

Ch. 8

Prob. 52

spherical shells
make up a capacitor

$$r_1 = 5.00 \text{ cm}$$

$$r_2 = 8.00 \text{ cm}$$

a) What is the capacitance?

$$C = 4\pi\epsilon_0 \frac{R_1 R_2}{R_2 - R_1} = 4\pi \left(8.85 \times 10^{-12} \frac{\text{C}^2}{\text{Nm}^2} \right) \frac{(8.00 \times 10^{-2} \text{ m})(5.00 \times 10^{-2} \text{ m})}{(8.00 - 5.00) \times 10^{-2} \text{ m}}$$
$$= 1.48 \times 10^{-11} \text{ F}$$

b) Add dielectric with $K = 6.00$

$$C = K C_0 = (6.00)(1.48 \times 10^{-11} \text{ F})$$
$$= \boxed{8.98 \times 10^{-11} \text{ F}}$$