EX3 CHEM101(DTM) FORM K 21 Nov rm 200 HELD (1:50 Class)

Name Key K **(Print last name in CAPS)**

SECTION _____**(same as your lab section)**

1.	**Fill in your ID, the department=CHEM, Course no. = 101, and Section= your lab section. Blacken the corresponding letters and numbers.**
2.	Read each question carefully before answering.
3.	Mark the choice that best answers the question or completes the statement.
4.	Use the scantron provided. Use a no. 2 pencil and clearly mark your choice. If you change an answer, completely erase your previous mark.
5.	Answer each question. There is no penalty for guessing. However, multiple answers are graded as incorrect, and blank answers are graded as incorrect.
6.	On the scantron, fill in your last name, first name and initial. Blacken the corresponding letters.
7.	Use the test for scratch paper.
8.	Mark your answers on the test so you can check them with the key /
9.	***Turning in a blank scantron results in a grade of zero. ***
10.	You may be asked to turn in both the scantron and the exam, have your PHOTO ID and your calculator ready to be checked when you do so.
11.	Work at a steady pace and you will have ample time to finish.
12.	The keys will be posted on my class web page as soon as possible. You may check your grade at the class web site. Your password is the middle 5 numbers of your student ID followed by the first letter of your last name in CAPS. Be patient and give the webmaster time to enter all of this information.

There are 30 questions for 150 points. Good Luck!

K

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Possibly Useful Information

$M = \frac{\text{mol solute}}{\text{L soln}}$ $M_1V_1 = M_2V_2$ $\text{density} = \frac{\text{mass}}{\text{volume}}$ $\lambda\nu = c$

$\frac{w}{w}\% = \frac{\text{mass}}{\text{total mass}} \times 100$ $E = mc^2$ $E = h\nu$ $\lambda = h/mv$ $1\ \text{Å} = 1 \times 10^{-10}\text{m}$

$PV = nRT$ $\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$ $R = 0.08206\ \frac{\text{L·atm}}{\text{mol·K}}$

A periodic table is also provided on the last page of this exam.

Q.1 HF is a weak acid.

(a.) TRUE
b. FALSE

Q.2 One torr is equal in value to one mm Hg.

(a.) TRUE
b. FALSE

Q.3 A sample of O_2 gas is collected over water at 40°C and 1.0 atm. If the total volume of gas collected is 2.00 L, how many grams of O_2 are there in this sample? The vapor pressure of water at 40°C is 55 mm Hg.

a. 0.072 g
b. 4.28 g
c. 2.5 g
d. 0.18 g
(e.) 2.3 g

$P_{TOT} = 1.0\ atm = P_{O_2} + P_{H_2O} = P_{O_2} + 55$

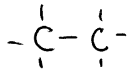
$P_{O_2} = 760 - 55 = 705\ mm\ Hg$

$PV = nRT \Rightarrow n_{O_2} = \frac{PV}{RT} = \frac{(705/760)(2.00)}{(.08206)(273+40)}$

$n_{O_2} = 0.07223\ mol * \frac{32.00\ g}{1\ mol\ O_2} = 2.3\ g\ O_2$

Q.4 In the molecule ethane, C_2H_6, the carbon-carbon sigma bond is the result of the overlap of ...

a. an s and a p orbital
b. two sp^2 hybrid orbitals
c. two unhybridized s orbitas
(d.) two sp^3 hybrid orbitals
e. two unhybridized p orbitals



Q.5	Which indication of relative acid strength is incorrect?
a.	$HC\ell O_3 > HBrO_3$
b.	$H_2PO_4^- > HPO_4^{2-}$
(c.)	$HC\ell O > HC\ell$
d.	$HNO_3 > HNO_2$
e.	$HI > HF$

Q.6	The standard molar volume is 22.414 mL.
a.	TRUE
(b.)	FALSE

Q.7	Pressure is force times area.
a.	TRUE
(b.)	FALSE

force/area

Q.8	A 0.5240 g sample of an impure solid Na_2CO_3 is neutralized by 43.60 mL of 0.1077 M H_2SO_4. What mass of Na_2CO_3 was contained in the sample? There are no acidic or basic impurities in the sample.
a.	0.5106 g
b.	0.4624 g
c.	0.5210 g
d.	0.5048 g
(e.)	0.4977 g

$Na_2CO_3 + H_2SO_4 \rightarrow CO_2 + Na_2SO_4 + H_2O$

$(0.04360\ L)\left(0.1077\ \frac{mol\ H_2SO_4}{L}\right) = 4.6957 \times 10^{-3}\ mol\ H_2SO_4$

$\therefore$ also $4.6957 \times 10^{-3}\ mol\ Na_2CO_3 * \frac{105.99\ g}{1\ mol\ Na_2CO_3} = 0.4977\ g$

Q.9	A triple bond is composed of 2 sigma bonds and 1 pi bond.
a.	TRUE
(b.)	FALSE

Q.10	The most electronegative element is Cs.
a.	TRUE
(b.)	FALSE

Q.11	Angles between adjacent bonds in an octahedral molecule are 180°.
a.	TRUE
(b.)	FALSE

Q.12	The valence shell is …
a.	the orbitals belonging to the entire molecule.
b.	the lowest energy level occupied by electrons.
c.	the hard covering on crustaceans.
(d.)	the highest energy level occupied by electrons.
e.	the set of orbitals used to make triple bonds.

Q.13	BeH_2 is a molecule that does not obey the octet rule.
(a.)	TRUE
b.	FALSE

Q.14	Molecules containing polar bonds are always polar.
a.	TRUE
(b.)	FALSE

Q.15	An ionic bond forms as a result of electron-pair sharing.
a.	TRUE
(b.)	FALSE

Q.16	If a species produces H^+ ions in water, then it is an Arrhenius acid.
(a.)	TRUE
b.	FALSE

Q.17	Valence electrons are also called core electrons.
a.	TRUE
(b.)	FALSE

Q.18	Which of the following is an amphoteric metal hydroxide?
a.	$Ba(OH)_2$
b.	$Mg(OH)_2$
(c.)	$Be(OH)_2$
d.	LiOH
e.	KOH

Q.19 What volume of O_2 would be required to react with excess SO_2 at STP to produce 0.500 mole SO_3?

$2\ SO_2\ (g) + O_2\ (g) \rightarrow 2SO_3\ (g)$

a. 44.8 L
b. 22.4 L
(c.) 5.60 L
d. 33.6 L
e. 11.2 L

$0.500\ mol\ SO_3 * \frac{① O_2}{② SO_3} = 0.250\ mol\ O_2$

$\therefore \frac{1}{4}(22.414) = 5.60\ L$

Q.20 A gas sample occupies 2.50 L at 125°C and 2.06 atm. What will be its volume at 25°C and 1.08 atm?

a. 6.37 L
b. 1.75 L
c. 0.981 L
(d.) 3.57 L
e. 0.954 L

$P_1 = 2.06$ atm $\quad P_2 = 1.08$ atm
$V_1 = 2.50$ L $\quad V_2 = ?$
$T_1 = (125+273)$ $\quad T_2 = (25+273)$
$n_1 = n_2$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2} \qquad V_2 = \frac{P_1V_1T_2}{P_2T_1} = \frac{(2.06)(2.50)(298)}{(1.08)(398)}$$

$V_2 = 3.57$ L

Q.21 Which of the following species could not react as a Brønsted-Lowry base?

a. H_2S
b. NH_3
c. H_2O
d. PH_3
(e.) CH_4

Q.22 The hybridization associated with the central atom in a molecle in which all bond angles are 120° is

a. sp
(b.) sp^2
c. sp^3
d. sp^3d^2
e. sp^3d

Q.23 How many pi-bonds are there in the molecule SiH_4?

a. 1
b. 2
c. 3
(d.) 0
e. 4

Q.24 For an ideal gas, pressure is directly proportional to volume.

a. TRUE
(b.) FALSE

Q.25	sp^3 hybridization is associated with the trigonal planar molecular geometry.
a.	TRUE
(b.)	FALSE

Q.26	In the T-shaped molecular geometry, the central atom has 2 bonded atoms and 3 lone pairs.
a.	TRUE
(b.)	FALSE

Q.27	Under conditions of high pressure and low temperature, a real gas will behave much like an ideal gas.
a.	TRUE
(b.)	FALSE

Q.28	Dalton's law of partial pressure states that the partial pressure of a gas in a mixture is equal to the total pressure.
a.	TRUE
(b.)	FALSE

Q.29	Gases are practically incompressible.
a.	TRUE
(b.)	FALSE

Q.30	At the same temperature, all gas molecules have the same average kinetic energy.
(a.)	TRUE
b.	FALSE

End of Test

KEY Ex3 FORM K Magnuson 101 21 Nov 2003

Total points = 150 Each question =5 points

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