

Chemistry 101
Homework Problem Set # 10 (Last One!)
Due Monday, November 24

Name: _____

Section (circle): 01 02 03

These questions are based on chapters 8 and 3 of the textbook: Timberlake, K. *General, Organic and Biological Chemistry: Structures of Life (Platinum Edition)*. Specifically, see sections

- For each of the following problems, temperature and pressure are assumed to be constant.
 - 5.4 moles of neon gas (Ne) takes up a volume of 4.00 L. At the same temperature and pressure, what is the volume of 10.8 moles of neon gas?
 - A balloon with a volume of 2.32 L, contains 0.11 moles of gas at a particular temperature and pressure. How many moles of gas would you expect to be in a 4.0 L balloon at the same temperature and pressure?
 - 12.6 grams of neon gas (Ne) takes up a volume of 1.00 L. At the same temperature and pressure, what is the volume taken up by 20.0 grams of argon gas?
 - 4.0 grams of Helium gas fills up a container of a volume of 22.0 L. If the same container is filled with argon (Ar) instead, and the pressure and temperature is held constant, what is the mass of argon gas in the container?
- Use the ideal gas law to calculate the following:
 - The number of moles of gas when the gas sample has a volume of 1.32 L, a pressure of 1.00 atm and is at a temperature of 20°C.
 - The pressure of 0.235 moles of N₂ gas, filling a container of volume 325 mL at 50°C.
 - The volume of 5.25 grams of argon gas (Ar) at a temperature of 30°C and a pressure of 8.00 atm.
 - The temperature of a gas when 0.382 moles of gas with a volume of 2.00 L exerts a pressure of 2.00 atm.

- (e) The number of grams of O_2 gas in a container with a volume of 2.50 L and a temperature of $25^\circ C$, if the gas exerts a pressure of 3.5 atm.
3. A sample of air in an air-tight container with volume of 15.6 L at a temperature of $40^\circ C$ has a pressure of 1.00 atm. If the container is cooled to $30^\circ C$ and the container is enlarged to a volume of 20.2 L (without allowing any air in or out, what is the final pressure of the gas?)
4. Timberlake, problem 3.22 (Page 96, Read section 3.4 before attempting this problem - pages 92-96).
- (a) What is background radiation?
- (b) What are the SI unit and the older unit that describe the biological effect of radiation?
- (c) What is meant by the terms mCi and mrem?
- (d) Why is a factor used to determine the dose equivalent?
5. Timberlake, problem 3.30 (Page 100, Read section 3.5 before attempting this problem - pages 96-100). A sample of sodium-24 with an activity of 12 *mCi* is used to study the blood flow in the circulatory system. If sodium-24 has a half-life of 15 hours, what is the activity of the sodium after 2.5 days?
6. Suppose a piece of bone has $\frac{1}{32}$ of its original C-14 activity. About how many years ago was the creature alive? (See sample problem 3.9, pages 98-99.)