Exam 1 Chemistry 152 Spring 2006 **GREEN**

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) (5 points) Calcium hydride (CaH_2) reacts with water to form hydrogen gas:

$$CaH_2\,(s) + 2H_2O\,(l) \rightarrow Ca(OH)_2\,(aq) + 2H_2\,(g)$$

How many grams of CaH_2 are needed to generate 48.0 L of H_2 gas at a pressure of 0.888 atm and a temperature of 32°C?

A) 50.7 B) 0.851 C) 35.8 D) 71.7 E) 143

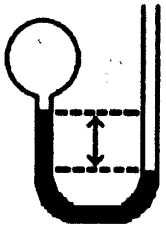
2) The density of chlorine gas at 1.21 atm and 34.9°C is _____ g/L.

A) 0.423 B) 1.70 C) 0.295 D) 0.0479 E) 3.39

3) A fixed amount of gas at 25.0°C occupies a volume of 10.0 L when the pressure is 629 torr. Use Charles's law to calculate the volume (L) the gas will occupy when the temperature is increased to 121°C while maintaining the pressure at 629 torr.

A) 7.56 B) 10.9 C) 48.4 D) 13.2 E) 2.07

4) A gas vessel is attached to an open-end manometer containing a nonvolatile liquid of density 0.791 g/mL as shown below.



The difference in heights of the liquid in the two sides of the manometer is 43.4 cm when the atmospheric pressure is 755 mmHg. Given that the density of mercury is 13.6 g/mL, the pressure of the enclosed gas is _____ atm.

A) 0.960 B) 0.987 C) 0.990 D) 0.993 E) 1.03

5) In ideal gas equation calculations, expressing pressure in Pascals (Pa), necessitates the use of the gas constant, R, equal to _____.

A) 8.314 J $mol^{-1}K^{-1}$

B) 62.36 L torr $mol^{-1}K^{-1}$

C) 1.987 cal $mol^{-1}K^{-1}$

D) 0.08206 atm L $mol^{-1}K^{-1}$

E) none of the above

6) A sample of a gas (5.0 mol) at 1.0 atm is expanded at constant temperature from 10 L to 15 L. The final pressure is _____ atm.

A) 15 B) 0.67 C) 3.3 D) 7.5 E) 1.5

7) Which one of the following is a valid statement of Avogadro's law?

A) PV = constant

B) V = constant × P

C) $\frac{V}{T}$ = constant

D) $\frac{P}{T}$ = constant

E) V = constant × n

8) The volume of an ideal gas is zero at _____.

A) -363 K B) -273°C C) 0°C D) -45°F E) -273 K

9) The reaction of 50 mL of Cl_2 gas with 50 mL of CH_4 gas via the equation:

$$Cl_2\,(g) + CH_4\,(g) \rightarrow HCl\,(g) + CH_3Cl\,(g)$$

will produce a total of _____ mL of products if pressure and temperature are kept constant.

A) 50 B) 200 C) 250 D) 150 E) 100

10) The mass of nitrogen dioxide contained in a 4.32 L vessel at 48°C and 141600 Pa is _____ g.

A) 10.5 B) 70.5 C) 53.5 D) 5.35×10^4 E) 9.46×10^{-2}

11) A gas is considered "ideal" if _____.

A) one mole of it occupies exactly 1 liter at standard temperature and pressure

B) one mole of it in a one-liter container exerts a pressure of exactly 1 atm at room temperature

C) it is not compressible

D) it can be shown to occupy zero volume at 0°C.

E) its behavior is described by the ideal-gas equation

12) The average kinetic energy of the particles of a gas is directly proportional to _____.

A) the square of the rms speed

B) the particle mass

C) the square of the particle mass

D) the square root of the rms speed

E) the rms speed

13) Which of the following is not part of the kinetic-molecular theory?

A) Collisions between gas molecules do not result in the loss of energy.

B) Atoms are neither created nor destroyed by ordinary chemical reactions.

C) The volume occupied by all of the gas molecules in a container is negligible compared to the volume of the container.

D) Attractive and repulsive forces between gas molecules are negligible.

E) Gases consist of molecules in continuous, random motion.

14) At 333 K, which of the pairs of gases below would have the most nearly identical rates of effusion?

A) CO and CO_2

B) NO_2 and N_2O_4

C) CO and N_2

D) N_2O and NO_2

E) N_2 and O_2

15) A real gas will behave most like an ideal gas under conditions of _____.

A) high temperature and high pressure

B) STP

C) low temperature and low pressure

D) high temperature and low pressure

E) low temperature and high pressure

16) In the van der Waals equation, the constants *a* and *b* _____.

A) are equal to each other for any real gas

B) are used to correct for the fact that collisions of gas molecules are not really completely elastic.

C) are equal to 1 for ideal gases

D) are used to correct for the difference between Celsius and Kelvin

E) are used to correct for the finite volume of gas molecules and the attractive forces between gas molecules.

17) The principal source of the difference in the normal boiling points of ICl (97°C; molecular mass 162 amu) and Br_2 (59°C; molecular mass 160 amu) is _____.

A) dipole-dipole interactions

B) London-dispersion forces

C) hydrogen bonding

D) both hydrogen-bonding and dipole-dipole interactions

E) both dipole-dipole interactions and London dispersion forces

18) What is the predominant intermolecular force in CBr_4?

A) London-dispersion forces

B) hydrogen-bonding

C) ionic bonding

D) dipole-dipole attraction

E) ion-dipole attraction

19) The property responsible for the "beading up" of water is _____.

A) surface tension

B) hydrogen bonding

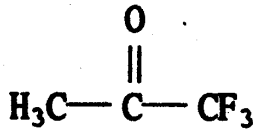
C) density

D) vapor pressure

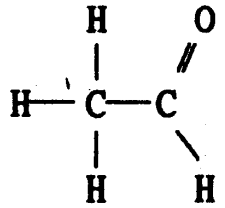
E) viscosity

20) Which one of the following substances will have hydrogen bonding as one of its intermolecular forces?

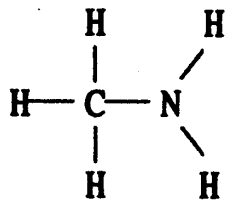
A)



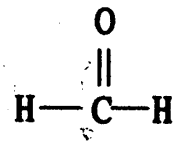
B)



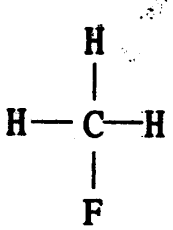
C)



D)



E)



21) _____ is the energy required to expand the surface area of a liquid by a unit amount of area.

A) Surface tension

B) Viscosity

C) Volatility

D) Capillary action

E) Meniscus

22) The shape of a liquid's meniscus is determined by _____.

A) the relative magnitudes of cohesive forces in the liquid and adhesive forces between the liquid and its container

B) the volume of the liquid

C) the type of material the container is made of

D) the viscosity of the liquid

E) the amount of hydrogen bonding in the liquid

23) Of the following, _____ is an exothermic process.

A) freezing

B) boiling

C) subliming

D) melting

E) All of the above are exothermic.

24) Heat of sublimation can be approximated by adding together _____ and _____.

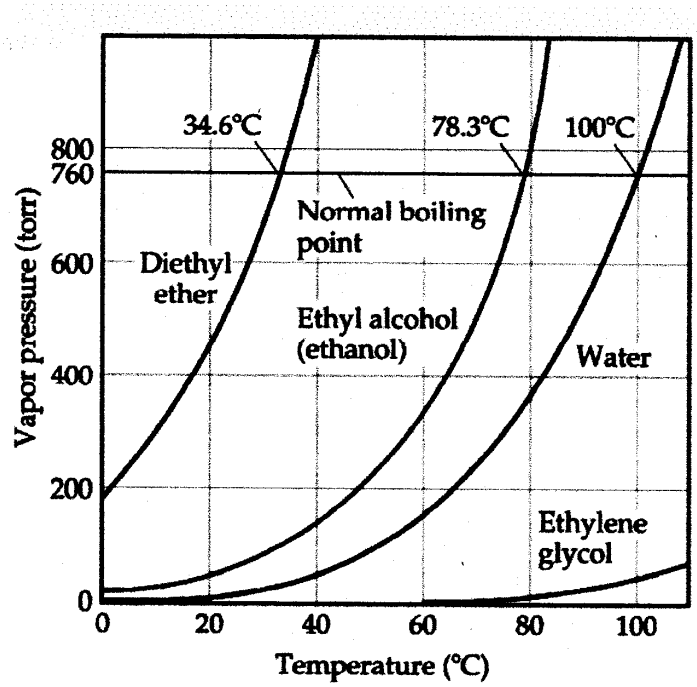
A) heat of fusion, heat of condensation

B) heat of deposition, heat of vaporization

C) heat of freezing (solidification), heat of vaporization

D) heat of fusion, heat of vaporization

E) heat of freezing (solidification), heat of condensation



25) Based on the figure above, the boiling point of diethyl ether under an external pressure of 1.32 atm is _____° C.

A) 20 B) 30 C) 40 D) 0 E) 10

Answer Key
Testname: TEST1_GREEN.TST

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) C
2) E
3) D
4) A
5) A
6) B
7) E
8) B
9) E
10) A
11) E
12) A
13) B
14) C
15) D
16) E
17) A
18) A
19) A
20) C
21) A
22) A
23) A
24) D
25) C