

7. Assuming conservation of volume, we find the radius of the combined spheres, then use $C = 4\pi\epsilon_0 R$ to find the capacitance. When the drops combine, the volume is doubled. It is then $V = 2(4\pi/3)R^3$. The new radius R' is given by

$$\frac{4\pi}{3}(R')^3 = 2\frac{4\pi}{3}R^3 ,$$

so

$$R' = 2^{1/3}R .$$

The new capacitance is

$$C' = 4\pi\epsilon_0 R' = 4\pi\epsilon_0 2^{1/3}R = 5.04\pi\epsilon_0 .$$