8 pts. total

a) $PV = nRT$

$P = \frac{nRT}{V}$

The pressure in the container holding H_2 is equal to the pressure in the containing holding N_2. **1 pt Ans.**

The number of moles, volume and temperature of both gases are the same, thus pressures would be the same.

1 pt explanation

b) Average Kinetic Energy of H_2 molecules = 6.2×10^{-21} J. **1 pt Ans.**

Temperature is a measure of average kinetic energy. H_2 and N_2 are at the same temperature, thus they will have the same average kinetic energy.

c) $KE = \frac{1}{2}mv^2$

Kinetic energy depends on the mass and speed (velocity) of the particles. H_2 and N_2 have the same average kinetic energy, thus H_2 molecules have a greater average speed than N_2 molecules because H_2 has a smaller mass than N_2.

1 pt Ans w/ explanation

d) Decrease temperature to decrease the average kinetic energy of the molecules in the container. Average kinetic energy is directly proportional to temperature. **1 pt Ans. w/ explanation**

e) i) $P_1V_1 = P_2V_2$

If $V_2 = \frac{1}{2}V_1$

then $P_1V_1 = P_2(\frac{1}{2}V_1)$ **1 pt explanation**

$(2\cancel{V_1})P_1\cancel{V_1} = P_2$

$2P_1 = P_2$

∴ If volume is halved, pressure is doubled.

1 pt Ans.

ii) The average speed of the H_2 molecules would not change. The temperature remained constant, thus the average kinetic energy and the speed of the molecules remains constant.

1 pt Ans. w/ explanation

Gases & States of Matter Study Guide Part 1

Multiple Choice

1.

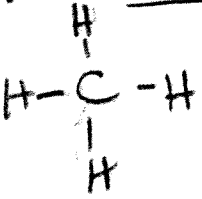
In which of the following processes are covalent bonds broken?

A) $I_2(s) \rightarrow I_2(g)$ molecular = IMF's broken
B) $CO_2(s) \rightarrow CO_2(g)$ molecular = IMF's
C) $NaCl(s) \rightarrow NaCl(l)$ ionic = ionic bonds broken
D) C(diamond) → C(g) network covalent = covalent bonds broken

2.

In solid methane, the forces between neighboring CH_4 molecules are best characterized as

CH4 is nonpolar



A) London (dispersion) forces
B) covalent bonds within the molecule, not between
C) hydrogen bonds
D) ion-dipole forces

3.

On a mountaintop, it is observed that water boils at 90°C, not at 100°C as at sea level. This phenomenon occurs because on the mountaintop the

boiling occurs when vapor pressure equals atm. press; if atm is lower, than vapor pressure needed for boiling is lower, thus boiling occurs a lower T.

atm. pressure is lower on mountain

A) equilibrium water vapor pressure is higher due to the higher atmospheric pressure
B) equilibrium water vapor pressure is lower due to the higher atmospheric pressure
C) equilibrium water vapor pressure equals the atmospheric pressure at a lower temperature
D) water molecules have a higher average kinetic energy due to the lower atmospheric pressure

average kinetic E is dependent on Temp not Pressure

4.

Which of the following substances involves the breaking of covalent bonds in order to melt?

A) Salt, NaCl ionic
B) Sand, SiO_2 network covalent = covalent bonds broken
C) Ice, H_2O molecular = IMF's broken during phase change
D) Paraffin, $C_{31}H_{64}$ molecular = IMF's

5.

On the basis of strength of intermolecular forces, which of the following elements would be expected to have the highest melting point?

Br_2 is a liquid @ room temp whereas all others are gases.

A) Br_2
B) Cl_2
C) F_2
D) N_2

High MP = Strong IMF's

All nonpolar molecules, thus all have London.
∴ strongest LDF = greatest # of electrons