CH1012 Tutorial 5

Name:

1. What is the **partial pressure** of methane in a gas vessel of 5 m^3 containing 16.0g of methane (CH_4) and 32.0g of oxygen at 297.8K.

2. What are the **van der Waals forces** and how do they affect the normal boiling point of liquids?

3. What is an **atomic orbital**?

4. What are the **quantum numbers** that define a 5s orbital? Give their values.

Additional information: pV = nRT $\left(p + \frac{n^2 a}{V^2}\right)(V - nb) = nRT$

$$\ell n\left(\frac{P_2}{P_1}\right) = \frac{-H_{vap}}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

Atomic masses
C= 12.0 H= 1.0 O= 16.0 S= 32.1

Constants
R = 8.31 Pa m^3 mol^{-1} K^{-1} T(K) = 273 + T(^{o}C) 1atm. = 101E3 Pa

5. Calculate the temperature at which n-butanol will boil at a pressure of 2666.4 Pa, if the normal boiling point is 118^{o}C. ΔH_{vap} (n-butanol) = 44.5 kJ mol^{-1}.

6. Describe the main features of the production of **pig iron** from the iron ore.

7. Explain the characteristics of **network covalent ceramics** using examples to illustrate your answer.