Effect of magnetic field on the friction and wear caused by the scratch of high density polyethylene

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Abstract:

The present work discusses the friction and wear of polyethylene as bearing materials scratched by steel insert in the presence of magnetic field. Tests were carried out at dry and oil lubricated surfaces. Paraffin, fenugreek, camphor, cress and Habet El-Baraka oils were used as lubricants. The friction coefficient and wear of the tested composites were investigated using a tribometer designed and manufactured for that purpose. It was found that, at dry sliding, friction coefficient displayed the highest values, where a value of 1.5 was approached. Application of magnetic field on the sliding surface caused significant friction decrease. As the intensity of the magnetic field increases, friction coefficient decreased. Wear of polyethylene increased with increasing applied load, and significantly increased under the application of the magnetic field. Lubricating the sliding surface by paraffin oil significantly decreased friction coefficient, while magnetic field significantly decreased friction and increased wear. Friction coefficient displayed by fenugreek oil represented relatively higher values indicating the weak lubricating properties of that oil. As the magnetic field was applied, friction coefficient decreased. Wear in the presence of magnetic field significantly decreased. Camphor oil displayed relatively lower friction and wear values than that observed for fenugreek oil. Application of magnetic field on the sliding surface caused significant friction and wear reduction. Besides, friction coefficient and wear displayed by cress oil decreased as a result of the magnetic field. Finally, Habit El-Baraka oil displayed the lowest values of friction coefficient among the tested oils. The wear resistance observed was quite good.

Keywords:

Magnetic field, oil polarity, scratch, friction coefficient, wear, polyethylene.

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