# Physical Chemistry-Properties of Gases

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

**University of Mustansiriyah**

**Department of Chemistry**

**1st Semester-2021**

**1st Exam-paper A**

**(50 degrees)**

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

**1:** A vessel of 100 L capacity contains a certain amount of gas at 50 °C and 0.5 bar pressure. The gas is transferred to another vessel has a pressure of 5 bar at 50 °C. What should be the volume of the vessel?

**Answer:** a) 10 bar b) 10 $dm^3$ c) 0.1 $dm^3$ d) 0.1 bar

**2:** What is the right formula of the Graham's law of effusion?

**Answer:** a) $\frac{r_1}{t_2} = (\frac{r_2}{M_1})^{\frac{1}{2}}$ b) $\frac{r_1}{r_2} = (\frac{M_1}{M_2})^{\frac{1}{2}}$ c) $\frac{d_1}{d_2} = (\frac{M_2}{M_1})^{\frac{1}{2}}$ d) $\frac{r_1}{r_2} = (\frac{d_2}{M_1})^{\frac{1}{2}}$

**3:** Calculate Z for a gas if T is 22 °C, $V_m$ is 5 $dm^3\ mol^{-1}$ and p is 3 bar.

**Answer:** a) 0.62 °C b) 6.2 K c) 0.62 d) 6.2

**4:** Calculate the molar mass of $O_2$ (16 $g.mol^{-1}$) in a 4 L cylinder at 9 atm and 281 K.

**Answer:** a) 32 $g.mol^{-1}$ b) 32 g c) 50 $g.mol^{-1}$ d) 50 g

**5:** Calculate the $V^o m$ of a gas, if p is 1 atm and temperature is 32 °C.

**Answer:** a) 25 K b) 25 atm c) 25 L $mol^{-1}$ d) 25 mol

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

**Answer:** a) real b) noble c) perfect d) expands

**7:** According to the Dalton's law the unit of the mole fraction is?

**Answer:** a) mol b) $dm^3$ c) psi d) free of units

**8:** What is the partial pressure of a gas in a mixture if the $X_i$ is 0.1, and under atmospheric pressure?

**Answer:** a) 760 mmHg b) 10 bar c) 0.1 atm d) 1 bar

**9:** If the value of R is 0.082 then the unit of pressure is?

**Answer:** a) Pascal b) mmHg c) Psi d) bar

**10:** What is the right equation of one of the following?

**Answer:** a) $p_r p_c = p$ b) $p_r p = p_c$ c) $p_r / p_c = p$ d) $p_r = p_c p$

**Q2: Calculate the mass of 335 mL of sulfur dioxide (64 g $mol^{-1}$) measured at 37 °C and 745 mm Hg pressure.?**

**(25 degrees)**

**Q3: Calculate the volume of 0.25 g of oxygen at 25 °C and 742 mm Hg pressure.**

**(25 degrees)**

**Wed_20/01/2021**

**Best wishes**

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Q2/ $PV = nRT$ ? = units

mass = ? $\left(V = \frac{335}{1000} = 0.335\ L\right)$ $M = 64\ g\ mol^{-1}$

$(T = 37 + 273) = 310K$ $(P = 745\ mmHg = 1\ atm)$

$PV = nRT$

$Pv = \frac{m}{m.wt} RT$

$(1 . 0.335) = \frac{M}{64\ g.mol} . 0.082 . 310$ ?

$M = \frac{21.44}{25.42} = 0.84g$

Q2 18/25

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Q3/

$P = 742\ mmHg$ $T = 25c^{\circ}$ $M = 0.25g$

$m.wt = 16\ g/mol$

$PV = nRT$

$(PV) = \frac{M}{M.wt} RT$

$(742\ V) = \frac{0.25g}{16\ g/mol}\ 0.082 . 25c^{\circ}$

$O_2 = 16 \times 2 = 32\ g/mol$

$(742V) = 0.02$

$V = \frac{0.02}{\frac{742}{1000}} = \frac{0.02}{0.742} = 0.026\ mL$

Q3 10/25