

References

- Adams, J.H., Borate-A new generation EP gear lubricant, *Lubri. Eng.*, 33, 241-246, 1977.
- Adams, J.H., Conservation potential with borate gear lubricant, *Lubri. Eng.* 34, 2-14, 1978.
- Agrawal, C.V., Verma, V.K., Singh, R., The assessment of dithiocarbamates as extreme pressure lubricant additives, *Wear*, 64, 33-38, 1980.
- Agrawal, C.V., Verma, V.K., Singh, R., Mamman, A., Effect of isodithiobiurets and related compounds as additives in extreme pressure lubrication of steel bearing balls, *Indian J. Chem. Technol.*, 19, 507-510, 1981.
- Ajayi., O.O., Ludema, K.C., Mechanism of transfer film formation during repeat pass sliding of ceramic materials, *Wear*, 140, 191-206, 1990.
- Amontons, G., Memoires de l'Academie Royale A, Chez Gerard Kuyper, Amsterdam, 251-282, 1699.
- Anacona, J.R., Bastardo, E., Camus, J., Manganese (II) and Palladium (II) complexes containing a new macrocyclic Schiff base ligand: Antibacterial properties, *Trans. Met. Chem.*, 24, 478-480, 1999.
- Asan, A., Soylu, S., Kiyak, T., Yıldırım, F., Öztaş, S.G., Ancın, N., Kabasakaloğlu, M., Investigation on some Schiff bases as corrosion inhibitors for mild steel, *Corros. Sci.*, 48, 3933-3944, 2006.
- Astruc, D., Boisselier, E., Ornelas, C., Dendrimers designed for functions: from physical, photophysical, and supramolecular properties to applications in sensing, catalysis, molecular electronics, photonics, and nanomedicine, *Chem. Rev.*, 110, 1857-1959, 2010.
- Atkin, R., Abedin, S.Z.E., Hayes, R., Gasparotto, L.H.S., Borisenko, N., Endres, F., AFM and STM studies on the surface interaction of [BMP]TFSA and [EMIM]TFSA ionic liquids with Au(111), *J. Phys. Chem. C.*, 113, 13266-13272, 2009.
- Babic-Samardija, K., Lupu, C., Hacke Chen, A.-S., Taguchi, T., Aoyama, S., Sugiura, M., Haruna, M., Wang, M-W., Miwa, I., Antioxidant activity of a Schiff base of pyridoxal and aminoguanidine, *Free Radical Bio. Med.*, 35, 1392-1403, 2003.

References

Babic-Samardzijz, K., Lupu, C., Hackerman, N., Barron, A.R., Luttge, A., Inhibitive properties and surface morphology of a group of heterocyclic diazoles as inhibitors for acidic iron corrosion, *Langmuir*, 21, 12187-12196, 2005.

Bai, G., Wang, J., Yang, Z., Wang, H., Wang, Z., Yang, S., Preparation of a highly effective lubricating oil additive-ceria/graphene composite, *RSC Adv.*, 4, 47096-47105, 2014.

Bakumin, V.N., Suslov, A.Y., Kuzmina, Z.M., Parenago, O.P., Recent achievement in the synthesis and application of inorganic nanoparticles as lubricants components, *Lubr. Sci.*, 17, 127-145, 2005.

Baldwin, B.A., Relative antiwear efficiency of boron and sulfur surface species, *Wear*, 45, 345-353, 1977.

Bansal, V., Dohhen, K.C., Sarin, R., Sarpal, A.S., Bhatnagar, A.K., Sulphur-phosphous components in gear oils: Part 1, oxidation stability studies by ^{31}P -NMR spectroscopic techniques, *Tribol. Int.*, 35, 819-828, 2002.

Barcroft, F.T., Bird, R.J., Hutton, J.F., Park, D., The mechanism of action of zinc thiophosphates as extreme pressure agents, *Wear*, 77, 355-384, 1982.

Barnes, A.M., Bartle, K.D., Thibon, V.R.A., A review of zinc dialkyldithiophosphates (ZDDPS): Characterization and role in the lubricating oil, *Tribol. Int.*, 34, 389-395, 2001.

Barros, E.B., Demir, N.S., Filho, A.G.S., Filho, J.M., Jorio, A., Dresselhaus, G., Dresselhaus, M.S., Raman spectroscopy of graphitic foams, *Phys. Rev. B*, 71, 165422-165426, 2005.

Battez, A.H., Gonzalez, R., Viesca, J.L., Fernandez, J.E., Fernandez, J.M.D., Machado, A., Chou, R., Riba, J., CuO, ZrO₂ and ZnO nanoparticles as antiwear additive in oil lubricants, *Wear*, 265, 422-428, 2008.

Battez, A.H., Viesca, J.L., Gonzalez, R., Blanco, D., Asedegbega, E., Osorio, A., Friction reducing properties of CuO nanolubricant used as lubricant, *Wear*, 268, 325-328, 2010.

References

- Beatty, H.A., Organolead compounds as lubricant additives, *Chem. & Industry.*, 8, 733-736, 1968.
- Becke, A.D., Density-functional thermochemistry. III. The role of exact exchange. *J. Chem. Phys.*, 98, 5648-5652, 1993.
- Bhattacharya, A., Singh, T., 1,3,4-Thiadiazoles as potential EP additives-a tribological evaluation using a four-ball test, *Tribol. Int.*, 28, 189-194, 1995.
- Bhushan, B., Principle and applications of tribology, John Wiley & Sons, 1999.
- Bhushan, B., Fundamentals of tribology and bridging the gap between the macro- and micro/nanoscales, Springer, Nano Science Series II:, 10, 2001a.
- Bhushan, B., Modern tribology handbook, CRC Press LLC, Boca Raton, 2001b.
- Bird, R.J., Coy, R.C., Hutton, J.F., The preparation and nature of surface films from zinc dialkyldithiophosphate, *ASLE Trans.*, 23, 121-130, 1980.
- Biresaw, G., Asadauskas, S.J., McClure, T.G., Polysulfide and biobased extreme pressure additive performance in vegetable vs paraffinic base oil, *ACS Ind.& Eng. Chem. Res.*, 51, 262-273, 2012.
- Born, M., Hipeaux, J.C., Marchand, P., Parc, G., Relationship between chemical structure and effectiveness of some metallic dialkyl and diaryl dithiophosphates in different lubricated mechanisms, *Lubr. Sci.*, 4, 93-116, 1992.
- Boshui, C., Junxiu, D., Guoxu, C., Tribocchemistry of gadolinium dialkyldithiophosphates, *Wear*, 196, 16-20, 1996.
- Bowden, F.P., Tabor, D., The friction and lubrication of solids. Oxford University Press, Part-I (1954), Part-II, 1964a.
- Braithwaite, E.R., Green, A.B., A critical analysis of the performance of molybdenum, *Wear*, 46, 405-431, 1978.

References

Cao, Y., Yu, L., Liu, W., Study of the tribological behavior of sulfurized fatty acids as additives in rapeseed oil, *Wear*, 244, 126-131, 2000.

Cavdar, B., Ludema, K.C., Dynamics of dual film formation in boundary lubrication of steels part I. Functional nature and mechanical properties, *Wear*, 148, 305-327, 1991.

Chen, A.-S., Taguchi, T., Aoyama, S., Sugiura, M., Haruna, M., Wang, M.-W., Miwa, I., Antioxidant activity of a Schiff base of pyridoxal and aminoguanidine, *Free Radical Bio. Med.*, 35, 1392-1403, 2003.

Chen, G., Chen, L., Dong, J., Preparation and tribological behaviour of oil-soluble cerium dioctyl dithiocarbamate, *Lubr. Eng.*, 53, 24-29, 1997.

Chen, L., Dong, J., Chen, G., The study of tribo-induced deposits from a copper containing antiwear additive, *Tribol. Trans.*, 40, 339-345, 1997.

Choi, U.S., Ahn, B.G., Kwon, O.K., Chun, Y.J., Tribological behavior of some antiwear additives in vegetable oils, *Tribol. Int.*, 30, 677-683, 1997.

Choudhary, R., Pande, P., Lubrication potential of boron compounds: An overview, *Lubri. Sci.*, 14, 211-222, 2002.

Coulomb, C.A., Memoires de Mathmatique et de physique de 1. Academie royale des science: 161, 1785.

Coy, R.C., Quinn, T.F.J., The use of physical methods of analysis to identify surface layers formed by organosulfur compounds in wear tests, *ASLE Trans.*, 18, 163-174, 1975.

Croudace, M.C., Lubrication antiwear additives. *U.S. Patent*, US4990273, 1990.

Crumer, C., Soto, C., Huezo, L.A., Tysoe, W.T., Growth kinetics and structure of films favoured by the thermal decomposition of methylene chloride on iron, *Langmuir*, 10, 3571-3581, 1994.

Dacre, B., Bovington, C.H., The adsorption and desorption of dibenzyl disulfide and dibenzyl sulfide on steel, *ASLE Trans.*, 25, 272-178, 1982.

References

- Davey, W., Edwards, E.D., The extreme-pressure lubricating properties of some sulphides and disulphides in mineral oil as assessed by the four-ball machine, *Wear*, 58, 291-304, 1957.
- David, M., GF-5 Engine Oil Spec Unveiled, *Lube Rep.*, 3, 31, 2002.
- Davim, J.P., Kretzer, J.P., *Biotribology of total hip replacement: the metal-on-metal articulation*, John Wiley & Sons, 2010.
- Domingo, L.R., Perez, P., Saez, J.A., Understanding the local reactivity in polar organic reactions through electrophilic and nucleophilic Parr functions, *RSC Adv.*, 3, 1486-1494, 2013.
- Dong, J., Chen, G., Luo, X., Chen, L., A new concept-Formation of permeating layers from nonactive antiwear additives, *Lubri. Eng.*, 50, 17-22, 1994.
- Dorinson, A., The antiwear action of zinc di-n-butyl phosphate, *ASLE Trans.*, 22, 190-192, 1979.
- Dorinson, A., Ludema, K.C., Mechanics and chemistry in lubrication, Elsevier, Amsterdam, 1985.
- Eddy, N.O., Ita, B.I., QSAR, DFT and quantum chemical studies of the inhibition potentials of some carbazones for the corrosion of mild steel in HCl, *J Mol Model*, 17, 633-647, 2011.
- Erdemir, A., Fenske, G.R., Erck, R.A., Nichols, F.A., Busch, D.E., Tribological properties of boric acid and boric acid forming surface. Part II. Mechanisms of formation and self-lubrication of boric acid films on boron- and boric acid containing surfaces, *Lubri. Eng.*, 47, 179-184, 1991a.
- Erdemir, A., Tribological properties of boric acid and boric acid forming surface. Part I. Crystal chemistry and mechanism of self-lubrication of boric acid, *Lubri. Eng.*, 47, 168-172, 1991b.

References

Espinosa, M.T., Jiménez, A.E., Martínez-Nicolás, G., Sanes, J., Bermúdez, M.D., Abrasion resistance of magnesium alloys with surface films generated from phosphonate imidazolium ionic liquids, *App. Surf. Sci.*, 320, 267-273, 2014.

Feng, I-M., Pyrolysis of zinc dialkyl phosphorodithioate and boundary lubrication, *Wear*, 3, 309-311, 1960.

Feng, I.-M., Perilstein, W.L., Adams, M.R., Solid film deposition and non-sacrificial boundary lubrication, *ASLE Trans.*, 6, 60-66, 1963.

Feng, X., Zhang, Z., Synthesis of 5-aromatic-2H-tetrazole-2-yl-acetal ethyl ester and its acethydrazide derivatives (In Chinese), *Chemical Reagents*, 12, 122-124, 1990.

Forbes, E.S., Reid, A.J.D., Liquid phase adsorption/reaction studies of organo-sulfur compounds and their load-carrying mechanism, *ASLE Trans.*, 1, 50-60, 1973.

Fuller, M., Yin, Z.F., Kasrai, M., Bancroft, G.F., Yamaguchi, P.R., Ryason, P.A., Willermet, K.H.T., Chemical characterization of tribochemical and thermal films generated from neutral and basic ZDDPs using X-ray absorption spectroscopy, *Tribol. Int.*, 30, 305-315, 1997.

Fuller, M., Kasrai, S.M., Bancroft, G.M., Fyfe, K., Tan, K.H., Solution decomposition of zinc dialkyl dithiophosphate and its effect on antiwear and thermal film formation studied by X-ray absorption spectroscopy, *Tribol. Int.*, 31, 627-644, 1998.

Furey, M.J., The formation of polymeric films directly on rubbing surfaces to reduce wear, *Wear*, 26, 369-392, 1973.

Gaussian 03, Revision D.01, Frisch, M.J., Trucks, G.W., Schlegel, H.B., Scuseria, G.E., Robb, M.A., Cheeseman,Jr. JR., Montgomery, J.A., Vreven, T., Kudin, K.N., Burant, J.C., Millam, J.M., Iyengar,S.S., Tomasi, J., Barone, V., Mennucci, B., Cossi, M., Scalmani, G., Rega, N., Petersson, G.A., Akatsuji, H., Hada, M., Ehara, M., Toyota, K., Fukuda, R., Hasegawa, J., Ishida, M., Nakajima, T., Honda, Y., Kitao, O., Nakai, H., Klene, M., Li, X., Knox, J.E., Hratchian, H.P., Cross, J.B., Bakken, V., Adamo, C., Jaramillo, J., Gomperts, R., Stratman, R.E., Yazyev, O., Austin, A.J., Cammi, R., Pomelli, C., Ochterski, J.W., Ayala, P.Y., Morokuma, K., Voth, G.A., Salvador P., Dannenberg J.J., Zakrzewski VG.,

References

Dapprich S., DanielsAD., Strain, MC., Farkas, O., Malick, D.K., Rabuck, A.D., Raghavachari, K., Foresman, J.B., Ortiz, J.V., Cui, Q., Baboul, A.G., Clifford, S., Cioslowski, J., Stefanov, B. B., Liu G., Liashenko, A., Piskorz, P., Komaromi, I., Martin, R.L., Fox, D.J., Keith, T., Al-Laham, M.A., Peng, C.Y., Nanayakkara, A., Challacombe, M., Gill, P.M.W., Johnson, B., Chen, W., Wong, M.W., Gonzalez, C., Pople, J.A., Gaussian, Inc., Wallingford, C.T., 2004.

Ge, X., Xia, Y., Shu, Z., Conductive and tribological properties of lithium-based ionic liquids as grease base oil, *Tribol Trans.*, 58, 686-690, 2015.

Gece, G., Drugs: A review of promising novel corrosion inhibitors, *Corros. Sci.*, 53, 3873-3898, 2011.

George, J.M., Martin, J.M., Mathia, T., Kapsa, P., Meille, G., Montes, H., Mechanism of boundary lubrication with zinc dithiophosphate, *Wear*, 53, 9-34, 1979.

George, J.M., Discussion: Wear reduction and surface layer formation by a ZDDP additive, *J. Tribol.*, 109, 577-586, 1987.

Godfrey, D., Chemical changes in steel surfaces during extreme pressure lubrication, *ASLE Trans.*, 5, 57-66, 1962.

Gong, D., Zhang, P., Xue, Q., Studies on relationship between structure of chlorine containing compounds and their wear and extreme-pressure behaviour, *Lubri. Eng.*, 46, 566-572, 1999.

Grossiord, C., Martin, J.M., Mogne, T.L., Palermo, T., In situ MoS₂ formation and selective transfer from MoDTP films, *Surf. Coat. Technol.*, 108, 352-359, 1998a.

Grossiord, C., Varlot, K., Martin, J.M., LeMogne, T.H., Esnouf, C., Inoue, K., MoS₂ single sheet lubrication by molybdenum dithiocarbamate, *Tribol. Int.*, 31, 737-743, 1998b.

Grossiord, C., Martin, J.M., Varlot, K., Vacher, B., Mogne, T., Yamada, Y., Tribocochemical interactions between Zndtp, Modtc and calcium borate, *Tribol. Lett.*, 8, 203-212, 2000.

References

Grupp, T.M., Utzschneider, S., Schroder, C., Schwiesau, J., Fritz, B., Maas, A., Biomer, W., Jansson, V., Biotribology of alternative bearing materials for unicompartmental knee arthroplasty, *Acta Biomaterialia*, 6, 3601-3610, 2010.

Gusain, R., Khatri, O.P., Ultrasound assisted shape regulation of CuO nanorods in ionic liquids and their use as energy efficient lubricant additives, *J. Mater. Chem. A.*, 1, 5612-5619, 2013.

Gusain, R., Gupta, P., Saran, S., Khatri, O.P., Halogen-free bis(imidazolium)/bis(ammonium)-di[bis(salicylato)borate] ionic liquids as energy-efficient and environmentally friendly lubricant additives, *ACS Appl. Mater. Interfaces*, 6, 15318-15328, 2014.

Hardy, W., Doubleday, I., Boundary lubrication. The paraffin series, *Royal Society of London, Series A*, 100, 550-574, 1922.

Hartley, R.J., Waddoups, M., Lubricating oil composition. US Patent 6500786 B1, 2002.

He, Z., Rao, W., Ren, T., Liu, W., Xue, Q., The tribochemical study of some n-containing heterocyclic compounds as lubricating oil additives, *Tribol. Lett.*, 13, 87-93, 2002.

Heckerman, N., Snavely, J. E., Payane, J.J.S., Effects of Anions on Corrosion Inhibition by Organic Compounds, *J. Electrochem. Soc.*, 113, 677-681, 1966.

Hehre, W.J., Radom, L., Schleyer, P.V.R., Pople, J.A., Ab initio Molecular Orbital Theory, Wiley, New York, 1986.

Herdan, J.M., Friction modifiers in engine and gear oils, *Lubr. Sci.*, 12, 265-276, 2000.

Heuberger, R., Rossi, A., Spencer, N.D., Pressure dependence of ZnDTP tribochemical film formation: A Combinatorial Approach. *Tribol. Lett.*, 28, 209-222, 2007.

Heuberger, R., Rossi, A., Spencer, N.D., Reactivity of alkylated phosphorothionates with steel: a tribological and surface-analytical study, *Lubr. Sci.*, 20, 79-102, 2008.

- Hiley, R.W., Spikes, H.A., Cameron, A., Polysulfides as extreme-pressure lubricant additives, *Lubr. Eng.*, 37, 732-737, 1981.
- Hu, Z.S., Dong, J.X., Chen, G.X., He, J.Z., Preparation and tribological properties of nanoparticles lanthanum borate, *Wear*, 243, 43-47, 2000a.
- Hu, Z.S., Yie, Y., Wang, L.G., Chen, G.X., Dong, J.X., Synthesis and tribological properties of ferrous octoxyborate as antiwear and friction-reducing additive of lubricating oil, *Tribol. Lett.*, 8, 45-50, 2000b.
- Hu, Z.S., Lai, R., Lou, F., Wang, L.G., Chen, Z.L., Chen, G.X., Dong, J.X., Preparation and tribological properties of nanometer magnesium borate as lubricating oil additive, *Wear*, 252, 370-374, 2002.
- Hu, X., Wo, H., Han, G., Lu, Y., Tribocatalytic effect of impurities in zinc dialkyldithiophosphate in engine oil, *Lubr. Sci.*, 5, 351-360, 2003.
- Huang, H., Hu, Qiao, H.S., Bai, L., Han, M., Liu, Y., Kang, Z., Carbon quantum dot/CuSx nanocomposites towards highly efficient lubrication and metal wear repair. *Nanoscale*, 7, 11321-11327, 2015.
- Huang, H.D., Tu, J.P., Gan, L.P., Li, C.Z., An investigation on tribological properties of graphite nanosheets as oil additive, *Wear*, 261, 140-144, 2006.
- Huang, T., Xin, Y., Li, T., Nutt, S., Su, C., Chen, H., Liu, P., Lai, Z., Modified graphene/polyimide nanocomposites: reinforcing and tribological effects, *ACS Appl. Mater. Interfaces.*, 5, 4878-4891, 2013.
- Huang, W., Dong, J., Wu, G., Zhang, C., A study of S-[2-(acetamido) benzothiazol-1-yl] N,N-dibutyl dithiocarbamate as an oil additive in liquid paraffin, *Tribol. Int.*, 37, 71-76, 2004a.
- Huang, W., Dong, J., Li, J., Hou, B., The tribological performance of S-[2-(acetamido) benzothiazol-1-yl] N,N-diethyl dithiocarbamate as an additive in rapeseed oil, *Tribol. Lett.*, 17, 199-204, 2004b.

References

Huang, W., Hou, B., Zhang, P., Dong, J., Tribological performance and action mechanism of *S*-[2-(acetamido) thiazol-1-yl] dialkyl dithiocarbamate as additive in rapeseed oil, *Wear*, 256, 1106-1113, 2004c.

Huang, W., Tan, Y., Chen, B., Dong, J., Wang, X., The binding of antiwear additives to iron surfaces: Quantum chemical calculations and tribological tests, *Tribol. Int.*, 36, 163-168, 2003.

Hubson, P.D., Industrial lubrication practices, The Industrial Press New York, 13, 1955.

Ishchuk, Y.L., Mel'nik, Z.P., Barykina, S.S., Surpina, L.V., Abramenko, V.L., Copper complexes as grease additives, *Chem. Technol. Fuels oils.*, 30, 123-127, 1994.

Jaiswal, V., Kalyani., Rastogi, R.B., Kumar, R., Tribological studies of some SAPS-free Schiff bases derived from 4-aminoantipyrine and aromatic aldehydes and their synergistic interaction with borate ester. *J. Mater. Chem. A.*, 2, 10424-10434, 2014.

Jaiswal, V., Rastogi, R.B., Kumar, R., Singh, L., Mandal, K.D., Tribological studies of stearic acid-modified $\text{CaCu}_{2.9}\text{Zn}_{0.1}\text{Ti}_4\text{O}_{12}$ nanoparticles as effective zero SAPS antiwear lubricant additives in paraffin oil. *J. Mater. Chem. A.*, 2, 275-286, 2014.

Jaiswal, V., Rastogi, R.B., Maurya, J.L., Singh, P., Tewari, A., Quantum chemical calculation studies for interactions of antiwear lubricant additives with metal surfaces. *RSC Adv.*, 4, 13438-13445, 2014.

Jayadas, N.H., Nair, K.P., Study of the anti-wear properties of coconut oil using quantum chemical calculations and tribological tests, *ASME J. Tribol.*, 128, 654-659, 2006.

Ji, H., Nicholls, M.A., Norton, P.R., Kasrai, M., Capehart, T.W., Perry, T.A., Zinc-dialkyl-dithiophosphate antiwear films: Dependence on contact pressure and sliding speed, *Wear*, 258, 789-799, 2005.

References

- Jianqiang, H., Huanjin, Z., Li, W., Xianyong, W., Feng, J., Zhiming, Z., Study on tribological properties and action mechanism of organic cadmium compound in lubricants, *Wear*, 259, 519-523, 2005.
- Jones, M.H., Scott, D., Industrial tribology Edn., Elsevier, Amsterdam, 1983.
- Ju, H., Kai, Z.-P., Li, Y., Aminic nitrogen-bearing polydentate Schiff base compounds as corrosion inhibitors for iron in acidic media: A quantum chemical calculation, *Corros. Sci.*, 50, 865-871, 2008.
- Kalyani., Jaiswal, V., Rastogi, R.B., Kumar, D., The investigation of different particle size magnesium-doped zinc oxide ($Zn_{0.92}Mg_{0.08}O$) nanoparticles on the lubrication behavior of paraffin oil. *Appl. Nanosci.*, DOI 10.1007/s13204-015-0471-1, 2015.
- Kamimura, H., Kubo, T., Minami, I., Mor, S., Effect and mechanism of additives for ionic liquids as new lubricants, *Tribol. Int.*, 40, 620-625, 2007.
- Kapadia, R., Glyde, R., Wu, Y., In situ observation of phosphorous and non-phosphorous antiwear films using a mini traction machine with spacer layer image mapping, *Tribol. Int.*, 40, 1667-1679, 2007.
- Karelson, M., Lobanov, V.S., Katritzky, A.R., Quantum-chemical descriptors in QSAR/QSPR studies, *Chem. Rev.*, 96, 1027-1043, 1996.
- Kim, Y.W., Chung, K., Kim, N.S., Hwang, D. H., Cho, W.O., Synergistic lubricating effect of several ashless dithiocarbamates with Mo-donor additives, *Tribol. Int.*, 40, 397-404, 2007.
- Kim., B., Mourhatch, R., Aswath, P.B., Properties of tribofilms formed with ashless thiophosphate and zinc dialkyldithiophosphate under extreme pressure conditions, *Wear*, 268, 579-591, 2010.
- Kim., B., Jiang, J.C., Aswath, P.B., Mechanism of wear at extreme load and boundary conditions with ashless anti-wear additives: Analysis of wear surfaces and wear debris, *Wear*, 270, 181-194, 2011.

References

- Kimura, Y., Wakabayashi, T., Okada, K., Wada, T., Nishikawa, H., Boron nitride as a lubricant additive, *Wear*, 232, 199-206, 1999.
- Klepper, C.C., Williams, J.M., Truhan, J.J.J., Qu, J., Riester, L., Hazelton, R.C., Moschella, J.J., Blau, P.J., Anderson, J.P., Popoola, O.O., Keitz, M.D., Tribomechanical properties of thin boron coatings deposited on polished cobalt alloy surfaces for orthopedic applications, *Thin Solid Films*, 516, 3070-3080, 2008.
- Kotvis, P.V., Huezo, L.A., Millman, W.S., Tysoe, W.T., The surface decomposition and extreme pressure tribological properties of highly chlorinated methanes and ethanes on ferrous surfaces, *Wear*, 147, 401-419, 1991.
- Kotvis, P.V., Huezo, L.A., Tysoe, W.T., Surface chemistry of methylene chloride on iron: A model for chlorinated hydrocarbon lubricant additives, *Langmuir*, 9, 467-474, 1993.
- Kreuz, K.L., Fein, R.S., Dundy, M., EP Films from Borate Lubricants, *ASLE Trans.*, 10, 67-76, 1967.
- Kuliyev, A.B., Kurbanov, M.M., Aliyev, F.Y., Kuliyev, F.A., *p*-chlorophenyl thioacetamides as lubricant additives, *Petro. Chem. U.S.S.R.*, 23, 79-82, 1983.
- Kuliyev, A.B., Gasanova, T., Akhadov, N.O., Mamedov, S.A., N-2-pyridyldialkylthioamides as additives to lubricating oils, *Petro. Chem. U.S.S.R.*, 28, 241-245, 1988.
- Kuliyev, A.B., Akhadov, N.O., Abdullayeva, M.I., Useinova, G.G., Substituted alkanoamidosulphides as additives to lubricants, *Petro. Chem. U.S.S.R.*, 29, 189-194, 1989a.
- Kuliyev, A.B., Dzhavadov, M.M., Mamedov, O.A., Gasanov, T., N-Mono- and N,N-dialkanoylacetamides and their thio analogues as additives to lubricants, *Petro. Chem. U.S.S.R.*, 29, 29-34, 1989b.
- Kuratomi, T., Nagano, K., Lubricant base oil. US Patent No. 2009/0233824 A1. 2009.

References

- Lava, K., Evrard, Y., Hecke, K.V., Meervelt, L.V., Binnemans, K., Quinolinium and isoquinolinium ionic liquid crystals, *RSC Adv.*, 2, 8061-8070, 2012.
- Lee, C., Yang, W., Parr, R.G., Development of the Colle-Salvetti conelation energy formula into a functional of the electron density, *Phys. Rev. B.*, 37, 785-789, 1988.
- Lee, C., Li, Q., Kalb, W., Liu, X.-Z., Berger, H., Carpick, R.W., Hone, J., Frictional characteristics of atomically thin sheets, *Science*, 328, 76-80, 2010.
- Li, J., Ren, T., Liu, H., Wang, D., Liu, W., The tribology study of tetrazole derivatives as additive in liquid paraffin, *Wear*, 246, 130-133, 2000.
- Li, J., Xu, X., Wang, Y., Ren, T., Tribological studies on a novel borate ester containing benzothiazol-2-yl and disulfide groups as multifunctional additive, *Tribol. Int.*, 43, 1048-1053, 2010.
- Lin, Y.C., So, H., Limitations on use of ZDDP as an antiwear additive in boundary lubrication, *Tribol. Int.*, 37, 25-33, 2004.
- Liu, G., Li, X., Qin, B., Xing, D., Guo, Y., Fan, R., Investigation of the mending effect and mechanism of copper nano-particles on a tribologically stressed surface, *Tribol. Lett.*, 17, 961-966, 2004.
- Liu, W., Jin, Z., Xue, Q., The performance and antiwear mechanism of S-containing organic borate as an oil additive, *Lubri. Sci.*, 7, 49-60, 1994.
- Liu, W., Ye, C.F., Gong, Q.Y., Wang, H.Z., Wang, P., Tribological performance of room-temperature ionic liquids as lubricant, *Tribol. Lett.*, 13, 81-85, 2002.
- Lovell, M., Higgs, C. F., Deshmukh, P., Mobley, A., Increasing formability in sheet metal stamping operations using environmentally friendly lubricants. *J. Mat. Pro. Tech.* 177, 87–90, 2006.
- Ludema, K.C., Friction, wear, lubrication: A textbook in tribology, CRC Press L.L.C., 124-134, 1996.

References

- Mamman, A., Agrawal, C.V., Verma, V.K., The load-carrying properties of certain S-alkylisothioamides and their effectiveness as extreme pressure lubricant additives, *Wear*, 71, 355-361, 1981.
- Mamman, A., Verma, V.K., Agrawal, C.V., Mechanism of EP additive-metal interaction: Assessment of certain S-benzylisothiocarbamides, *Tribol. Int.*, 16, 291-296, 1983.
- Mamman, A., Verma, V.K., Agrawal, C.V., The EP performance of certain S-benzyl isoformamidinothiocarbamides in the four-ball test, *Tribol. Int.*, 17, 289-292, 1984.
- Mangolini, F., Rossi, A., Spencer, N.D., Reactivity of triphenyl phosphorothionate in lubricant oil solution, *Tribol. Lett.*, 35, 31-43, 2009.
- Mangolini, F., Rossi, A., Spencer, N.D., Tribocchemistry of triphenylphosphorothionate (TPPT) by *in situ* attenuated total reflection (ATR/FT-IR) tribometry, *J. Phys. Chem. C.*, 116, 5614-5627, 2012.
- Margielewski, L., Stanecka, R., Effect of the structure and metal atom of dialkyldithiophosphate derivatives on the wear behaviour in steel-zirconia contacts, *Lubr. Sci.*, 14, 333-348, 2002.
- Martin, J.M., Ohmae, N., *Nanolubricants*, John Wiley & Sons, Ltd., Chichester, UK, 2008.
- Martin, J.M., Mogne, T.L., Grossiord, C., Palermo, T., Tribocchemistry of ZDDP and MoDDP chemisorbed films, *Trib. Lett.*, 2, 313-326, 1996.
- Martin, J.M., Antiwear mechanisms of zinc dithiophosphate: A chemical hardness approach, *Tribol. Lett.*, 6, 1-8, 1999.
- Martin, J.M., Grossiard, C., Varlot K., Vacher, B., Igarashi, J., Synergistic effects in binary systems of lubricant additives: a chemical hardness approach, *Tribol Lett.*, 8, 193-201, 2000.
- Martin, J.M., Mansot, J.L., Berbezier, I., The nature and origin of wear particles from boundary lubrication with a zinc dialkyldithiophosphates, *Wear*, 93, 117-126, 1984.

References

McHugh, K.L., Mo, K., Smith, J.O., Mass, S., Lubricants containing a Schiff base. *US Patent*, 3201350, 1965.

Minami, I., Kita, M., Kubo, T., Nanao, H., Mori, S., The tribological properties of ionic liquids composed of trifluoro tris(pentafluoroethyl) phosphate as a hydrophobic anion, *Tribol. Lett.*, 30, 215-223, 2008.

Minfray, C., Martin, J.M., Esnouf, C., Le Mogne, T., Kersting, R., Hagenhoff, B., A multi-technique approach of tribofilm characterisation, *Thin Solid Films*, 447-448, 272-277, 2004.

Minfray, C., Mogne, T., Lubrecht, A.A., Martin, J.-M., Experimental simulation of chemical reactions between ZDDP tribofilms and steel surfaces during friction processes, *Tribol. Lett.*, 21, 65-76, 2006.

Minfray, C., Le Mogne, T., Martin, J.-M., Onodera, T., Nara, S., Takahashi, S., Tsuboi, H., Koyama, M., Endou, A., Takaba, H., Kubo, M., Del Carpio, C.A., Miyamoto, A., Experimental and molecular dynamics simulations of tribochemical reactions with zddp: zinc phosphate–iron oxide reaction, *Tribol. Trans.*, 51, 589-601, 2008.

Mirin, N.A., Ali, T.A., Nordlander, P., Halas, N.J., Perforated semishells: Far-field directional control and optical frequency magnetic response. *ACS Nano*, 4, 2701-2712, 2010.

Mohamed, G.G., Abd El-Wahab, Z.H., Salisaldehyde-2-aminobenzimidazole Schiff base complexes of Fe(III), Co(II), Ni(II), Cu(II), Zn(II) and Cd(II), *J. Therm. Anal. Calorimet.*, 73, 347-359, 2003.

Mohammed, A-K., Ahmad, A, H., M.R., Al-Messri., Z,A,K., Synthesis, characterization and evaluation of overbased magnesium fatty acids detergent for medium lubricating oil. *Iraqi J. Chem. Petrol. Engg.*, 14, 1-9, 2013.

Morina, A., Neville, A., Priest, M., Green, J.H., ZDDP and MoDTC interactions in boundary lubrication-The effect of temperature and ZDDTP/MoDTC ratio, *Tribol. Int.*, 39, 1545-1557, 2006a.

References

- Morina, A., Neville, A., Priest, M., Green, J.H., ZDDP and MoDTC interactions and their effect on tribological performance-Tribofilm characteristics and its evolution, *Tribol. Lett.*, 24, 243-256, 2006b.
- Morina, A., Neville, A., Tribofilms: Aspects of formation, stability and removal, *J. Phys. D: Appl. Phys.*, 40, 5476-5487, 2007.
- Mosey, N.J., Muser, M.H., Woo, T. K., Molecular mechanisms for the functionality of lubricant additives, *Science*, 307, 1612-1615, 2005.
- Mtsumoto, K., Surface chemical and tribological investigations of phosphoruscontaining lubricant additives, PhD thesis (2003) ETH, Zurich, Switzerland, 9.
- Mu, X. D., Meng, J.Q., Li, Z.C., Kou, Y., Rhodium nanoparticles stabilized by ionic copolymers in ionic liquids: Long lifetime nanocluster catalysts for benzene hydrogenation, *J. Am. Chem. Soc.*, 127, 9694-9695, 2005.
- Myshkin, N.K., Kim C.K., Petrokovet, M.I., Introduction to tribology, Cheong Moon Gak, Seoul, 1997.
- Najman, M.N., Kasrai, M., Bancroft, G. M., Miller, A., Study of the chemistry of films generated from phosphate ester additives on 52100 steel using X-ray absorption spectroscopy, *Tribol. Lett.*, 13, 209-218, 2002.
- Najman, M., Kasrai, M., Bancroft, G.M., Miller, A., study of the chemistry of films generated from phosphate ester additives on 52100 steel using x-ray absorption spectroscopy, *Tribol. Lett.*, 13, 209-218, 2002.
- Najman, M., Kasrai, M., Bancroft, G.M., Frazer, B.H., Stasio, G.D., The correlation of microchemical properties to antiwear (AW) performance in ashless thiophosphate oil additives, *Tribol. Lett.*, 17, 811-822, 2004a.
- Najman, M., Kasrai, M., Bancroft, G.M., Chemistry of antiwear films from ashless thiophosphate oil additives, *Tribol. Lett.*, 17, 217-229, 2004b.

References

- Nakayama, K., Sakurai, T., Some aspects of the mechanism of chemical wear: A correlation between dynamic wear rate and static corrosion rate, *Wear*, 68,259-262, 1981.
- Normand, V., Martin, J.M., Ponsonnet, L., Inoue, K., Micellar calcium borate as an antiwear additive, *Tribol. Lett.*, 5, 235-242, 1998.
- Oliphant, C.M., Pharm, D., Gary, M., Green, M.D., Permanente, K., Quinolones: A Comprehensive Review. *Am. Fam. Physician.* 65, 455-465, 2002.
- Otto, R., Proceedings 60th annual meeting of national lubricating grease institute, USA, 23-37, 1993.
- Palacios, J.M., Thickness and chemical composition of films formed by antimony dithiocarbamate and zinc dithiophosphate, *Tribol. Int.*, 19, 35-39, 1986.
- Papay, A., Antiwear and extreme-pressure additives in lubricants, *Lubri. Sci.*, 10, 209-224, 1998.
- Perkin, S., Albrecht, T., Klein, J., Layering and shear properties of an ionic liquid confined to nano-films between mica surfaces, *Phys. Chem. Chem. Phys.*, 12, 1243-1247, 2010.
- Perkin, S., Ionic liquids in confined geometries, *Phys. Chem. Chem. Phys.*, 14, 5052-5062, 2012.
- Philippon, D., De Barros-Bouchet, M.I., Lerasle, O., Le Mogne, T., Martin, J.M., Experimental simulation of tribochemical reactions between borates esters and steel surface, *Tribol. Lett.*, 41,73-82, 2011.
- Rastogi, R.B., Yadav, M., Bhattacharya, A., Application of molybdenum complexes of 1-aryl-2,5-dithiohydrazodicarbonamides as extreme pressure lubricant additives. *Wear*, 252, 686-692, 2002.
- Rastogi, R.B., Maurya, J.L., Jaiswal, V., Tiwary, D., lanthanum dithiocarbamates as potential extreme pressure lubrication additives, *Int. J. Ind. Chem.*, 3, 32-42, 2012.

References

Rastogi, R.B., Maurya, J.L., Jaiswal, V., Phosphorous free antiwear formulations: Zinc thiosemicarbazones–borate ester Mixtures. *Proc. IMechE Part J: J Engineering Tribology*, 227, 220-233, 2012.

Rastogi, R.B., Maurya, J.L., Jaiswal, V., Low sulfur, phosphorus and metal free antiwear additives: Synergistic action of Salicylaldehyde N(4)-phenylthiosemicarbazones and its different derivatives with Vanlube 289 additive, *Wear*, 297, 849-859, 2013.

Rastogi, R.B., Maurya, J.L., Jaiswal, V., Tiwary, D., Studies on lanthanum complexes of 1-aryl-2,5-dithiohydrazodicarbonamides in paraffin oil as extreme pressure lubrication additives, *ASME J. Tribol.*, 135, 044502, 1-6, 2013.

Rastogi, R.B., Maurya, J.L., Jaiswal, V., Zero SAPs and ash free antiwear additives: Schiff bases of salicylaldehyde with 1,2-phenylenediamine; 1,4-phenylenediamine and 4,4'-diamino diphenylenemethane and their synergistic interactions with borate ester, *Tribol. Trans.*, 56, 592-606, 2013.

Rastogi, R.B., Maurya, J.L., Jaiswal, V., Theoretical study of Schiff base compounds as antiwear lubricant additives: A quantum chemical calculation approach. *Proc. IMechE Part J: J. Engineering Tribology*, 228, 198-205, 2014.

Ratoi, M., Niste, V.B., Alghawel, H., Suen, Y. F., Nelson, K., The impact of organic friction modifiers on engine oil tribofilms, *RSC Adv.*, 4, 4278-4285, 2014.

Reeves, C.J., Menezes, P.L., Lovell, M.R., Jen, T.-C., The size effect of boron nitride particles on the tribological performance of biolubricants for energy conservation and sustainability, *Tribol. Lett.*, 51, 437-452, 2013.

Ren, S., Wang, R., Komatsu, K., Bonaz-Krause, P., Zyrianov, Y., McKenna, C.E., Csipke, C., Tokes, Z.A., Lien, E.J., Synthesis, biological evaluation, and quantitative structure-activity relationship analysis of new Schiff bases of hydroxysemicarbazide as potential antitumor agents, *J. Med. Chem.*, 45, 410-419, 2002.

Ren, T., Liu, W., Xue, Q., Wang, H., The effect of molecular structure of N-containing heterocyclic compounds on their wear properties, *Lubr. Sci.*, 5, 205-212, 1993.

References

- Ren, T., Xue, Q., Wand, H., A study of S-(1H-benzotriazol-1-yl)methyl N,N-dialkyldithiocarbamates as novel multifunctional oil additives, *Wear*, 172, 59-64, 1994.
- Reynolds, O., On the theory of lubrication and its application to Mr. Beauchamp tower's experiments, including an experimental determination of the viscosity of olive oil. *Phil. Trans. Roy. Soc. London.*, 177, 157-234, 1886.
- Ribeaud, M., Volatility of phosphorus-containing anti-wear agents for motor oils, *Lubri. Sci.*, 18, 231-241, 2006.
- Rokosz, M. J., Chen, A. E., Lowe-Ma, C.K., Kucherov, A. V., Benson, D., Paputa, M. C., Peck, R.W., McCabe., Characterization of phosphorus-poisoned automotive exhaust catalysts, *Appl. Catal. B: Envir.*, 33, 205-215, 2001.
- Rossi, A., Eglin, M., Piras, F., Matsumoto, M., Spencer, K.N.D., Surface analytical studies of surface-additive interactions by means of *in situ* and combinatorial approaches, *Wear*, 256, 578-584, 2004.
- Rossi, A., Piras, F.M., Kim, D., Gellman, A.J., Spencer, N.D., Surface reactivity of tributyl thiophosphate: effects of temperature and mechanical stress, *Tribol. Lett.*, 23, 197-208, 2006.
- Roswan, D.M., Wu, Y.L., The effect of the additive chemistry of elemental sulphur on the contact fatigue life of steel EN31 discs, *Wear*, 70, 373-381, 1981.
- Rounds, F.G., Some effects of amines on zinc dialkyldithiophosphate antiwear performance as measured in 4-ball wear tests, *ASLE Trans.*, 24, 431-440, 1981.
- Rowe, C.N., Dickert, J.J., The relation of antiwear function to thermal stability and structure of metal *O,O'*-dialkyl phosphorodithioates, *ASLE Trans.*, 10, 85-90, 1967a.
- Rowe, C.N., Dickert, J.J., Thermal decomposition of metal *O,O*-dialkyl phosphorodithioates, *J. Org. Chem.*, 32, 647-653, 1967b.
- Samanta, B., Chakraborty, J., Chodhury, C., Dey, S.K., Dey, D.K., Batten, S.R., Jensen, P.Y., Glenn, P.A., Mitra, S., New Cu(II) complexes with polydentate chelating Schiff base

References

ligands: Synthesis, structures, characterisations and biochemical activity studies, *Struct. Chem.*, 18, 33-41, 2007.

Sarin, R., Gupta, A.K., Tuli, D.K., Verma, S.S., Rai, M.M., Bhatnager, A.K., Synthesis and performance evaluation of *O,O*-dialkylphosphorodithioic disulphides as potential antiwear, extreme-pressure and antioxidant additives. *Tribol. Int.*, 26,389-394, 1993.

Sarin, R., Tuli, D.K., Sureshbabu, A.V., Mishra, A.K., Rai, M.M., Bhatnagar, A.K., Molybdenum dialkylphosphorodithioates: Synthesis and performance evaluation as multifunctional additives for lubricants, *Tribol. Int.*, 27, 379-386, 1994.

Sarin, R., Tuli, D.K., Rai, M.M., Mehta, A.K., Bhatnagar, A.K., Titanium dithiophosphates: A new class of multifunctional lubricant additives, *Lubr. Eng.*, 51, 313-320, 1995.

Seddon, K.R., Ionic liquids: A taste of the future, *Nature Materials*, 2, 363-365, 2003.

Shah, F.U., Glavatskikh, S., Antzutkin, O.N., Synthesis, physicochemical, and tribological characterization of *S*-Di-*n*-octoxyboron-*O,O'*-di-*n*-octyldithiophosphate, *ACS Appl. Mater. & Interfaces*, 1, 2835-2842, 2009.

Shah, F.U., Glavatskikh, S., Höglund, E., Lindberg, M., Antzutkin., O.N., Interfacial antiwear and physicochemical properties of alkylborate-dithiophosphates, *ACS Appl Mater Interfaces*, 3, 956-968, 2011.

Shao, H.Y., Liu, Y.M., Fu, X.S., Ren, T.H., Tribological behavior of diisobutyl polysulfide as an extreme-pressure additive in a diester synthetic lubricant, *J. Syn. Lubri.*, 22, 259-270, 2005.

Sharma, M., Bansal, V., Ray, S.S., Sarin, R., Tuli, D.K., Shainagar, A.K., Role of alkyl moieties in the antiwear and antioxidant performance of alkyl phosphorodithioates, *Lubr. Sci.*, 15,321-328, 2003.

Sheasby, J.S., Caughin, T.A., Habeeb, J.J., Observation of the antiwear activity of zinc dialkyldithiophosphate additives, *Wear*, 150, 247-257, 1991.

References

- Shen, G., Zheng, Z., Wan, Y., Xu, X., Cao, L., Yue, Q., Sun, T., Liu, A., Synergistic lubricating effects of borate ester with heterocyclic compound, *Wear*, 246, 55-58, 2000.
- Singh, A.R., Gandra, R., Schneider, E.W., Biswas, S. K., Lubricant degradation and wear of a steel pin on lubricated sliding against a steel disc, *ACS Appl. Mat. & Interfaces.*, 3, 2512-2521, 2011.
- Somers, A.E., Howlett, P.C., MacFarlane, D.C., Forsyth, M., A review of ionic liquid lubricants, *Lubricants*, 1, 3-21, 2013.
- Spedding, H., Watkins, R.C., The antiwear mechanism of ZDDPs Part 1, *Tribol. Int.*, 15, 9-12, 1982.
- Spikes, H., Cameron, A., Additive interference in dibenzyl disulfide extreme pressure lubrication, *ASLE Trans.*, 17, 283-289, 1973.
- Spikes, H., The history and mechanism of ZDDP, *Tribol. Lett.*, 17, 469-489, 2004.
- Spikes, H., Low and zero-sulphated ash, phosphorus and sulphur antiwear additives for engine oils, *Lubr. Sci.*, 20, 103-136, 2008.
- Tang, Y.-Z., Liu, Z.-Q., The antioxidant effect of hydroxyl-substituent Schiff bases on the free-radical-induced hemolysis of human erythrocytes, *Cell Biochem. Func.*, 25, 149-158, 2007.
- Tao, X., Jiazheng, Z., Kang, X., The ball-bearing effect of diamond nanoparticles as an oil additive, *J. Phys. D: Appl. Phys.*, 29, 2932-2937, 1996.
- Towers, B., First report on friction experiment, *Proc. IME*, 29, 632-654, 1884.
- Trofimov, V.A., Spirkin, V.G., Bocharov, A.A., Ecological characteristics of oil sludges, *Chem. Technol. Fuels Oils.*, 35, 49-53, 1999.
- Unnikrishnan, R., Jain, M.C., Harinarayan, A.K., Mehta, A.K., Additive-additive interaction: An XPS study of ZDDP on the AW/EP characteristics of Molybdenum based additives, *Wear*, 252, 240-249, 2002.

References

Varlot, K., Martin, J.M., Grossiord, C., Vargiolu, R., Vacher, B., Inoue, K., A dual-analysis approach in tribocorrosion: Application to ZDDP/calcium borate additive interactions, *Tribol. Lett.*, 6, 181-189, 1999.

Verma, A., Jiang, W., Abusafe, H.H., Brown, W.D., Malshe, A.P., Tribological behavior of deagglomerated active inorganic nanoparticles for advanced lubrication, *Tribol. Trans.*, 51, 673-678, 2008.

Verma, V.K., Singh, R., Srivastava, V., Singh, P.K., EP/AW performance evaluation of zinc alkyl/dialkyl/alkylaryl dithiocarbamates in four ball tests, *Lubri. Sci.*, 16 195-203, 2004.

Wan, Q., Jin, Y., Sun, P., Ding, Y., Tribological behaviour of a lubricant oil containing boron nitride nanoparticles, *Procedia. Engg.*, 102, 1038- 1045, 2015.

Wan, Y., Yao, W., Ye, X., Cao, L., Shen G and Yue Q. Tribological performance and action mechanism of certain S, N heterocyclic compounds as potential lubricating oil additives, *Wear*, 2, 1083-1087, 1997.

Wang, D.Z., Flotation reagent-fundamentals and application, *Metallurgical Industry Press, Beijing*, 20-22, 1982.

Wang, H., Wang, X., Wang, H., Wang, L., Liu, A., DFT study of new bipyrazole derivatives and their potential activity as corrosion inhibitors, *J. Mol. Model.*, 13, 147-153, 2007.

Wang, L., Zhou, X.C., Li, Q.Q., Yuan, C.Q., Yan, X.P., Chen, Y.H., Application of metal self-repairing additives on cylinder-piston ring rubbing pairs, *Proceedings of CIST & ITS-IFTOMM*, Beijing, China, 2008.

Wang, S., Yue, W., Fu, Z., Wang, C., Li, X., Liu, J., Study on the tribological properties of plasma nitrided bearing steel under lubrication with borate ester additive, *Tribol. Int.*, 66,259-264, 2013.

Wang, S.T., Feng, L., Jiang, L., One-step solution immersion process for the fabrication of stable bionic super hydrophobic surfaces, *Adv. Mater.*, 18, 767-770, 2006.

References

- Wang, W., Chen, K., Zhang, Z., From borax to ultralong one-dimensional boric acid, *J. Phys. Chem. C*, 113, 2699-2703, 2009.
- Watkins, R.C., The antiwear mechanism of ZDDPs Part 2, *Tribol. Int.*, 15, 13-15, 1982.
- Waynick, J.A., The development and use of metal deactivators in the petroleum industry: A review, *Energy & Fuels*, 15, 1325-1340, 2001.
- Weintraub, B., Zhou, Z., Li, Y., Deng, Y., Solution synthesis of one-dimensional ZnO nanomaterials and their applications, *Nanoscale*, 2, 1573-1587. 2010.
- Willermet, K.H.T., Chemical characterization of tribochemical and thermal films generated from neutral and basic ZDDPs using X-ray absorption spectroscopy, *Tribol. Int.*, 30, 305-315, 1997.
- Wright, D. H., Brown, G.H., Peterson, M.L., Rotschafer, J.C., Application of fluoroquinolone pharmacodynamics, *Antimicrob. Chemother.*, 46, 669-683, 2000.
- Wu, H., Li, J., Ma, H., Ren, T., The tribological behaviours of dithiocarbamate-triazine derivatives as additives in mineral oil, *Surf. Interface Anal.*, 41, 151-156, 2009a.
- Wu, H., Ren, T., Zuo, G., The tribological chemistry of the oil blends of zinc dialkyldithiophosphate with 2-mercaptopbenzothiazole derivatives, *Tribol. Lett.*, 35, 171-179, 2009b.
- Wu, J.H., Phillips, B.S., Jiang, W., Sanders, J.H., Zabinski, J.S., Malshe, A.P., Bioinspired surface engineering and tribology of MoS₂ overcoated cBN-TiN composite coating, *Wear*, 261, 592-599, 2006
- Wu, J.M., Chen Y.R., and Lin, Y.H., Rapidly synthesized ZnO nanowires by ultraviolet decomposition process in ambient air for flexible photodetector. *Nanoscale*, 3, 1053-1058, 2011.

References

- Xie, H., Yu, W., Chen, W., MgO nanofluids: higher thermal conductivity and lower viscosity among ethylene glycol-based nanofluids containing oxide nanoparticles. *J. Exp. Nanosci.*, 5, 463-472, 2010.
- Xiong, H.M., Shchukim, D.G., Mohwald, H., Xu, Y., Xia, Y.Y., Sonochemical synthesis of highly luminescent zinc oxide nanoparticles doped with magnesium (II), *Angew. Chem. Int. Ed.*, 48, 2727-2731, 2009.
- Xu, X., Wan, Y., Cao, L., Tribological performance and action mechanism of S-alkyl and S-benzimidazole substituted dialkyldithiocarbamates, *Wear*, 241, 41-46, 2000.
- Xue, Q., Liu, W., Zhang, Z., Friction and wear properties of a surface-modified TiO₂ nanoparticle as an additive in liquid paraffin, *Wear*, 213, 29-32, 1997.
- Xue, Q., Zhang, J., Liu, W., Yang. S., The friction and wear behavior of 2-(n-alkyldithio)-benzimidazole as additives in liquid paraffin, *Tribol. Lett.*, 7, 27-30, 1999.
- Yan, J., Zeng, X., Heide, E., Ren, T., The tribological performance and tribochemical analysis of novel borate esters as lubricant additives in rapeseed oil, *Tribol. Int.*, 71, 149-157, 2014.
- Yang, Y., Jin, Y., He, H., Wang, Q., Tu, Y., Lu, H., Ye, Z., Dopant-induced shape evolution of colloidal nanoparticles: The case of zinc oxide. *J. Am. Chem. Soc.*, 132, 13381-13394, 2010.
- Yang, G., Zhang, Z., Li, G., Zhang, J., Yu, L., Zhang, P., Synthesis and tribological properties of S- and P-free borate esters with different chain lengths, *J. Tribol.*, 133, 021801-021808, 2011.
- Yao, J., Antiwear function and mechanism of borate containing nitrogen, *Tribol. Int.*, 30, 387-389, 1997.
- Ye, C., Liu, W., Chen, Y., Yu, L., Room-temperature ionic liquids: A novel versatile lubricant, *Chem. Commun.*, 2001, 2244-2245, 2001.

References

- Ye, C.F., Liu, W., Chen, Y.X., Ou, Z.W., Tribological behavior of Dy-sialon ceramics sliding against Si_3N_4 under lubrication of fluorine-containing oils, *Wear*, 253, 579-584, 2002.
- Zeng, H.S., Ren, T. and Liu, W., Study of the tribological behaviors of S,P-containing triazine derivatives as additives in rapeseed oil, *Wear*, 257, 389-394, 2004.
- Zeng, X., Li, J., Wu, X., Ren, T., Liu, W., The tribological behaviors of hydroxyl-containing dithiocarbamate-triazine derivatives as additives in rapeseed oil, *Tribol. Int.*, 40, 560-566, 2007.
- Zeng, X., Li, J., Wu, X., Ren, T., Liu, W., The tribological behaviors of hydroxyl-containing dithiocarbamate-triazine derivatives as additives in rapeseed oil, *Tribol. Int.*, 40, 560-566, 2007b.
- Zeng, X., Wu, H., Yi, H., Ren, T., Tribological behavior of three novel triazine derivatives as additives in rapeseed oil, *Wear*, 262, 718-726, 2007a.
- Zhan, W., Song, Y., Ren, T., Liu, W., The tribological behaviour of some triazine-dithiocarbamate derivatives as additives in vegetable oil, *Wear*, 256, 268-274. 2004.
- Zhang, J., Liu, W., Xue, Q., Tribological study of a manich compound of 2-mercapto benzimidazole in liquid paraffin, *Tribol. Int.*, 31, 767-770, 1998.
- Zhang, J., Liu, W., Xue, Q., Wang, Q., Investigation of the friction and wear behaviours of Cu(I) and Cu(II) dioctyldithiophosphates as additives in liquid paraffin, *Wear*, 216, 35-40, 1998.
- Zhang, J., Liu, W., Xue, Q., The tribological properties of the heterocyclic compound containing S, N, O, and B as additive in liquid paraffin, *Wear*, 224, 68-72, 1999a.
- Zhang, J., Liu, W., Xue, Q., The effect of molecular structure of heterocyclic compounds containing N, O and S on their tribological performance, *Wear*, 231, 65-70, 1999b.
- Zhang, J., Liu, W., Xue, Q., A study of 2-(dibutylaminomethyl)-thiobenzimidazole as an oil additive, *Wear*, 231, 279-284, 1999c.

References

Zhang, J., Yang, S., Liu, W., Xue, Q., A study of 2-(*n*-alkyldithio)-benzoxazoles as novel additives, *Tribol. Lett.*, 7, 173-177, 1999d.

Zhang, L., Chen, L., Wan, H., Chen, J., Zhou, H., Synthesis and tribological properties of stearic acid-modified anatase (TiO_2) nanoparticles, *Tribol. Lett.*, 41, 409-416, 2011.

Zhang, Z., Shen, G., Wan, Y., Cao, L., Xu, X., Yue, Q., Sun, T., Synthesis, hydrolytic stability and tribological properties of novel borate esters containing nitrogen as lubricant additives, *Wear*, 222, 135-144, 1998.

Zhang, Z., Najman, M.N., Kasrai, M., Bancroft, G.M., Yamaguchi, E.S., Study of interaction of EP and AW additives with dispersants using XANES, *Tribol. Lett.*, 18, 43-51, 2005.

Zhou, F., Liang, Y., Liu, W., Ionic liquid lubricants: Designed chemistry for engineering applications, *Chem. Soc. Rev.*, 38, 2590-2599, 2009.

Zhou, J., Yang, J., Zhang, Z., Liu, W., Xue, Q., Study on the structure and tribological properties of surface-modified Cu nanoparticles, *Mater. Res. Bull.*, 34, 1361-1367, 1999.

Zhou, J., Wu, Z., Zhang, Z., Liu, W., Dang, H., Study on an antiwear and extreme pressure additive of surface coated LaF_3 nanoparticles in liquid paraffin, *Wear*, 249, 333-337, 2001.

Zhou, Z.R., Jin, Z.M., Biotribology: Recent progresses and future perspectives, *Biosurf. Biotribol.*, 1, 3-24, 2015.

Zinke, H., Schumacher, R., Tribofragmentation and antiwear behaviour of isogeometric phosphorus compounds, *Tribol. Int.*, 30, 199-208, 1997.