Chemistry department

General chemistry 402101-4

MODEL (Final Exam)

Name of student:

Student number:

Serial no.:

Score:

Choose your correct answer of the following: (Put your answer in the table above)

1- The mass of 1 mol of HNO_3 is: (A_w: N(14), O(16), H (1))

   a) 63   b) 31   c)   0.0158   d) 0.0322

2- Which of these has the most percent of nitrogen: (A_w: N(14), O(16), H (1), C(12))

   a) NH_3 b) $(NH_2)_2CO$ c) N_2H_4 d)HNO_3

3- An empirical formula of a compound is C_2H_5 and its molecular mass is 60, so the molecular formula is:

   a) C_6H_{15} b) C_2H_5 c) C_8H_{20} d) C_4H_{10}

4- The number of atoms of 2 moles of Cu is:

   a) 3.02×10^{23} b) 12.02×10^{23} c) 0.75×10^{-23} d) 12.02

5- Which of the following equations is balanced:

   a) $N_2O_5 \longrightarrow N_2O_4$ b) $KNO_3 \longrightarrow KNO_2 + O_2$

   c) $NH_4NO_3 \longrightarrow N_2O + H_2O$ d) $NH_4NO_2 \longrightarrow N_2 + 2H_2O$

6- The mass of MgO formed by burning 8.1 g of Mg is:

Mg (s) + O_2 (g) $\longrightarrow$ MgO   (A_w: Mg(24.31), O(16))

   a) 0.2 g   b) 0.333 g   c) 8.1 g   d) 13.4 g

7- A chemical system is at equilibrium when:

   a) Concentration of products = concentration of reactants
   b) the rate of forward reaction = the rate of reverse reaction
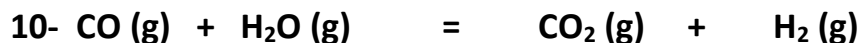   c) Rate of forward reaction = rate of reverse reaction = zero
   d) a + b

8- The equilibrium is related to:

   a) Reversible reactions   b) irreversible reactions

   c) One direction reactions   d) a + c

9- K_c of reaction below is represented as follows:

$2HgO$ (s) $=$ $2Hg$ (l) + O_2 (g)

   a) $K_c = [O_2]$ b) $K_c = [HgO]^2/[Hg]^2 [O_2]$

   c) $K_c = 1/[O_2]$ d) $K_c = [Hg]^2[O_2]/[HgO]$

10- CO (g) + H_2O (g) $=$ CO_2 (g)   + H_2 (g)

at 1000K, $K_c = 1$ when:

   a) $[CO] = [H_2O] = [CO_2] = [H_2]$ b) $[CO] \times [H_2O] = [CO_2] \times [H_2]$

   c) $[CO] = [H_2O]$ and $[CO_2] = [H_2]$ d) $[CO] \times [H_2O] = [CO_2] \times [H_2] = 1$

11- PCl_5 (g) $=$ PCl_3 (g)   + Cl_2 (g)

The relation between K_c and K_b of this reaction is:

a) $K_p = K_c (RT)^{-2}$ b) $K_p = K_c (RT)^2$ c) $K_p = K_c (RT)$ d) $K_c = K_p (RT)$

12- N_2O_4 (g) $=$ $2NO_2$ (g) $K_c = 4.55 \times 10^{-3}$
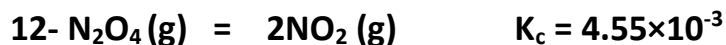
If $[N_2O_4] = 0.16$ M at equilibrium, so $[NO_2]$ is:

a) 73×10^{-4} b) 0.27   c) 7.3×10^{-4} d) 0.027

13- N_2 (g)   + $3H_2$ (g) $=$ $2NH_3$ (g) $K_c = 0.52$

  $2NH_3$ (g) $=$ N_2 (g) + $3H_2$ (g) $K_c = ???$

a) 1.12   b) 0.52   c) 1.92   d) 5.2

14- $2SO_2$ (g)   + O_2 (g) $=$ $2SO_3$ (g)

If $\underline{K_c > Q}$, so the reaction:

a) is at equilibrium.   b) will shift to form more products.

c) will shift to form more reactants.   d) we need to know Kp first.

15- Which one of the following statements is <u>incorrect</u>?

a) adding products shifts the equilibrium to the left

b) adding reactants shifts the equilibrium to the left

c) exothermic reactions shifts the equilibrium to the left with increasing temperature

d) endothermic reactions shifts the equilibrium to the right with increasing temperature

16- The branch of chemistry which deals with the heat changes caused by chemical reactions is called:

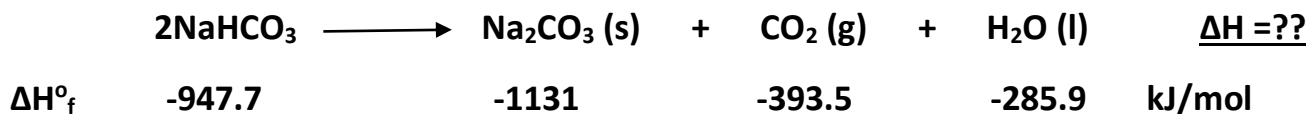a) Equilibrium   b) thermochemistry   c) stoichiometry   d) none of these

17- CH_4 (g)   +   3/2 O_2 $\longrightarrow$ CO_2 (g)   + H_2O (l)
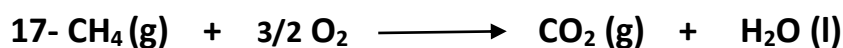
This reaction:

a) Exothermic and ΔH = -ve   b) Exothermic and ΔH = +ve

c) endothermic and ΔH = -ve   d) endothermic and ΔH = +ve

18- Which of the following ΔH^o_f ≠ zero:

a) N_2 (g)   b) C (graphite)   c) O_2 (g)   d) H_2O (l)

19- $NaHCO_3$ decomposes according to the following equation:

2NaHCO$_3$ $\longrightarrow$	Na$_2$CO$_3$ (s)	+	CO$_2$ (g)	+	H$_2$O (l) <u>ΔH =??</u>

ΔH^o_f -947.7   -1131   -393.5   -285.9   kJ/mol

a) +3706   b) +85   c) -85   d) -3706

20- Which of the following reactions represents a correct thermochemical equation:

a) N_2 (g) + 3H_2 (g) $\longrightarrow$ 2NH$_3$ (g)

b) N_2 + 3H_2 $\longrightarrow$ 2NH$_3$ ΔH = 92.6 kJ

c) N_2 (g) + 3H_2 (g) $\longrightarrow$ NH$_3$ (g) ΔH = 92.6 kJ

d) N_2 (g) + 3H_2 (g) $\longrightarrow$ 2NH$_3$ (g) ΔH = 92.6 kJ

21- Which of the following metals will heat first on basis of specific heat (the values in the brackets)?

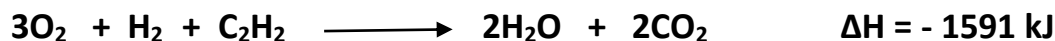a) Al(0.9)   b) Cu (0.385)   c) Fe (0.44)   d) Hg (0.139)

22- The unit of heat capacity is:

a) J/°C   b) J/g.°C   c) J. g.°C   d) J/g

23- A piece of silver of mass 362 g has a heat capacity of 85.7. The specific heat of silver is:

a) 4.22   b) 2.4   c) 0.236   d) 31.023

24- Consider the reactions:

$$3O_2 + H_2 + C_2H_2 \longrightarrow 2H_2O + 2CO_2 \qquad \Delta H = -1591 \text{ kJ}$$

$$H_2 + C_2H_2 \longrightarrow C_2H_4 \qquad \Delta H = -174.8 \text{ kJ}$$

What is ΔH of the following reaction: $C_2H_4 + 3O_2 \longrightarrow 2H_2O + 2CO_2$

a) 9.1   b) -174.9   c) -1416.2   d) +1416.2

25- The heat of reaction is called enthalpy when:

a) Pressure = zero   b) T = 0 °C   c) T = 0 K   d) pressure is constant

26-ocean is an example of:

a) open system   b) closed system   c) isolated system   d) none of these

27- An acid is a compound that gives H^+ ions in water and a base is a compound that gives OH^- ions in water. This concept was given by:

a) Arrhenius   b) Lewis   c) Bronsted   d) Lowery

28- According to Bronsted concept, an acid is a substance that:

a) accepts proton   b) releases a proton

c) accepts electron pairs   d) releases electron pairs

29- In the reaction between NH_3 and HCl: $HCl + NH_3 \longrightarrow NH_4^+ + Cl^-$

The conjugate acid of NH_3 is:

a) HCl   b) NH_4^+ c) Cl^- d) none of these

30- An unknown gas effuses 1.66 times more rapidly than CO$_2$. What is the molar mass of the unknown gas.
a) 28 g/mol   b)   8 g/mol   c) 16 g/mol   d) 32 g/mol

31- All of the following acids are strong except:
a) CH_3COOH b) HNO_3 c) HCl   d) H_2SO_4

32- The auto-ionization of water can be represented by:

a) $H_2O \rightleftharpoons H^+ + OH^-$ b) $H_2O + H^+ \rightleftharpoons H_3O^+ + OH^-$

c) $H_2O + H_2O \rightleftharpoons H_3O^+ + OH^-$ d) $H_2O + HA \rightleftharpoons H_3O^+ + A^-$

33- Which of the following is Lewis base:

a) $AlCl_3$ b) BH_3 c) NH_3 d) all of them
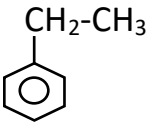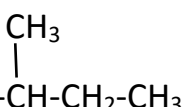
34- Which of the following is correct:

a) pH - pOH = 14   b) pH + pOH = 7   c) pH – pOH = 0   d) pH + pOH = 14

35- The pH of 0.001 M HCl is:

a) 0.001   b) 10^{-3} c) 3   d) -3

36- All of the following compounds are aliphatic except:

a) CH_3-CH_2-CH_2-CH_3 b) CH_2-CH_3

CH_3
|
c) CH_3-CH-CH_2-CH_3 d) CH_4

37-Which of the following correctly identifies Boyle's law?
a) PV = k1   b) V = k2T   c) P/V = k3   d) V = k4n

38- Alkenes are among of:

a) aromatic compounds   b) saturated aliphatic compounds

c) unsaturated aliphatic compounds   d) inorganic compounds

39- C$_9$H$_{20}$ is:

a) alkane   b) alkene   c) alkyne   d) aromatic compound

40- C$_3$H$_4$ is:

a) ethane   b) propene   c) ethyne   d) Propyne