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# Thermal End Effect on the Isotachophoretic Separation of Analytes

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**Abstract :** We investigate the thermal end effect on the pseudo-steady state behavior of the isotachophoretic transport of ionic species in a 2-D microchannel. Both ends of the channel are kept at a constant temperature which may lead to significant changes in electrophoretic migration speed. A mathematical model based on Nernst-Planck equations for transport of ions coupled with the equation for temperature field is considered. In addition, the charge conservation equations govern the potential field due to the external electric field. We have computed the equations for ion transport, potential and temperature in a coupled manner through the finite volume method. The diffusive terms are discretized via central difference scheme, while QUICK (Quadratic Upwind Interpolation Convection Kinematics) scheme is used to discretize the convective terms. We find that the thermal end effect has significant effect on the isotachophoretic (ITP) migration speed of the analyte. Our result shows that the ITP velocity for temperature dependent case no longer varies linearly with the applied electric field. A detailed analysis has been made to provide a range of the key parameters to minimize the Joule heating effect on ITP transport of analytes.

**Keywords :** finite volume method, isotachophoresis, QUICK scheme, thermal effect
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