (1987).
- [67] Krevt W. Alkali and sulphur vaporization in cement kilns in the presence of high chlonne intake levels Zement-Kalk-Gips, No.8, p417-422, (1995).
- [68] Ritzmann, H., Cyclic phenomena in rotary kiln system. Zement-Kalk-Cips, No. 8, p 338, (1971).
- [69] Tettmar, B., Gerogory, S and Khor, J. H., Zement-Kallc-Gips, 31 (6), p 278 (1978).
- [70] Sell, N. J. and Fischbach, F. A., Poll. Eng., 11 (7), p. 46 (1979).
- [71] Hatano H., The behavior of sulphur in the suspension preheater kiln system, Zement-Kalk-Gips, No.1, p. 08-18, (1972).
- [72] Farag L.N1 and Kamel H.N., Effect of high intakes of chlorine-sulphur and alkalis on cement kiln operation. Zement-Kalk-Gips, No.10, p. 585-590, (1994).
- [73] Krevt.W.Method for advance calculation of cyclic phenomena in rotary cement kiln. Zement-Kalk-Gips, No.9, p 456-459 (1982).
- [74] Abdel-Fattah, W. I. and El-Didamony, H., Thermochemica Acta, 51, p. 297 (1981).
- [75] Krevt, W. The interruption of metal cycle, taking account of integrated further utilization in cement plant, Zement-Kalk-Gips, No. 9, p. 447-450 (1987).
- [76] Krevt, W., Composition of vanous by-pass system in clinker burning plants, Zement Kalk Gips, No. 1. p. 20-25, (1990).

- [77] Krevt, W. Scheubel, B., and sehutte. R. Clinker quality, portel economy and environmental load, Influencing factors and adaptatiou of the burning process. Part 1, Basic considerations, Zement-Kalk-Gips, No. 3, p127-133, (1987).
- [78] Bade. E. Method of reducing the alkali circulation in cement bumming. Zement-Kalk-Gips. No. 9, p. 403-408, (1962)
- [79] Warshawsky J. and Porter E. S, Reduction of alkali and sulphur content of clinker by-pass in flash calciner system. Zement-Kalk-Gips. No. 6, p 284-287, (1978).
- [80] Davis P. and Zongman P. A. Design and experience with bypasses for chloride, sulphate and alkalis. I.C.S proceeding. p. 25-30, (1983).
- [81] Jones. G. D. and Hansen. E. R. Alkali reduction in a precaleiner kiln. Zement-Kalk-Gips. No. 10. p. 593-594, (1985).
- [82] Gardiek H. O. Optimization of rotary tube kiln in the cement industry with respect to product quality, energy usage and emission of pollution S., Zement-Kalk-Gips. No. 3, p. 105-109, (1991).
- [83] Scheuer A. and Ellerbrock. H. G. Possible ways of saving energy in cement production, Zement-Kalk-Gips. No. 5, p. 222-230, (1992).
- [84] Huchanf H. State of the art and possibilities of the efficient energy utilization in cement clinker burning, Zement-Kalk-Gips. No. 4, p. 153-157, (1998).
- [85] Peng Fei. Thermal analysis of eyelone prcheater system based on a mathematical model, Zement-Kalk-Gips. No. 3, p. 133-153, (1989).
- [86] Ellebrock H. G. Mill temperature and cement properties, Zemnt-Kalk-Gips. No. 1, p. 1-12, (1988).
- [87] Ghazzi A. Investigation on cement dry process with respect to fuel economy and product quality. Thesis submitted for the Ph. D, Chemical Engineering Department, Faculty of Engineering. Cairo. University (1997).
- [88] Davis T. A. and Hooks D. B. Disposal and utilization of waste kiln dust from cement Industry, EPA-670/2-75-043, USA, Cincinnati, Ohio, (1975).
- [89] Sabra B. A., El Didamony H. and Hilal N. H. Interbrick, 2, 1, (1986).
- [90] Elwan M., Abdel Aziz D. and El Didamony H., Silikaty, 43 (3), p. 117, (1999).

- [91] El-Didamony H., Abdel Kader A, Maky A. T. and Tabi M. E., Key Engineering Materials, Vol. 206-213, p.1871-1874, (2002).
- [92] El-Sherbiny S. A., Youssef N. F., Ibrahim O. A. and Abadir M. F., accepted for publication in the Journal of waste management (2002).
- [93] Farag L.M and Abbas M., Practical limits for chlonne cycles in dry process cement plants with precalcining and tertiary air dusting, Zement-Kalk Gips.No.1, p. 22-26, (1990).
- [94] Farag L.M., Thermal evaluation of cement dry process with complete kiln exit gases removal through by-pass., Zement-Kalk Gips.No.1, p. 542-549, (1990).
- [95] Annual Book of ASTM Standards, Petroleum Products and Lubricants vols. 05.01- 05.03, Am. Soc. Test. Mat., Philadelphia (1996).
- [96] IP Standards for Analysis and Testing of Petroleum and Related Products., vols.1- 2, London (1997).
- [97] UOP, Laboratory Test Methods for Petroleum and Its Products, Universal Oil Products Co. Chicago (1985).
- [98] Landais P., Rochdi, A., Largeou, C and Derenne S., Thermo Acta, vol.87, p. 2529-2539 (1993).
- [99] Blanco C.G., Prado, J.G., Diaz C., Energy & Fuels,vol.10, p.77-84 (1996).
- [100] Allgelt K. H. and Gouw T. H., "chromatography in petroleum analysis" Chromatographic Science Sieve 11 (1979).
- [101] Bolehm P. D., Douglas G. S.,Burns W. A.,Mankiewicz P. J., Page D.S. and Bence A. E., Marine Pollution Bulletin, 34, No. 8 p. 599-613 (1997).
- [102] El-Naggar, A. Y., El-Adly, R. A., A Study on the Change in Hydrocarbon Constituents of Some Lubricating Oils During Operation, J. Egypt. Soc. Eng. 4 (2004).
- [103] Kalichevsky V. A. and Peters E. H., The Raw Material, Crude, Petroleum and Natural Gas, Petroleum Products Handbook, ed. Guthrie B., McGraw Hit Book Company, New York, p 1-22 (1990).
- [104] El-Adly R. A. and Sayed, A. Ward., Evaluations of different grades of lube base oils as insulating oil, Egyptian Journal of Petroleum, 13, No.1, (2002).

- [105] Herbert, G., Electrical Insulating Oils, Erdmam editor, ASTM, Philadelphia, USA (1998).
- [106] El-Adly R.A., Moustafa Y.M and Omer A.M., J. Pigment and Resin Technology, V.26 (4) p.221 (1997).
- [107] El-Adly, R.A., Youssef, E. A. M and Abd El-Ghaffar, M. A., 16th Annual Conference "Corrosion Problems in Industry", Hurghada, Egypt, Dec. 9-11, (1997).

تطوير طرق محلية لتدوير وإعادة استخدام زيوت المحولات الكهربائية

رسالة مقرمة من

مهندس / على جمعة على عبد العزيز
بكالوريوس مهندسة القوى الكهربائية
جامعة عين شمس - ١٩٨٠

لاستكمال متطلبات الحصول على درجة الماجستير فى
الهندسة البيئية

قسم الهندسة البيئية
معهد الدراسات والبحوث البيئية
جامعة عين شمس

صفحة الموافقة على الرسالة

تطوير طرق محلية لتدوير وإعادة استخدام زيوت المحولات الكهربائية

رسالة مقرمة من

مهندس / على جمعة على عبد العزيز
بكالوريوس هندسة القوى الكهربائية
جامعة عين شمس - ١٩٨٠

لاستكمال متطلبات الحصول على درجة الماجستير في
الهندسة البيئية - قسم الهندسة البيئية

وقد تمت مناقشة الرسالة والموافقة عليها،
اللجنة:

الأستاذ الدكتور / عبد العزيز مصطفى الفاضلي
أستاذ كيمياء البترول بمعهد بحوث البترول

الأستاذ الدكتور / سالم محمود الخضري
أستاذ مساعد بقسم هندسة القوى الكهربائية - كلية الهندسة - جامعة عين شمس

الأستاذ الدكتور / إبراهيم الدسوقي هلال
أستاذ مساعد بقسم هندسة القوى الكهربائية - كلية الهندسة - جامعة عين شمس

الأستاذ الدكتور / رفعت أحمد العادلي
أستاذ كيمياء البترول - معهد بحوث البترول - وزارة البحث العلمي

تطوير طرق محلية لتدوير وإعادة استخدام زيوت المحولات الكهربائية

رسالة مقرمة من

مهندس / على جمعة على عبد العزيز
بكالوريوس هندسة القوى الكهربائية
جامعة عين شمس - ١٩٨٠

لاستكمال متطلبات الحصول على درجة الماجستير في
الهندسة البيئية - قسم الهندسة البيئية

تحت إشراف

الأستاذ الدكتور / إبراهيم الدسوقي هلال

أستاذ مساعد بقسم هندسة القوى الكهربائية - كلية الهندسة - جامعة عين شمس

الأستاذ الدكتور / رفعت أحد العادلي

أستاذ كيمياء البترول - معهد بحوث البترول - وزارة البحث العلمي

دكتور / نهى سمير دنيا

مدرس بقسم الهندسة البيئية - معهد الدراسات والبحوث البيئية - جامعة عين شمس

ختم الإجازة

أجيزت الرسالة بتاريخ / / ٢٠٠٥

موافقة الجامعة

موافقة مجلس المعهد

/ / ٢٠٠٥

/ / ٢٠٠٥