Table 2A. Summary of relevant dimensionless numbers

Dimensionless number	Description (ratio of…)	Remarks	Relationships
Rayleigh $Ra = \alpha g \Delta T H^3/\nu\kappa$	diffusion to advection time scales	$Ra > Ra_{cr}$ is required for convection to occur. As Ra increases, behavior becomes more time-dependent.	
Peclet $Pe = u\, d/\kappa$	advection to diffusion	Relative size of advective over diffusive transport of passive scalar	
Prandtl $Pr = \nu/\kappa$	momentum to thermal diffusivities	relative size of thermal and momentum boundary layers	$Pr = Pe / Re$
Reynolds $Re = u\, d/\nu$	inertia to viscous forces		$Re \sim Ra^{2/3}/Pr$
Densimetric Froude $Fr_d = \frac{u}{\sqrt{(\Delta\rho/\rho)gd}}$	inertia to buoyancy forces		$Fr_d = \sqrt{\frac{Pr\,Re^2}{Ra}}$
Nusselt $Nu = Q_{tot}/Q_{cond}$	heat transfer normalized by conduction	In general, $Nu \sim Ra^{\sim 1/3}$	$Nu \sim Ra^{\sim 1/3}$
Biot $Bi = h/\delta k$	thermal resistance of magma chamber versus host rocks	$Bi << 1$ in real magmatic settings	
Stokes $St = \tau_p/\tau_f$	particle to fluid time scales	For $St << 1$, particles follow passively the fluid; $St > 1$, settling is important	
Stefan $Ste = c_p \Delta T/L$	sensible to latent heat	Large Ste represents phase transition that does not cost or release too much energy	
Schmidt $Sc = \nu/D$	momentum to mass diffusivities	Relative size of compositional and momentum boundary layers	
Buoyancy $B = \beta\Delta C/\alpha\Delta T$	compositional to thermal buoyancy	$B \sim 1$ and $Pr/Sc \neq 1$ promotes double diffusive convection	
$f_T = \frac{-\Delta T}{\eta_0}\frac{d\eta}{dT}$	viscosity range due to temperature dependence	Large values of f_T imply small ΔT for active boundary layers	
$f_C = \frac{-\Delta C}{\eta_0}\frac{d\eta}{dC}$	viscosity range due to compositional dependence	Large values of f_C implies small ΔC for active boundary layers	