Answer on Question #61777 - Chemistry - General Chemistry

Question:

At the boiling point, the density of liquid nitrogen is 809 g/L and that of the gas is 4.566 g/L. How many liters of liquid nitrogen are produced when 241.0 L of nitrogen gas is liquefied at 77.36 K?

Solution:

1) As there are no any additional conditions are given we assume that given amount of gas is **fully** liquefied (no equilibrium gas phase).
2) Calculate the mass of nitrogen:
   $\text{Mass=volume*gas density} = 241.0\text{L} * 4.566\ \text{g/L} = 1100.406\text{g}.$
3) Find the volume of liquid nitrogen of mass calculated in step 2:
   $\text{Volume} = \text{mass/liquid density} = 1100.406\text{g}/809\text{g/L} = 1.360\ \text{L}.$

Answer:

1.360 L of liquid nitrogen is produced.