A

**Physical Chemistry_Chpt_One_Properties of Gases**

Name of a student **Yousif nabil Abd-Alsatar** -------- Signature ------------ No. -----------

| University of Mustansiriyah | 1st Semester-2021 |
|---|---|
| Department of Chemistry | 1st Exam-paper C |

**Q1: Circle the right answer for all of the following:** (50 points)

**1:** If a gas has polar particles then the difference between the volume of this gas is:
Answer: **a) $V_{Real} > V_{Perfect}$**    b) $V_{Real} < V_{Perfect}$    c) $V_{Real} = V_{Perfect}$    d) $V_{Real} \neq V_{Perfect}$

**2:** A gas occupies $60 \times 10^3$ mL at 150 °C and 760 mmHg pressure. What would be its volume at STP?
Answer: a) 38.7 mL    **b) 38.7 dm$^3$**    c) 38.7 L$^{-1}$    d) 38.7 dm$^{-3}$

**3:** Calculate the weight of $H_2O$ gas (18 g.mol$^{-1}$) in a 5 L cylinder at $10 \times 10^2$ kPa and 373 K.
Answer: a) 29.40 g mol$^{-1}$    **b) 29.40 g**    c) 29.40 mol    d) 29.40 kg

**4:** Calculate the density of $H_2O$ placed in a 22400 mL cylinder at $10^5$ Pa and 0 °C.
Answer: a) 0.804 kg L$^{-1}$    **b) 0.804 g L$^{-1}$**    c) 0.804 g    d) 0.804 L$^{-1}$

**5:** According to Graham's law the heaviest gas is?
Answer: a) $H_2O$    b) $CH_4$    c) $NH_3$    **d) $Cl_2$**

**6:** A tank contains a certain amount of gas at $10^5$ Pa. The gas is transferred to another tank 40 dm$^3$ with pressure of $200 \times 10^3$ Pa. What should be its volume?
Answer: a) 80 L    b) 80 Pa L    **c) 80 Pa dm$^3$**    d) 80 L$^{-1}$

**7:** According to Boyle's law the pressure of a gas is inversly proportional with?
Answer: a) p    b) T    c) R    **(d) V**    e) n

**8:** The difference between real and ideal gas, that the real gas interested in?
Answer: **a) V & p**    b) V & T    c) p & n    d) T & p

**9:** It can follow the direct proportional between temperature and pressure through the law of
Answer: **a) Van der Waal**    b) Graham    c) Charles    d) Gay-Lussac

**10:** The behaviour of real gas is ideal when the value of Z is equal to
Answer: a) $V_m < V^O_m$    **b) $V_m > V^O_m$**    c) $V_m = V^O_m$    d) $V_m \neq V^O_m$

**Q2:** The following data have been observed for 800 mg of nitrogen gas at 273 K. Calculate the best value of the molar mass of $N_2$. (25 points)

| p/$10^5$ Pa | 0.750 | 0.500 | 0.200 |
|---|---|---|---|
| V/dm$^3$ | 3.0 | 4.5 | 7.0 |

**Q3:** A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 dm$^3$. The $p_f$ and $V_f$ of the gas are $2 \times 10^2$ kPa and 2.14 dm$^3$, respectively. Calculate the $p_{original}$ of the gas in (i) bar, (ii) torr. (25 points)

Wed_10/11/2021                Best wishes                Dr Abduljabbar I. R. Rushdi

Q2/

$$PV = nRT \implies PV = \frac{m}{M} RT$$

① $0.750 * 3.0 = \frac{800 \, mg}{M} * 0..0182 * 273K$   ? ? $\equiv$ units

$m = 800 mg$
$T = 273K$
$M = ?$

| P/10⁵Pa | ① 0.750 | ② 0.500 | ③ 0.200 |
|---|---|---|---|
| V/dm³ | 3.0 | 4.5 | 7.0 |

$2.25 * M = 3.9$

$M = \frac{3.936}{2.250} = 1.6$

② $0.500 * 4.5 = \frac{800}{M} * 0.0182 * 273$

$2.25 * M = 3.9$

$M = \frac{3.9}{2.25} = 1.6$   ?   $Q_2 \frac{15}{25}$

③ $0.200 * 7 * M = 3.9$

$1.4 * M = 3.9$

$M = \frac{3.9}{1.4} = 2.78$ ?

Q3/

$Q_3 \frac{0}{25}$

NO ANSWER why?