



Physical Chemistry\_Chpt\_One\_Properties of Gases

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23-11-2021  
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Name of a student

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Signature

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No. 4

University of Mustansiriyah

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Department of Chemistry

1<sup>st</sup> Exam-paper B

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

(50 points)

1: A vessel of 5000 mL capacity contains a certain amount of gas at 313 K and 2 bar pressure. The gas is transferred to another vessel of volume 10000 mL at 40 °C. What should be its pressure?

Answer: a) 1.0 atm b) 1.0 mmHg c) 75 cmHg d) 1.5 bar

2: If the particles of a gas are polar that means the difference between  $p_{ideal}$  and  $p_{real}$  is

Answer: a) low b) equal c) high

3: Calculate the temperature of 5000 mmol of a gas occupying 5.0 dm<sup>3</sup> at 3.3 · 10<sup>5</sup> Pa?

Answer: a) 40.2 °C b) 40.2 K c) 44.2 °C d) 44.2 K

4: Calculate the weight of NH<sub>3</sub> (17 g · mol<sup>-1</sup>) in a 4 L cylinder at 8 atm and 300 K.

Answer: a) 22.11 kg b) 22.11 g c) 23 K d) 23 °C

5: Calculate the  $p_c$  of a gas, if the  $p_r$  is 0.44 and  $p$  is 1 bar.

Answer: a) 2.27 K b) 2.27 atm c) 2.27 L d) 2.27 mol

6: If the attraction forces are calculated, that means the gas is?

Answer: a) real b) noble c) perfect d) compressed

7: According to the Dalton's law total mole fraction is equal to?

Answer: a)  $\sum n$  b)  $\sum p_i$  c)  $\sum p_r$  d)  $\sum \chi$

8: What is the partial pressure of a gas in a mixture, if the  $X_i$  is 1, and the conditions are at STP?

Answer: a) 0.99 torr b) 0.89 bar c) 0.900 atm d) 1.01 bar

9: At high pressure the  $Z > 1$  which means the dominated forces are?

Answer: a) Van der Waal's b) equal c) repulsions d) attractions

10: According to Avogadro's law the amount of a gas at STP is?

Answer: a) 1.00 mol b) 2.00 mol c) 1.00 mmol d) 2.00 mmol

Q2: The air inside a flexible 3.5 L container has a pressure of 115 kPa. What should the volume of the container be increased to in order to decrease the pressure to 625 torr? (25 points)

Q3: A 3 dm<sup>3</sup> container holds 0.5 moles of N<sub>2</sub> gas at 42 °C. What is the pressure inside the container? (25 points)

- Q1
- ①
  - ②
  - ③
  - ④
  - ⑤

- ⑥
- ⑦
- ⑧
- ⑨
- ⑩

Q2

$V_1 = 3.5 \text{ L}, P_1 = 115 \text{ kPa}, V_2 = ?, P_2 = 625 \text{ torr}$

$1 \text{ atm} = 760 \text{ torr} \Rightarrow = \frac{625}{760} = 0.82 \text{ atm}$

$\frac{P_1}{P_2} = \frac{V_1}{V_2} \Rightarrow = \frac{115 \text{ kPa}}{0.82 \text{ atm}} = \frac{3.5 \text{ L}}{V_2} \Rightarrow V_2 = \frac{0.82 \text{ atm} * 3.5 \text{ L}}{115 \text{ kPa}}$

$V_2 = \frac{2.87}{115 \text{ kPa}} \Rightarrow V_2 = 0.024 \text{ L}$

*should be converted to atm like*

*Q2 15/25*

Q3

$V_1 = 3 \text{ dm}^3, n = 0.5 \text{ mol}, T = 42^\circ \text{C}, P = ?$

$T_C = T_C + 273 \text{ K}$

$= 42 + 273 \text{ K} \Rightarrow T = 315 \text{ K}$

$PV = nRT$

$P * 0.003 \text{ K} = 0.5 \text{ mol} * 0.082 \text{ K*atm} * 315 \text{ K}$

$P = \frac{0.5 * 0.082 \text{ atm} * 315}{0.003}$

$P = 12.915 \text{ atm} \Rightarrow P = 430 \text{ atm}$

*dm<sup>3</sup> ≡ L*

*Q3 15/25*