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# Physical Chemistry_Chpt_One_Properties of Gases

Name of a student ---------- Signature ---------- No. 13

**University of Mustansiriyah** — **1st Semester-2021**

**Department of Chemistry** — **1st Exam-paper E**

**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)**

**Thur_11/11/2021** **Best wishes** **Dr Abduljabbar I. R. Rushdi**

Q2

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

$M = \frac{mRT}{PV}$

$M = \frac{8 \times 0.082 \text{ dtm K/mol}^{-1}}{0.3 \times 0.740 \text{ dtm}}$

$M = \frac{8 \times 0.082 \text{ dtm.K/mol}^{-1}}{4.5 \times 0.048}$

Q2 8/25

Q3

$P_1V_1 = V_2P_2$

Q3 2/25