**Table 2A.** Summary of relevant dimensionless numbers

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimensionless number** | **Description**  (ratio of…) | **Remarks** | **Relationships** |
| Rayleigh  Ra= *gTH*3*/* | diffusion to advection time scales | Ra > Racr is required for convection to occur. As Ra increases, behavior becomes more time-dependent. |  |
| Peclet  Pe= *u d/* | advection to diffusion | Relative size of advective over diffusive transport of passive scalar |  |
| Prandtl  Pr= */* | momentum to thermal diffusivities | relative size of thermal and momentum boundary layers | Pr = Pe /Re |
| Reynolds  Re= *u d/* | inertia to viscous forces |  | Re ~ Ra2/3/Pr |
| Densimetric Froude  Frd = | inertia to buoyancy forces |  |  |
| Nusselt  Nu = *Qtot*/*Qcon*d | heat transfer normalized by conduction | In general, Nu ~ Ra~1/3 | Nu ~ Ra~1/3 |
| Biot  Bi = *h/k* | thermal resistance of magma chamber versus host rocks | Bi << 1 in real magmatic settings |  |
| Stokes  St = *p/f* | particle to fluid time scales | For St << 1, particles follow passively the fluid; St > 1, settling is important |  |
| Stefan  Ste = *cpT/L* | sensible to latent heat | Large Ste represents phase transition that does not cost or release too much energy |  |
| Schmidt  Sc= */D* | momentum to mass diffusivities | Relative size of compositional and momentum boundary layers |  |
| Buoyancy  B = *C/T* | compositional to thermal buoyancy | B ~ 1 and Pr/Sc ≠ 1 promotes double diffusive convection |  |
|  | viscosity range due to temperature dependence | Large values of *fT* imply small *T* for active boundary layers |  |
|  | viscosity range due to compositional dependence | Large values of *fC* implies small *C* for active boundary layers |  |