

Answer on Question # 73066 - Chemistry - General Chemistry

Hydrogen sulfide, H₂S, is a gas that is responsible for the odor of rotten eggs. The solubility of H₂S(g) in water at STP is 0.195 M. What is the solubility of H₂S(g) in units of M in water at 0°C and a partial pressure of 0.698 atm?

Solution

The relevant equation here is the Henry's Law:

$$c = k_{\text{H}}P,$$

where k_{H} is the constant, c – molarity, P – pressure.

We rearrange and solve to get the Henry's Law constant:

$$k_{\text{H}} = c/P = 0.195\text{M}/1\text{atm} = 0.195 \text{ M/atm}.$$

To get the solubility at 0.698 atm, we use the above constant:

$$c = k_{\text{H}}P = 0.195 \text{ M/atm} (0.698 \text{ atm}) = 0.136 \text{ M}.$$

Answer: 0.136 M.

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