**Physics 2211K, Quiz # 11 Solution** **November 18, 2010**

***V cm³ of steam at T° C and a pressure of P atm is cooled enough to become liquid at room temperature.***

***a.*** Calculate ***how many moles of water*** are in the steam. $\boxed{n = \frac{PV}{RT}}$

***b.*** Calculate the ***mass of water (in kg).*** $\boxed{M = n\left(\frac{gMW_{H_2O}}{1000}\right)kg = n\left(\frac{18}{1000}\right)kg}$

***c.*** Calculate the ***volume of the liquid water (in m³ and in cm³).***

$$\boxed{V_{liquid} = \frac{M}{\rho_{liquid}} = \frac{M(kg)}{10^3 \frac{kg}{m^3}} = M \times 10^{-3}\ m^3 = M \times 10^3\ cm^3}$$

---

***<u>Version 1</u>: 3.00 x 10⁴ cm³ of steam at 400° C and a pressure of 30 atm is cooled enough to become liquid at room temperature.***

***a.*** $\boxed{n = 16.3\ mol}$

***b.*** $\boxed{M = 0.293\ kg}$

***c.*** $\boxed{V_{liquid} = 2.93 \times 10^{-4}\ m^3 = 2.93 \times 10^2\ cm^3}$

---

***<u>Version 2</u>: 8.00 x 10⁴ cm³ of steam at 500° C and a pressure of 35 atm is cooled enough to become liquid at room temperature.***

***a.*** $\boxed{n = 44.1\ mol}$

***b.*** $\boxed{M = 0.795\ kg}$

***c.*** $\boxed{V_{liquid} = 7.95 \times 10^{-4}\ m^3 = 7.95 \times 10^2\ cm^3}$

---

***<u>Version 3</u>: 1.50 x 10⁵ cm³ of steam at 450° C and a pressure of 35 atm is cooled enough to become liquid at room temperature.***

***a.*** $\boxed{n = 88.5\ mol}$

***b.*** $\boxed{M = 1.59\ kg}$

***c.*** $\boxed{V_{liquid} = 1.59 \times 10^{-3}\ m^3 = 1.59 \times 10^3\ cm^3}$

**Physics 2211K**
**Quiz # 11**
**November 18, 2010**

*Name:*_____

***8.00 x $10^4$ $cm^3$ of steam at 500° C and a pressure of 35 atm is cooled enough to become liquid at room temperature***.

***a.*** Calculate ***how many moles of water*** are in the steam.

***b.*** Calculate the ***mass of water (in kg).***

***c.*** Calculate the ***volume of the liquid water (in $m^3$ and in $cm^3$).***

***(Note: Take care with the units!!!)***

**Physics 2211K**
**Quiz # 11**
**November 18, 2010**

***Name:*** _____

***1.50 x $10^5$ $cm^3$ of steam at 450° C and a pressure of 35 atm is cooled enough to become liquid at room temperature***.

***a.*** Calculate ***how many moles of water*** are in the steam.

***b.*** Calculate the ***mass of water (in kg).***

***c.*** Calculate the ***volume of the liquid water (in $m^3$ and in $cm^3$).***

***(Note: Take care with the units!!!)***