Chem 151 Lecture   Quiz #4   February 17, 2005   25 pts
USE SCANTRONS (2.5 points/question) Write name, CIN, seat # & version # on your scantron.

(1) A substance is reduced if it…
   a) loses oxygen. b) gains hydrogen   c) gains electrons   d) all of the above   e) none of the previous.

d

(2) In the reaction, $3 ClO_2^-$ ---> Cl^- + $2 ClO_3^-$. chlorine of ClO_2^- is…?
a) oxidized only b) reduced only   c) the reducing agent only   d) both oxidized & reduced. e) unchanged.

d since O.N.(ox.number) of Cl is +3 in ClO_2^- , -1 in Cl^-, and +5 in ClO_3^-.

(3) Which of the following substances is a common oxidizing agent?
a) C   b) H_2 c) Na   d) $KMnO_4$ e) N_2

d

(4) Which of the following unbalanced equation represents a reduction?
a) CO_2 --> $C + O_2$ b) Ca --> Ca^{2+} c) Cu^{2+} --> Cu^+ d) $2 F^-$ --> F_2 e) $2 O^{2-}$ --> O_2

c : note that in a) C is reduced but O is oxidized. The rest of the reactions are oxidation half reactions.

(5) What is the oxidation number of chromium in CrO_4^{2-}?
        a) +6   b) +3   c) +4   d) +2   e) none of the previous.
a: if x is the oxidation number, x+4(-2)=2- => x = -2 +8 = +6

(6) Temperature is… a) heat   b) a measure of the momentum of molecules.   c) radiation
d) the potential energy of molecules e) a measure of the average kinetic energy of molecules.

e

(7) A gas occupies 4.0 m^3 at 1.0 atm pressure. What volume will it occupy at 10 atm if the temperature is unchanged?   a) 0.040 m^3 b) 0.40 m^3 c) 4.0 m^3 d) 40 m^3
        e) 400 m^3.
b use $P_1V_1 = P_2V_2$ or, $V_2 = V_1P_1/P_2 = (4.0m^3)(1.0 atm)/(10 atm) = 0.40 m^3$

(8) If you raise the temperature of a gas in a container of fixed volume, the molecules will strike the walls…a) harder, but less often. b) harder, and more often.   c) less hard, and less often.
d) less hard, but more often.   e) There will be no change.

b

(9) A tank can explode if the pressure exceeds 12.5 atm. At 25°C, the gas inside is at a pressure of 2.07 atm. To what temperature can the tank be heated before it will explode?
a) 151 °C   b) 347 °C   c) 424°C   d) 1630°C   e) 1527°C
e: Here, we can start with combined gas law: $P_1V_1/T_1 = P_2V_2/T_2$ =>$T_2 = T_1P_2V_2/ P_1V_1$. The V's just cancel out since V is constant: $T_2 = T_1P_2/P_1 = (25+273)K(12.5atm)/(2.07atm)=1800K$, or =1800-273=1527°C

(10) The approximate density of nitrogen gas (N_2) at STP is:
        a) 28 g/L   b) 0.28 g/L   c) 1.25g/L   d) 0.80 g/L   e) 0.40 L
c: at STP, molar vol =22.4L. take 1 mole of N_2: density = 1mol(28.0g/mol)/(22.4L)=1.25 g/L

(11) The solubility of a gas in a liquid…
a) increases with temperature   b) depends on the partial pressure of the liquid
c) increases with the pressure of the gas at the surface of the liquid.

d) decreases as pressure of the gas at the surface is increased   e) increases with volume.
c (refer to Henry's Law)
(12) All of the following are postulates of the Kinetic Molecular Theory except which one?
a) There is attraction between molecules of a gas.   b) Molecules are in rapid, constant motion.
c) Molecules of a gas are tiny compared to the distances between them.
d) All matter is composed of tiny, discrete particles.
e) Temperature is a measure of the average kinetic energy of gas molecules.
a
(13) The total pressure exerted by a mixture of gases is equal to the sum of the partial pressures of the various gases is a statement of _____ law.
a) Daltons's   b) Charles'   c) Boyle's   d) Henry's   e) Avogadro's
a