P2

50/100 Fifty Only

Physical Chemistry_Chpt_One_Properties of Gases

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University of Mustansiriyah — 1st Semester-2021

Department of Chemistry — 1st Exam-paper D

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

1: According to van der Waal's corrections if $V_{Real} < V_{Perfect}$ of any gas that means the gas has:
Answer: a) non-polar particles 0/5 b) polar particles c) small particles d) big particles

2: Calculate the weight of CO_2 gas (44 g.mol^{-1}) in a 0.5×10^4 mL cylinder at 20×10^2 kPa and 25 °C.
Answer: a) 180 g mol^{-1} b) 180 g c) 180 mol d) 180 kg 5/5

3: Calculate the density of CO_2 placed in a 22.4×10^3 mL cylinder at 20×10^2 kPa and 298 K.
Answer: a) 36.06 kg L^{-1} b) 36.06 g L^{-1} 5/5 c) 36.06 g d) 36.06 L^{-1}

Q1 30/50

4: According to Graham's law the heaviest gas has?
Answer: a) low rate 5/5 b) high rate c) middle rate d) low density

5: A gas occupies 20 dm^3 at 90 °C and 760 torr pressure. What would be its volume at STP?
Answer: a) 15.04 mL b) 15.04 dm^3 c) 15.04 L^{-1} d) 15.04 dm^{-3} 0/5 NO ANSWER

6: A vessel contains a certain amount of gas at 80×10^5 Pa. The gas is transferred to another tank 20 dm^3 with pressure of 20×10^3 Pa. What should be its volume?
Answer: a) 0.5 L 5/5 b) 0.5 Pa L c) 0.5 Pa dm^3 d) 0.5 L^{-1}

7: According to Avogadro's law n is directly proportional with volume at constant?
Answer: a) p & V b) T & p 5/5 c) T & V d) p & n e) R & P

8: Attractive and repulsive forces between particles are present in a?
Answer: a) perfect gas b) non-ideal gas c) ideal gas d) noble gas 0/5

9: It can follow the direct proportional between temperature and volume through the law of
Answer: a) Van der Waal b) Graham c) Charles 5/5 d) Gay-Lussac

10: The mol fraction of atmospheric pressure is equal to?
Answer: a) zero b) one c) two d) three NO ANSWER 0/5

Q2: The following data have been observed for 10000 mg of CO_2 gas at 273 K. Calculate the best value of the molar mass of CO_2. (25 points)

p/10^2 kPa	1.00	2.00	3.00
V/L	4.00	7.50	11.75

Q3: A perfect gas undergoes isothermal expansion, which increases its volume by 2.48 dm^3. The p_i and V_i of the gas are 2×10^2 kPa and 2.14 dm^3, respectively. Calculate the p_f of the gas in (i) bar, (ii) torr. (25 points)

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

Q2 M.wt = ? CO_2 wt = 10000 mg = 10 wt(g)

t = 273

10^2 10^2 kPa ≡ 10^5 Pa ≡ 1 atm or 1 bar

P = 1 kPa 1000 Pa 9.86×10^{-3}

V = 4 L

Pv = nRt

$9.86 \times 10^{-3} * 4 = \frac{10}{M.wt} * 0.082$

$0.0392 X \frac{0.82}{M.wt}$

$M.wt = \frac{0.082}{0.0392}$ g/mol = 20.9

P = 2 kPa 2000 Pa 0.019

V = 7.50 L

$0.019 * 7.50 = \frac{10}{M.wt} * 0.082$

$0.1425 = \frac{0.82}{M.wt}$

$M.wt = \frac{0.82}{0.1425} = 5.75$

you don't explain how you get this unit!

10/25

P = 3 kPa 0.02

V = 11.75

$0.02 * 11.75 = \frac{10}{M.wt} * 0.082$

$0.235 = \frac{0.82}{M.wt}$

$M.wt = 3.4$

Q3 $P_i = 2 \times 10^2$ kPa → atm = 1.97

$V_i = 2.14$ dm³

$V_f = 2.48$ dm³

بما انه الحجم ازداد الضغط يقل

$P_1 V_1 = P_2 V_2$

2 atm ≡ 2×10^5 Pa * 2.14 = P_2 * 2.48

$424000 = P_2 * 2.48$

$P_2 = \frac{424000}{2.48} = 172.5$ Pa ÷ 101325 = 1.70×10^{-3} atm

no need

is this acceptable

torr = $1.70 \times 10^{-3} * 760 = 1.292$ torr

10/25

atm > Pa !

1 kP → $P_1 = 2 \times 10^5$ Pa

katm = Pa | 101325

Pa = 1 atm ÷ 101325

atm → torr * 760

? ≡ units