



Physical Chemistry-Properties of Gases

55/100 Fifty line

09-02-2021
Dr. Abduljabbar I. R. Rushdi



Name of a student سماح خالد العبيد

Signature Sama

No.

University of Mustansiriyah

Department of Chemistry

1st Semester-2021

1st Exam-paper A

Q1: Circle the right answer for all of the following:

1: How many minutes are required to effuse H₂ gas if its molar mass is 2 g mol⁻¹ in comparison with (32 g mol⁻¹ min) O₂ gas?
Answer: a) 0.800 min b) 0.750 min c) 0.700 min d) 0.075 min

2: What is the right formula of the following equation?
Answer: a) $a = \frac{V_c}{3}$ b) $b = \frac{T_c}{3}$ c) $b = \frac{V_c}{3}$ d) $b = \frac{p_c}{3}$

3: Calculate the pressure of a gas occupying 3.0 dm³ at 36.5 K?
Answer: a) 10 atm b) 1 bar c) 10 bar d) 765 mmHg

4: Calculate the mass of (44 g mol⁻¹) CO₂ occupied 2 L cylinder at 8 atm and 273 K.
Answer: a) 31.44 g b) 31.44 g⁻¹ c) 33.44 g d) 31.44 mg

5: Calculate the density of (17 g mol⁻¹) ammonia gas under pressure of 760 mmHg and temperature 40 °C.
Answer: a) 0.66 g L b) 0.66 g L⁻¹ c) 0.66 g mL⁻¹ d) 0.66 L g⁻¹

6: It can know the gas is real or perfect from its?
Answer: a) volume b) pressure c) compression factor d) Gas constant

7: If you multiply mole fraction by total pressure then it can calculate?
Answer: a) no. of moles b) pressure of a gas c) temperature d) rate of flow

8: What is the partial pressure of a gas in a mixture if the X_i is 0.5, and the conditions are at STP?
Answer: a) 1.5 Pa b) 0.49 bar c) 0.5 atm d) 0.5 bar

9: The unit of R = 0.082 is?
Answer: a) K L mol⁻¹ atm b) K⁻¹ mol⁻¹ atm L c) K L mol⁻¹ J d) atm⁻¹ L mol⁻¹ K

10: You can know that the gas is heavy from its?
Answer: a) mass b) volume c) molar mass d) pressure

Q2: 8 moles of a gas are contained in a 40 dm³ container at a pressure of a 9120 mmHg and a temperature of 220 K. a) Calculate the compression factor, Z. b) Determine if the gas is ideally-behaved or real. c) Determine if repulsions or attractions is predominated in the gas.

Q3: Calculate the pressure exerted by 0.400 mol of acetic acid in 3 L container at 50 °C using Van der Waals equation (a = 17.71 atm L² mol² and b = 0.0237 L mol⁻¹).?

09/02/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

Q2/
a) $PV = ZRT$

$$Z = \frac{PV}{RT}$$

$$= \frac{12 \text{ atm} \times 40 \text{ K}}{0.082 \text{ atm} \cdot \text{K} / \text{mol} \cdot \text{K} \times 220 \text{ K}}$$

$$= 26.60$$

$$V = 40 \text{ dm}^3$$

$$P = \frac{9120 \text{ mm Hg}}{760 \text{ mm Hg}} = 12 ?$$

$$T = 220 \text{ K}$$

? units

b) $Z < 1$
 الغا صغرى
 لان معامل الانضغاط (الجزيون) (1)

Q2 $\frac{23}{25}$

c) قوة تنافر هي سائدة

Q3/
 $(P + \frac{an^2}{V^2})(V - nb) = nRT$

$$P = \frac{nRT}{V - nb} - \frac{an^2}{V^2}$$

$$P = \frac{0.400 \text{ mol} \times 0.082 \text{ atm} \cdot \text{K} / \text{mol} \cdot \text{K} \times 323 \text{ K}}{3 \text{ L} - 0.400 \text{ mol} (0.0237) \text{ L/mol}} - \frac{17.71 \text{ atm} \cdot \text{K} \times (0.400)^2 \text{ mol}^2}{(3 \text{ L})^2}$$

$$P = \frac{10.59 \text{ atm}}{6.48 \text{ L}} - \frac{2.8336 \text{ mol}}{9 \text{ L}}$$

$$P = 1.634 \text{ atm/L} - 0.3147 \text{ mol/L} \times \text{atm}$$

$$P = 1.3192 \text{ atm mol}$$

$$3.5 \text{ atm}$$

$$3.5 \text{ atm} - 0.3147 \text{ atm}$$

$$3.218 \text{ atm}$$

$$V = 3 \text{ L}$$

$$\Delta T = 273 + 50^\circ \text{C} ?$$

$$= 323 \text{ K}$$

$$R = 0.082 \text{ atm} \cdot \text{L} / \text{mol} \cdot \text{K}$$

$$n = 0.400 \text{ mol}$$

$$17.71 \text{ atm} \cdot \text{K} \times (0.400)^2 \text{ mol}^2$$

$$(3 \text{ L})^2$$

$$\text{atm} \cdot \text{L} \cdot \text{mol}^2$$

Q3 $\frac{12}{25}$