

ENGINEERING CHEMISTRY

Assignment Part

For

ENGINEERING AND APPLIED SCIENCE

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by

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- 1- A balloon has a volume of 2.32 liters at 24.0°C. The balloon is heated to 48.0°C. Calculate the new volume of the balloon. (2.51 L)

- 2- You are holding two balloons, an orange balloon and a blue balloon. The orange balloon is filled with neon (Ne) gas and the blue balloon is filled with argon (Ar) gas. The orange balloon has twice the volume of the blue balloon. Which of the following best represents the mass ratio of Ne:Ar in the balloons? (1:1)

- 3- A gas sample is heated from -20.0°C to 57.0°C and the volume is increased from 2.00 L to 4.50 L. If the initial pressure is 0.140 atm, what is the final pressure? (0.0811 atm)

- 4- Mercury vapor contains Hg atoms. What is the volume of 201 g of mercury vapor at 822 K and 0.512 atm? (132 L)

- 5- An automobile tire is filled with air at a pressure of 27.0 lb/in² at 25°C. A cold front moves through and the temperature drops to 5°C. Assuming no change in volume, what is the new tire pressure?

(25.2 lb/in²)

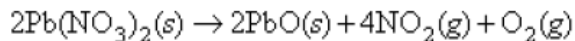
- 6- The mass of 1.12 liters of gas Y at STP is found to be 6.23 g. what is the molar mass of gas Y? (125 g/mol)

- 9- You carry out the reaction represented by the following balanced equation $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$

You add an equal number of moles of nitrogen and hydrogen gases in a balloon. The volume of the balloon is 1.00 L before any reaction occurs. Determine the volume of the balloon after the reaction is complete. Assume constant temperature. (0.67 L)

- 10- What volume does 40.5 g of N_2 occupy at STP? (32.4 L)

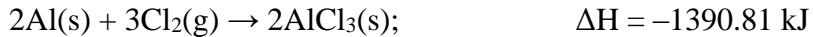
- 11- A 3.31-g sample of lead nitrate, $\text{Pb}(\text{NO}_3)_2$, molar mass = 331 g/mol, is heated in an evacuated cylinder with a volume of 2.37 L. The salt decomposes when heated, according to the equation:



Assuming complete decomposition, what is the pressure in the cylinder after decomposition and cooling to a temperature of 300. K? Assume the $\text{PbO}(s)$ takes up negligible volume. (0.260 atm)

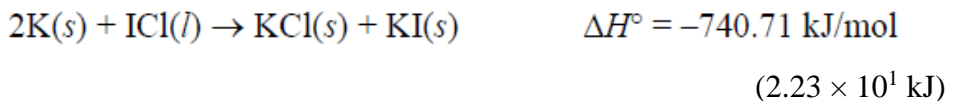
- 12- A 1.00-g sample of a gaseous compound of boron and hydrogen occupies 0.820 L at 1.00 atm and 3°C. What could be the molecular formula for the compound? (B_2H_6)

24- the following reaction:



- a) Is the reaction exothermic or endothermic?
- b) How much heat is produced/required when 10.0 g AlCl_3 forms. (52.2 KJ)
- c) How many grams of Al are required to absorb/evolve 1.00 kJ of energy?
(0.0388 g Al)

25- How much heat is liberated at constant pressure when 2.35 g of potassium metal reacts with 5.68 mL of liquid iodine monochloride ($d = 3.24 \text{ g/mL}$)?



32- For the reaction $\text{Cl}_2\text{O}(\text{g}) + \frac{3}{2}\text{O}_2(\text{g}) \rightarrow 2\text{ClO}_2(\text{g})$

$\Delta H^\circ = 126.4 \text{ kJ/mol}$ and $\Delta S^\circ = -74.9 \text{ J/K mol}$. At 361°C , what is ΔG ?

(173.9 kJ/mol)

33- Given the following data (ΔH_f , S° , respectively) for $\text{N}_2\text{O}_4(\text{l})$ -20. kJ/mol, 209.0 J/K mol, and $\text{N}_2\text{O}_4(\text{g})$ 10. kJ/mol, 304.2 J/K mol. What is temperature (in $^\circ\text{C}$) is the vaporization of N_2O_4 liquid spontaneous?

(Above 42°C .)

الكيمياء الهندسية

(جزء التمارين)

للهندسة والعلوم التطبيقية

2019

دكتور

علاء الدين السيد حساين

كيمياء – قسم العلوم الأساسية

معهد المستقبل العالى للهندسة والتكنولوجيا