Diffusion calculations with mass loss in hot white dwarfs and subdwarfs

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The combined effects of diffusion processes and weak winds have been investigated for hot white dwarfs on the upper cooling sequence with effective temperatures $T_{\rm eff} > 50000$K and for subdwarf B stars in the range 25000K $\leq$ T$_{\rm eff} \leq$ 40000K. Within the outer stellar envelope characterized by mass depths $< 10^{-2} M_*$ for the elements H, He, C, N and O the equations of continuity and the momentum equations are solved simultaneously. So from a given initial composition the time evolution of the various abundances is predicted. Detailed opacity calculations allow to take into account the effect of the changing composition on the temperature structure. The winds are assumed to be chemically homogeneous and the mass loss rate $\dot{M}$ is considered as a free parameter.The results show that for subdwarf B stars weak winds with $10^{-14} \leq \dot{M} \leq 10^{12} M_{\odot}/{\rm yr}$ may explain the typical helium deficiencies and lead to abundance anomalies of heavy elements. In addition, according to the location of these stars in the $T_{\rm eff} - \log g$ diagram the existence of weak winds is plausible. For hot white dwarfs we expect the onset of gravitational settling when during the cooling process the mass loss rate decreases below about $10^{-11} M_{\odot}/{\rm yr}$. For a final clarification of the chemical evolution of hot white dwarfs theoretical mass loss rates from hydrodynamical model atmospheres are required.