Name: _____ date: _____ period: _____

Ch. 12 (ngss) atmosphere / ch. 13 gas (chem) **test** 50 points (5 ec) ngss chem

In problems involving calculations, show your work in an organized manner, include the appropriate formula / equation, conversion factors, and units in your answer.

1. Describe the role of atmospheric carbon dioxide in global warming, which was illustrated in the phet "The green house effect" simulation. Include a description of the mechanism of this action. [10 points]

5pt: absorb radiated energy from ground

5pt: re emit / radiate to surface / space

2. Describe the effect(s) of clouds on temperature, which was / were illustrated in the phet "The green house effect" simulation. Include a description of the mechanism(s) of these actions. hint: prior chapter on the effect of clouds during the day versus at night. [10 points]

5pt: reflect sunlight → cool

5pt: absorb / reemit / radiate → warm

3. At 21 °C, a 25 mL syringe has a pressure of 95 kPa; what is the pressure, when the syringe's volume is increased to 35 mL ? [5 points]

2 pt → $P_1V_1 = P_2V_2$

$95\ kPa\ (25\ mL) = P_2\ 35\ mL$

$P_2 = \frac{95\ kPa \cdot 25\ mL}{35\ mL}$

$= 67.9\ kPa$

2

1

$T = 21\ ^\circ C$

4. Based on a hypothetical Boyles' law lab experimental data, where graphical analysis of a volume of syringe (in mL) versus 1 / P (in units of 1 / kPa) is a straight line with a slope = 3545 --- you'll have to determine its units, what is the number of moles of gas in the syringe ? [15 points]

5 pt i) $\text{slope} = \frac{mL}{\left(\frac{1}{kPa}\right)} = mL\ kPa$

2 ii) $\text{slope} = nRT$

$n = \frac{\text{slope}}{RT}$

6 $= \frac{3545\ mL\ kPa}{\left(0.0821 \frac{L\ atm}{mol\ K}\right)(21+273)K} \quad \frac{4\ th}{101.3\ kP} \quad \frac{L}{10^3\ mL}$

2 $= 1.45 \cdot 10^{-3}\ mol$

5. A 5.0 L container at 37 °C has 8.0 grams of hydrogen gas, 28 grams of nitrogen gas, and 64 grams of oxygen gas. What is ___ ? [15 points]

a. partial pressure of hydrogen

7 pt i) $n_{H_2} = 8{,}5\ H_2 \quad \frac{mol\ H_2}{2{,}5\ H_2} = 4\ mol$

1 ii) $P_{H_2} = \frac{n_{H_2} RT}{V}$

2 $= \frac{4\ mol \left(0.0821 \frac{L\ atm}{mol\ K}\right)(37+273)K}{5\ L}$

1 $= 20.4\ atm$

b. mole fraction of hydrogen

7 pt i) $n_{N_2} = 28{,}5\ N_2 \quad \frac{mol\ N_2}{28{,}5\ N_2} = 1\ mol$

1 $n_{O_2} = 64{,}5\ O_2 \quad \frac{mol\ O_2}{32{,}5\ O_2} = 2\ mol$

1 ii) $\chi_{H_2} = \frac{n_{H_2}}{n_{total}} = \frac{n_{H_2}}{n_{H_2} + n_{N_2} + n_{O_2}}$

2 $= \frac{4}{4+1+2} = \frac{4}{7} = 0.57$

c. total pressure

2 pt $P_{H_2} = \chi_{H_2} P_{total}$

2 $20.4\ atm = 0.57\ P_{total}$

1 $P_{total} = 35.8\ atm$