Page 148, equation (4.19)

Expression for $\partial\rho_\alpha\varphi/\partial t$ is modified substituting from (4.3) and (4.17); the summation convention is supposed:

$$\begin{aligned}
\frac{\partial\rho_\alpha\varphi}{\partial t} &= \rho_\alpha\frac{\partial\varphi}{\partial t} + \varphi\frac{\partial\rho_\alpha}{\partial t} = \rho_\alpha\left(\overset{\backslash\alpha}{\varphi} - v^i_\alpha\frac{\partial\varphi}{\partial x^i}\right) + \varphi\left[r_\alpha - \frac{\partial}{\partial x^i}(\rho_\alpha v^i_\alpha)\right] \\
&= \rho_\alpha\overset{\backslash\alpha}{\varphi} - \rho_\alpha v^i_\alpha\frac{\partial\varphi}{\partial x^i} + \varphi r_\alpha - \varphi\frac{\partial}{\partial x^i}(\rho_\alpha v^i_\alpha) \\
&= \rho_\alpha\overset{\backslash\alpha}{\varphi} - \frac{\partial}{\partial x^i}(\varphi\rho_\alpha v^i_\alpha) + \varphi r_\alpha \equiv \rho_\alpha\overset{\backslash\alpha}{\varphi} - \mathrm{div}\rho_\alpha\varphi\mathbf{v}_\alpha + \varphi r_\alpha
\end{aligned}$$

Eq. (4.19) follows immediately.