The Hindenberg

Let's model the famous Hindenberg blimp as a cylinder. Assuming it was 75 meters long and had a radius of 8 meters, how many moles of H_2 gas were present in the Hindenberg? [Hint: you may assume that the pressure of H_2 was 1 atm.]

The Hindenberg

How many moles of H_2 gas were present in the Hindenberg?

Solution: First, use the equation for a cylinder to calculate the volume.

$$V = \pi r^2 h = \pi(8\ m^2)(75\ m) = 15080\ m^3$$

Insert the value in the ideal gas law.

$$n = \frac{PV}{RT} = \frac{(1\ atm)(1.51\ x\ 10^7\ L)}{\left(0.08206\ \frac{Latm}{molK}\right)(298\ K)}$$
$$= 6.17\ x\ 10^5\ mol$$