Workbook: Kc,Kp,Ksp Equilibrium (review states of matter)
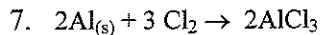
Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

_____ 1. Which of these alkaline earth metal oxides has the greatest percent by mass oxygen?
(Last Modified 5-13-04)

    a. barium oxide
    b. beryllium oxide
    c. calcium oxide
    d. magnesium oxide
    e. strontium oxide

_____ 2. Which expression gives percent by mass of carbon in oxalic acid $H_2C_2O_4*2H_2O$?
(Last Modified 5-13-04)

    a. (2/14) * 100
    b. (12/90) * 100
    c. (24/66) * 100
    d. (24/90) * 100
    e. (24/126) *100

_____ 3. Which oxides of manganese, Mn, have percent by mass of manganese that is greater than 50%.

    I. MnO
    II. MnO_2
    III. Mn_2O_3

(Last Modified 5-13-04)

    a. II
    b. III
    c. I and III
    d. II and III
    e. I, II, III

_____ 4. Which pair of samples contains the same number of oxygen atoms in each compound?
(Last Modified 5-13-04)

    a. 0.10 mol Al_2O_3 and 0.50 mol BaO
    b. 0.20 mol Cl_2O and 0.10 mol HclO
    c. 0.20 mol SnO and 0.20 mol SnO_2
    d. 0.10 mol Na_2O and 0.10 mol Na_2SO_4
    e. 0.20 mol $Ca(OH)_2$ and 0.10 mol $H_2C_2O_4$

_____ 5. $ScCl_{3(aq)} + 3KOH_{(aq)} \rightarrow Sc(OH)_{3(s)} + 3KCl_{(aq)}$
Which of the following identifies the maximum number of moles of products formed when 0.60 moles of $ScCl_3$ is mixed with 0.60 moles KOH in water solution?
(Last Modified 5-13-04)

	mol $Sc(OH)_{3(s)}$	moles $KCl_{(aq)}$
a.	0.20	0.20
b.	0.20	0.60
c.	0.20	1.00
d.	0.60	0.20
e.	0.60	0.60

_____ 6. $2KClO_3 \rightarrow 2KCl + 3O_2$
Which expression gives the mass of O_2 produced when 15g $KClO_3$ is heated, according to the equation above, in an open vessel until no further weight loss is observed
(Last Modified 5-13-04)

    a. 15.0 x (122.5/1) x (2/3) x (31/1)
    b. 15.0 x (1/122.5) x (3/2) x (32/1)
    c. 15.0 x (1/122.5) x (3/2) x (1/32)
    d. 15.0 x (1/122.5) x (2/3) x (1/32)
    e. 15.0 x (122.5/1) x (3/2) x (32/1)

_____ 7. $2Al_{(s)} + 3\,Cl_2 \rightarrow 2AlCl_3$

Which expression gives the volume of Cl_2 consumed, measured at 1 atm and 273 K, when 25g Al reacts completely with Cl_2 according to the above equation
(Last Modified 5-13-04)

   a.   25.0 x (3/2) x (22.4/2)

   b.   25.0 x (3/2) x (22.4/2)

   c.   25.0 x (27/1) x (3/2) x (22.4/1)

   d.   25.0 x (1/27) x (3/2) x (22.4/1)

   e.   25.0 x (1/27) x (2/3) x (22.4/1)

_____ 8. Which sample contains the greatest number of nitrogen atoms? All measurements are taken at stp.
(Last Modified 5-13-04)

   a.   0.20 mol of $N_2O_{4(g)}$ .2 x 2 = .4

   b.   0.40 mol N_2 .8 mol

   c.   40. L NO_2 1 mol = 22.4L = 1.7 mol

   d.   40g $NH_{3(G)}$ 40/17 = 2.3 mol

   e.   80. g $N_2O_{4(g)}$

_____ 9. If 18 grams of x completely reacts with 14 grams of Y to produced 10 grams of M and 2.0 moles of Z, the molar mass of Z is
(Last Modified 5-13-04)

   a.   11

   b.   16

   c.   22

   d.   32

   e.   42

_____ 10. What is the minimum volume of 0.200M Na_2CO_3 is needed to precipitate all the Sr^{2+} from 25.0mL of 0.100 $Sr(NO_3)_2$? The reaction will produce solid $SrCO_3$.
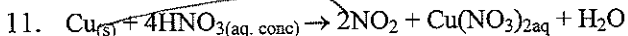
$Sr^{2+} + CO_3^{-2}$ 1:1 Ratio

½ Conc

   a.   6.25 mL

   b.   12.5 mL

   c.   25.0 mL

   d.   50 mL

   e.   100 mL

_____ 11. $Cu_{(s)} + 4HNO_{3(aq.\,conc)} \rightarrow 2NO_2 + Cu(NO_3)_{2aq} + H_2O$

What volume of $NO_{2(g)}$ measured at 1 atm and 273 K can be produced by the reaction of 48g of copper with excess concentrated nitric acid according to the equation.
(Last Modified 5-13-04)

$48g/63 = .75\,mol \times 2 = 1.5\,mol$
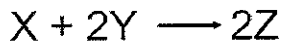$\times 22$
$34L$

   a.   11.2 liters

   b.   22.4 liters

   c.   33.6 liters

   d.   44.6 liters

   e.   67.2 liters

_____ 12. The following reaction goes to equlibibrium, If X and Y start as equal concentrations of [20] which is NOT a possble set of equilibrium concentrations?
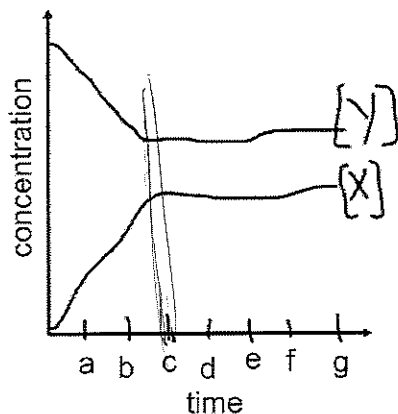
$$X + 2Y \longrightarrow 2Z$$

X   2Y   →   2Z
20   20   0
-5   -10   +10
15   10   10

|	[X]	[Y]	[Z]
a.	20	20	0
b.	18	19	1
c.	10	10	10
d.	12	4	16

Stoich Ratio not being followed

A Student was asked to sketch of graph of a reaction

_____ 13. At what time does the reaction establish equilibrium?
  a. a   c. c
  b. b   d. g

_____ 14. The K value for this reaction can be safely estimated at
  a. K > 1
  b. K < 1
  c. K = 0
  d. Can not determine.   Depends who is the actual product and reactant.

_____ 15. Which of the following equations might represent this graph?
  a. $X(aq) + Y(aq) \rightleftharpoons Z(aq)$

  b. $X(s) \rightleftharpoons Y(aq)$

  c. $X(aq) \rightleftharpoons 2Y(aq)$

  d. $Y(aq) \rightleftharpoons X(aq) + Z(s)$ ← 1:1 Ratio

_____ 16. For this particular reaction the only way to possibly get a higher [X] then [Y] is to
  a. add more X   c. add a catalyst
  b. remove some Y   d. change the temperature

This Rxn is product favored (Y)
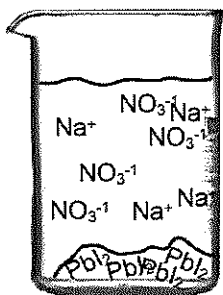
_____ 17.

What is the net ionic equation for the picture above?

a. $NaNO_3 + KI \longrightarrow NaI + Pb(NO_3)_2$

b. $Pb^2 + 2I^{-1} \longrightarrow PbI_2$

c. $Na^+ + NO_3^{-1} \longrightarrow NaNO_3$

d. $NaI + Pb(NO_3)_2 \longrightarrow NaNO_3 + Pb(NO_3)_2$

_____ 18. (#4-3c) 22g of carbon dioxide is added to a balloon at STP. What is the volume?

   a. 1L   b. 11.2 L   c. 22.4L   d. 33.6L   e. 100L

_____ 19. The equilibrium constant, Kc, for the reaction

$1/2H_{2(g)} + 1/2I_{2(g)} \leftrightarrow HI_{(g)}$ is 7.4 at 425C. The value for the equilibrium constant will be changed if

I. The temperature is changed to 500C   II. The concentration of H_2 is doubled

   a. I only   c. Both I and II

   b. II only   d. Neither I or II

_____ 20. (ebbing14.3)

The equilibrium expression for K_c for the system

        $CO_{2(g)} + CaO_{(s)} == CaCO_{3(s)}$ is

   a. $[CaCO_3]/[CO_2][CaO]$ d. $1/[CO_2]$

   b. $[CaCO_3]/[CO_2]$ e. $[CO_2][CaO]$

   c. $[CO_2]$

_____ 21. In which of the following does the reaction go the least to completion (see the following K values)

   a. 10E5   d. 10E-3

   b. 10E3   e. 10E-5

   c. 10E0

_____ 22.

                  $A(aq) + 2B(s) \Leftrightarrow C(g) \;\; Kc = 10$
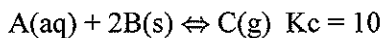
Both 1 mole of A and B are placed in a 1L flask and allowed to come to equilibirum Which of the following are true?

I. The reaction quotient = 1

II. Q < K

   a. I only   c. Both I and II

   b. II only   d. Niether I or II