$$\left[\prod_{i=1}^{4}\left(\prod_{j=1}^{4} K\right)\tau_\alpha \exp\left(-\frac{\tau_\alpha^2}{2}\alpha_i^2\right)\right]\exp\left(-\tau_\alpha^2\right)$$

$$\propto \tau_\alpha^4 \exp\left(-\frac{\tau_\alpha^2}{2}\sum \alpha_i^2 - \tau_\alpha^2\right)$$

$$a\left(\tau_\alpha^2\right)^2 \exp\left(-\tau_\alpha^2\left(\frac{\sum \alpha_i^2}{2}+1\right)\right)$$

$$\text{gamma}\left(3, \frac{\sum \alpha_i^2}{2}+1\right)$$

$$\prod_i\left[\prod_j \exp\left(-\frac{\tau^2}{2}\left(\alpha_i-(y_i-\mu)\right)^2\right)\right]\exp\left(-\frac{\tau_\alpha^2}{2}\alpha_i^2\right)$$

$$\exp\left(-\frac{\tau^2}{2}\sum_j\left(\alpha_i-(y_{i,j}-\mu)\right)^2-\frac{\tau_\alpha^2}{2}\alpha_i^2\right)$$

$$\exp\left(-\frac{\tau^2}{2}\sum_j\left(\alpha_i^2-2\alpha_i(y_{i,j}-\mu)+(y_{i,j}-\mu)^2\right)-\frac{\tau_\alpha^2}{2}\alpha_i^2\right)$$

$$\exp\left(-\frac{\tau^2}{2}\left(4\alpha_i^2-2\alpha_i\sum_j(y_{i,j}-\mu)-\frac{\tau_\alpha^2}{2}\alpha_i^2\right)+\cdots\right)$$

$$\exp\left(-\frac{\tau^2}{2}4\alpha_i^2-\frac{\tau_\alpha^2}{2}\alpha_i^2-2\alpha_i\frac{\tau^2}{2}\sum_j(y_{i,j}-\mu)+\cdots\right)$$

$$\exp\left(-\frac{1}{2}\left[\left(\tau^2 4+\tau_\alpha^2\right)\alpha_i^2+\alpha_i 2\tau^2\sum_j(y_{i,j}-\mu)+\cdots\right]\right)$$

$$\exp\left(-\frac{1}{2}\left(4\tau^2+\tau_\alpha^2\right)\left(\alpha_i^2+\alpha_i\frac{2\tau^2}{4\tau^2+\tau_\alpha^2}\sum(y_{i,j}-\mu)+\cdots\right)\right)$$

$$\alpha_i \sim N\left(\frac{\tau^2}{4\tau^2+\tau_\alpha^2}\sum(y_{i,j}-\mu), \frac{1}{4\tau^2+\tau_\alpha^2}\right)$$