Identifying fifth powers, you find that $\sqrt[5]{512a^9b^5c^{14}} = \sqrt[5]{2^5 \cdot 16 \cdot a^5 \cdot a^4 \cdot b^5 \cdot \left(c^2\right)^5 \cdot c^4}$. This simplifies to $2abc^2 \sqrt[5]{16a^4c^4}$.