AP Chemistry Multiple Choice Questions - Chapter 11

1 Convert the following pressure measurement to atmospheres:
325 kPa

a 5.23 atm
b 0.98 atm
c 7.22 atm
d 3.21 atm

	11.1

2 Convert the following pressure measurement to millibars:
27.0 psi

a 1860 mb
b 1.86 mb
c 18.6 mb
d 18600 mb

	11.1

3 Convert the following pressure measurement to Pascals:
2.5 atm

a 0.25 Pa
b 250000 Pa
c 25000 Pa
d 250 Pa

	11.1

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1 Which of the following is a statement of Boyle's Law? **11.2**

a V = kn (P, T constant)
b P = kT (V, n constant)
c PV = k (n, T constant)
d V = kT (n, P constant)

2 A gas at 30°C and 1 atm pressure has a volume of 3.50 L. What volume is the gas at 40°C and 1 atm? **11.2**

a 2.63 L
b 4.67 L
c 3.39 L
d 3.62 L

3 A sample of gas at 750 torr and a temperature of -50°C and a volume of 3.00 L is allowed to change so that the temperature is 200°C and gas pressure is 845 torr. What is the new volume? **11.2**

a 5.65 L
b 1.26 L
c 7.17 L
d 0.499 L

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1 What is the gas density of C_2H_2 at STP in units of g/L?

a 2.12 g/L
b 1.83 g/L
c 1.16 g/L
d 0.850 g/L

11.3

2 Which flask contains the smallest number of moles of gas?

a Flask 1: N_2, 30°C, 1 atm
b Flask 2: N_2, 50°C, 0.5 atm
c Flask 3: O_2, 40°C, 2 atm
d Flask 4: O_2, 50°C, 1 atm
e Flask 5: O_2, 40°C, 0.5 atm

11.3

3 Which flask contains the sample with the greatest density?

a Flask 1: N_2, 30°C, 1 atm
b Flask 2: N_2, 50°C, 0.5 atm
c Flask 3: O_2, 40°C, 2 atm
d Flask 4: O_2, 50°C, 1 atm
e Flask 5: O_2, 40°C, 0.5 atm

11.3

4 How many moles of hydrogen gas are in a sample of H_2 gas with a volume of 9.00 L at a temperature of 100°C and at a pressure of 2.00 atm?

a 2.19 moles
b 0.588 moles
c 0.429 moles
d 0.0289 moles

11.3

5 A scuba diving tank is filled with 42 L of O_2 at 1.00 atm and 10 L of He at 1.00 atm and 27°C. The tank has a total volume of 6.0 L. What is the total pressure in the scuba tank at 25°C?

a 5.3 atm
b 8.6 atm
c 10.3 atm
d 12.6 atm

11.3

6 43.2 g of a gas occupies 22.4 L at 200°C and 2.00 atm. What is its molar mass?

a 49.9 g/mol
b 37.6 g/mol
c 21.6 g/mol
d 13.2 g/mol

11.3

7 At STP how many molecules of O_2 are present in 11.2 L?

a 1.20×10^{24}
b 6.02×10^{23}
c 3.01×10^{23}
d 1.51×10^{23}

11.3

1 A sample of $KClO_3$ is heated and decomposed as follows:

$2KClO_3$ (s) ---> $2KCl$ (s) + $3O_2$ (g)

If 3.00 g of $KClO_3$ is totally decomposed and the evolved O_2 collected in a 1.00 L vessel at 22°C, what pressure will the O_2 exert?

11.4

a 0.245 atm
b 0.389 atm
c 0.811 atm
d 0.889 atm

2 What is the total volume of gas, in liters, at 520°C and 880 torr that would result from the decomposition of 33 g of potassium bicarbonate according to the following equation:

$2\ KHCO_3$ (s) --> K_2CO_3 (s) + CO_2 (g) + H_2O(g)

11.4

a 56 L
b 37 L
c 10. L
d 19 L
e 12 L

3 Calculate the weight of $KClO_3$ that would be required to produce 29.5 L of oxygen at 127°C and 760 torr:

$2\ KClO_3$ (s) --> $2\ KCl$ (s) + $3\ O_2$ (g)

11.4

a 7.82 g
b 12.2 g
c 14.6 g
d 24.4 g
e 73.5 g

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1 A 2L sample of N_2 (g) and a 1 L sample of Ar (g), each originally at 1 atm and 0°C, are combined in a 1L tank. If the temperature is held constant, what is the total pressure of the gases in the tank?

	11.5

a 1 atm
b 2 atm
c 3 atm
d 4 atm
e 5 atm

2 The pressure of a gas is measured using a U-shaped manometer. The height of the mercury in the manometer is 13 cm on the side connected to the sample and 26 cm on the side connected to the atmosphere. Atmospheric pressure is 752 torr. What is the gas pressure of the sample?

	11.5

a 882 torr
b 765 torr
c 752 torr
d 622 torr

3 A sealed container contains 1.0 mol of hydrogen and 2.0 moles of nitrogen gas. If the total pressure in the container is 1.5 atm, what is the amount of pressure exerted by each gas?

	11.5

a H_2 = 1.0 atm and N_2 = 0.50 atm
b H_2 = 0.5 atm and N_2 = 1.0 atm
c H_2 = 1.0 atm and N_2 = 2.0 atm
d H_2 = 2.0 atm and N_2 = 1.0 atm

4 A sample of H_2 gas is collected by water displacement. The atmospheric pressure in the room is 757 mm Hg and the vapor pressure of water is 17 mm Hg. What is the partial pressure of hydrogen here?

	11.5

a 17 mm Hg
b 740 mm Hg
c 757 mm Hg
d 774 mm Hg

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1 In which flask do the molecules have the greatest speed?

a Flask 1: N_2, 30°C, 1 atm

b Flask 2: N_2, 50°C, 0.5 atm

c Flask 3: O_2, 40°C, 2 atm

d Flask 4: O_2, 50°C, 1 atm

e Flask 5: O_2, 40°C, 0.5 atm

11.6

2 Which of the following statements is true according to the kinetic molecular theory?

a Gravitational forces act upon gas particles

b Average KE of gas particles is proportional to K temp

c Gas particles exert forces upon each other

d Gas particles have measurable volumes

11.6

3 The table below contains information about samples of four different gases at 273K. The samples are in four identical rigid containers numbered 1 through 4

Container	Gas	Pressure (atm)	Mass (g)
1	He	2.00	?
2	Ne	2.00	?
3	?	2.00	16.0
4	SO_2	1.96	64.1

Under the conditions given, consider containers 1, 2, and 4 only. The average speed of the gas particles is

a Greatest in container 1

b Greatest in container 2

c Greatest in container 4

d The same in containers 1, 2, and 4

11.6

4 The table below contains information about samples of four different gases at 273K. The samples are in four identical rigid containers numbered 1 through 4

Container	Gas	Pressure (atm)	Mass (g)
1	He	2.00	?
2	Ne	2.00	?
3	?	2.00	16.0
4	SO_2	1.96	64.1

On the basis of the data above, the gas in container 3 could be

a CH_4

b O_2

c Ar

d CO_2

11.6

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	11.6

5 The average volume of a sample of air in a cylinder with a movable piston is 2.0 L at a pressure P_1. The volume is increased to 5.0 L as the temperature is held constant. The pressure of the air in the cylinder is now P_2. What effect do the volume and pressure changes have on the average kinetic energy of the molecules in the sample?

a The average kinetic energy increases

b The average kinetic energy decreases

c The average kinetic energy stays the same

d It cannot be determined how the kinetic energy is affected without knowing P_1 and P_2

	11.6

6 The table below contains information about samples of four different gases at 273K. The samples are in four identical rigid containers numbered 1 through 4

Container	Gas	Pressure (atm)	Mass (g)
1	He	2.00	?
2	Ne	2.00	?
3	?	2.00	16.0
4	SO_2	1.96	64.1

The best explanation for the lower pressure in container 4 is that SO_2 molecules

a Have a lower average speed than the other three gases

b Occupy a larger portion of the container volume than the other three gases

c Have stronger intermolecular attractions than the other three gases

d Contain pi bonds, while the other gases contain only sigma bonds

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1 How many times faster (or slower) will H_2 gas pass through a pinhole than HF (g)?

a 0.101 **b** 0.318

c 3.15 **d** 9.91

	11.7

2 Which of the following gases will have the smallest rate of effusion?

a H_2 **b** He

c N_2 **d** Ne

e CO

	11.7

3 He has an effusion rate of 0.00274 mol/sec. Which of the gases below would have an effusion rate of 0.000551 mol/sec?

a CH_4 **b** Xe

c $COCl_2$ **d** Ar

e Ne

	11.7

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1 Which of the following is not a property of a gas under normal conditions?

a Flows easily
b Compressible
c Completely fills its container
d High Density

	11.8

2 A real gas typically exhibits behavior that is closest to an ideal gas at

a High pressure and low temperature
b High pressure and high temperature
c Low pressure and low temperature
d Low pressure and high temperature

	11.8

3 Under which of the following conditions of temperature and pressure will H_2 gas be expected to behave most like an ideal gas?

a 50 K and 0.10 atm
b 50 K and 5.0 atm
c 500 K and 0.10 atm
d 500 K and 50 atm

	11.8