

المملكة العربية السعودية

وزارة التعليم

MINISTRY OF EDUCATION



لكل المهتمين و المهتمات
بدروس و مراجع الجامعية

هام

مدونة المناهج السعودية eduschool40.blog

BChoose the correct answer

B-1 From the following compound (Fe_2S_3 , Na_2O , NO_2 , CaCl_2). The only molecular compound is

a) Fe_2S_3 b) Na_2O c) NO_2 d) CaCl_2

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B-2 Which of the following describes the molecule O_2 ?

- a) A diatomic molecule containing atoms of the same element.
 b) A polyatomic molecule containing atoms of different elements
 c) A polyatomic molecule containing atoms of the same element.
 d) A diatomic molecule containing atoms of different elements.

B-3 Calculate the mass in grams of iodine (I_2) that will react completely with 8.4 g of aluminum (Al) to form aluminum iodide (AlI_3)? $2\text{Al} + 3\text{I}_2 \rightarrow 2\text{AlI}_3$

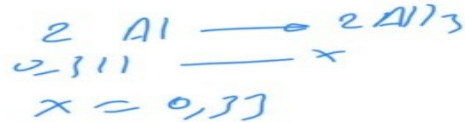
a) 118.5 g

b) 130.7 g

c) 95.2 g

d) 54.8 g

$$n \text{ of Al} = \frac{8.4}{27} = 0.311$$



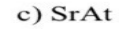
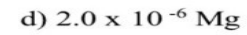
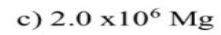
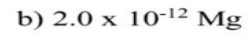
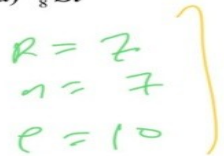
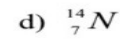
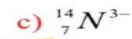
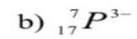
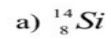
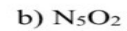
ایوی سے متعلقہ سوال کا جواب

من چاہئے

$$\text{mass of AlI}_3 = n \times M$$

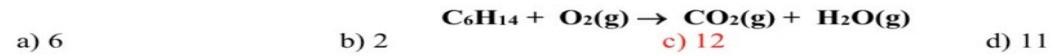
$$= 0.311 \times 408$$

$$= 118.5 \text{ g}$$

B**B-3** What is the correct formula of a compound consist of Sr and At?**B-4** An object has a weight of 20 pg express that weight in Mg ?**B-5** Give the symbol that identifies the species ,which have 7 protons, 7 neutrons, 10 electrons. Include the charge if it is not neutral :**B-6** The correct formula for dinitrogen pentoxide is

B

B-7 After balancing the following chemical equation, the coefficient of CO_2 is



B-8 A chemist needs 20.0 grams of a liquid that has a density of 0.930 g/cm^3 . How many mL should be measured out, using a graduated cylinder?

- a) 21.5 ml b) 9.23 ml c) 0.43 ml d) 25.7 ml

$$d = \frac{m}{V} \rightarrow V = \frac{m}{d} = \frac{20}{0.930} = 21.5 \text{ ml}$$

B-9 What is the pressure in atmospheres of a gas mixture that consists of 0.40 moles of nitrogen and 0.30 moles of oxygen in a 1250 mL container at 10°C ?

- a) 15.2 atm b) 13.0 atm c) 0.0013 atm d) 1.29 atm

$$n = n_1 + n_2 = 0.30 + 0.40 = 0.7$$

$$Pv = nRT$$

$$P = \frac{nRT}{V} = \frac{0.7 \times 0.082 \times 283}{1.25} = 13 \text{ atm}$$

B

B-10 A mixture of two gases (A and B) are mixed in the same container. Calculate the mole fraction of gas A if the total pressure is 2 atm and the partial pressure of gas A is 0.5 atm ?

a) 0.50

b) 0.75

c) 0.25

d) 1

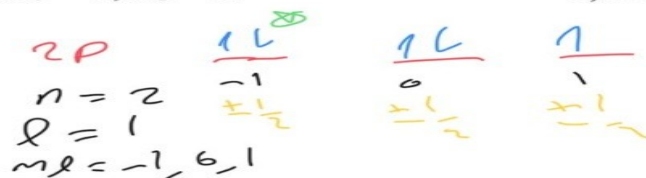
$$P_T = 2 \text{ atm}$$

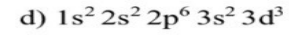
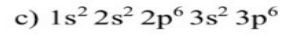
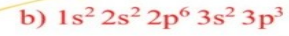
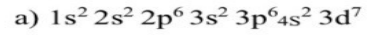
$$P_A = 0.5 \text{ atm}$$

$$X_A = \frac{P_A}{P_T} = \frac{0.5}{2} = 0.25$$

B-11 Give a possible set of four quantum numbers $\{n, l, m_l, m_s\}$ for the starred electron in the following diagram. Select the values of m_l by numbering from $-l$ to $+l$ from left to right.

2p $\underline{\quad}$ $\underline{\quad}$ $\uparrow\downarrow^*$ $\underline{\quad}$ $\uparrow\downarrow$ \uparrow

a) $n=2, l=1, m_l=-3, m_s=1/2$ b) $n=3, l=1, m_l=-1, m_s=-1/2$ c) $n=2, l=1, m_l=-1, m_s=-1/2$ d) $n=3, l=0, m_l=0, m_s=-1/2$

B-12 The electron configuration of P is :**B-13** The Ca^{2+} ion is isoelectronic with which neutral atom?

a) Si

b) Na

c) Ne

d) Ar

**B-14** How many valence electrons in NO_2^{-1} ?

a) 26

b) 18

c) 20

d) 24

عدد إلكترونات التكافؤ = عدد إلكترونات كل ذرة + عدد إلكترونات الشحنة السالبة - عدد إلكترونات الشحنة الموجبة

$$18e^- = 1 + 5 \times 1 + 6 \times 2 =$$

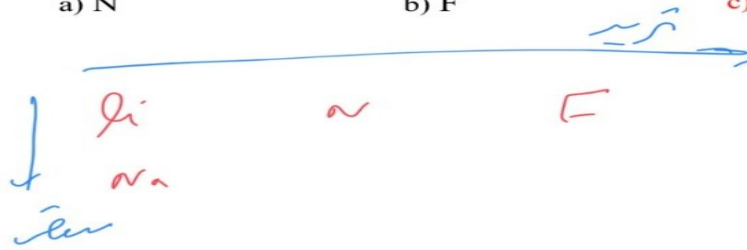
B-15 Which atom of the following has the lowest first ionization energy?

a) N

b) F

c) Na

d) Li



B

B-16 A police officer is measuring traffic speed with radar operating at a frequency of 3.0×10^9 Hz. What is the wavelength?

- a) 0.10 nm b) 0.10 m c) 0.24 m d) 3×10^{19} m

$$v = \frac{c}{\lambda} \rightarrow \lambda = \frac{c}{v} = \frac{3 \times 10^8}{3 \times 10^9} = 0.10 \text{ m}$$

B-17 You have a sample of CO_2 gas in a flask (A) with a volume of 265 mL. At 22.5°C , the pressure of the gas is 136.5 mmHg. To find the volume of another flask (B), you move the CO_2 to that flask and find that its pressure is now 84.3 mmHg at 24.5°C . What is the volume of flask B?

- a) 432.0 mL b) 453.8 mL c) 573.2 mL d) 439.5 mL

$$V_A = 265 \text{ mL}$$

$$T_A = 22.5 + 273 = 295.5$$

$$P_A = 136.5 \text{ mmHg}$$

$$V_B = ?$$

$$T_B = 24.5 + 273 = 297.5$$

$$P_B = 84.3$$

↑
volume
↑
temp
↓
pressure

$$P_1 V_1 T_2 = P_2 V_2 T_1$$

$$V_2 = \frac{P_1 V_1 T_2}{P_2 T_1} = \frac{136.5 \times 265 \times 297.5}{84.3 \times 295.5} = 432 \text{ mL}$$

B-19 An initial mixture of nitrogen gas and hydrogen gas is reacted in a rigid container at a certain temperature by the reaction $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

At equilibrium, the concentrations are $[\text{H}_2]=3.0\text{ M}$, $[\text{N}_2]=1.0\text{ M}$, and $[\text{NH}_3]=5.0\text{ M}$.

What were the concentrations of nitrogen gas and hydrogen gas that were reacted initially?

d) $[\text{H}_2]=10.5\text{ M}$, $[\text{N}_2]=3.5\text{ M}$ $3\text{H}_2 + \text{N}_2 \rightleftharpoons 2\text{NH}_3$

I	$[\text{H}_2]_0$	$[\text{N}_2]_0$	0	} use this
C	$-3x$	$-x$	$+2x$	
E	3	1	5	

$$[\text{NH}_3] : 2x = 5 \rightarrow x = 2.5$$

$$[\text{H}_2] - 3x = 3$$

$$[\text{H}_2] - 3(2.5) = 3 \rightarrow \text{H}_2^0 = 3 + 7.5 = 10.5$$

$$\text{N}_2 - x = 1$$

$$\text{N}_2 \rightarrow 2.5 = 1$$

$$\text{N}_2^0 = 1 + 2.5 = 3.5$$

B

B-20 The equilibrium position of the reaction $2\text{SO}_3(\text{g}) \rightleftharpoons 2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \quad \Delta H = 197 \text{ kJ}$ can be shifted in the forward direction by _____.

- a) increase pressure b) decrease volume c) increase temperature d) add SO_2

$\Delta H = +$ بهای زیاد می شود $\Delta H = + 197$
 بهای زیاد می شود
 بهای زیاد می شود $\Delta H = -$ بهای کم می شود

B-21 For the reaction $\text{N}_2(\text{g}) + 3\text{Cl}_2(\text{g}) \rightleftharpoons 2\text{NCl}_3(\text{g})$

an analysis for the mixture at equilibrium is performed at a certain temperature. It is found that $[\text{N}_2] = 4.0 \text{ M}$, $[\text{Cl}_2] = 5.0 \text{ M}$, and $[\text{NCl}_3] = 5.0 \text{ M}$. Calculate K_c for the reaction at this temperature.

- a) 0.05 b) 0.25 c) 0.56 d) 20

$$K_c = \frac{[\text{NCl}_3]^2}{[\text{N}_2][\text{Cl}_2]^3} = \frac{[5]^2}{[4][5]^3} = 0,05$$

B-22 Consider the following: (1) $2\text{A}(\text{g}) + 3\text{B}(\text{g}) \longrightarrow 3\text{C}(\text{g}) + \text{D}(\text{g})$,

(2) $2\text{A}(\text{aq}) + 3\text{B}(\text{aq}) \rightleftharpoons 3\text{C}(\text{aq}) + \text{D}(\text{aq})$, (3) $2\text{A}(\text{aq}) + 3\text{B}(\text{g}) \rightleftharpoons 3\text{C}(\text{g})$, (4) $2\text{A}(\text{aq}) + 3\text{B}(\text{g}) \longrightarrow 3\text{C}(\text{s})$

3, 4 is an example of heterogeneous equilibrium and 1, 2 is an example of homogenous equilibrium?

- a) 1 and 3, 2 and 4 b) 1 and 2, 3 and 4 c) 2, 4 d) 3, 2

B

B-23 The value of K_c for the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, is 1.2. The reaction is started with $[H_2]_0 = 0.1 M$, $[N_2]_0 = 0.7 M$ and $[NH_3]_0 = 0.01 M$. Which of the following is correct as the reaction comes to equilibrium?

- a) The concentration of N_2 will increase b) The concentration of NH_3 will decrease

هنا $Q_c < K_c$ دالة ترايبلاستية لرسد في Q_c

$$Q_c = \frac{[NH_3]^2}{[N_2][H_2]^3} = \frac{[0.01]^2}{[0.7][0.1]^3} = \frac{1 \times 10^{-4}}{7 \times 10^{-4}} = 0.142$$

- c) The concentration of NH_3 will increase d) The reaction is at equilibrium

$Q_c < K_c$

∴ $Q_c < K_c$ ف التوازن K_c ما يقابل
 ستمتد في اليمين لتكونه NH_3 ويتناقص
 لذلك سيزداد تركيز NH_3 في

B-24 The equilibrium constant, K_p , for the reaction $2A_2(g) + 3B(s) \rightleftharpoons D(g)$, is 5.2×10^{-6} at $415^\circ C$. The value of K_p for the equilibrium $3D(g) \rightleftharpoons 6A_2(g) + 9B(s)$ at the same temperature is _____.

- a) 7.11×10^{15} b) 1.42×10^8 c) 5.2×10^{-6} d) 2.65×10^{-10}

$$2A_2 + 3B \rightleftharpoons D \quad K_p = 5.2 \times 10^{-6}$$

$$3D \rightleftharpoons 6A_2 + 9B \quad K_p = ?$$

الخ K_p لثابت التوازن
 في $2A_2 + 3B \rightleftharpoons D$
 في $3D \rightleftharpoons 6A_2 + 9B$
 $\frac{1}{(K_p)^3} = K_p$
 $= 7.11 \times 10^{15}$

B

B-25 We dilute 4.20 mL of 2.00 M HCl solution to 15.0 mL. What is $[\text{OH}^-]$ in this solution at 25 °C?

a) 0.56 M

b) 1.79×10^{-14} M

c) 2.0 M

d) 3.4×10^{-14} M

$$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]}$$

$\xrightarrow{\text{H}^+}$

$M_1 V_1 = M_2 V_2$

$M_2 = 0,56$

$$[\text{OH}^-] = \frac{1 \times 10^{-14}}{0,56} = 1,785 \times 10^{-14}$$

B-26 What is the pH of a 0.0243 M solution of HNO_2 at 25 °C? (K_a for $\text{HNO}_2 = 4.5 \times 10^{-4}$)



a) 11.5

b) 3.1

c) 1.61

d) 2.48

$$[\text{H}^+] = \sqrt{K_a (\text{acid})}$$

$$M = \sqrt{4,5 \times 10^{-4} (0,0243)}$$

$$\text{pH} = -\log [\text{H}^+] =$$

B

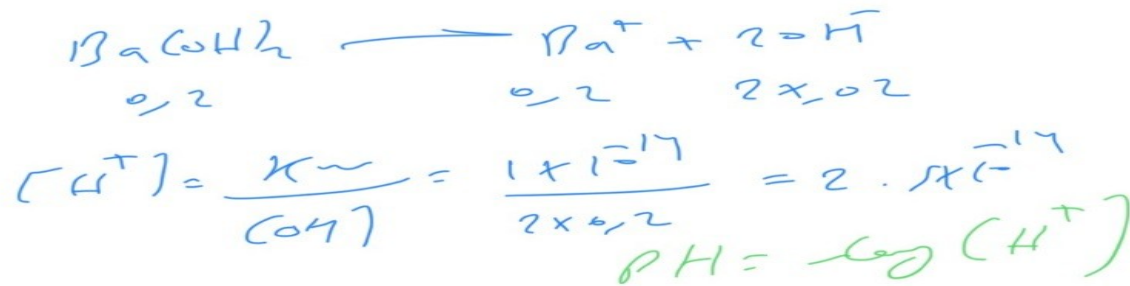
B-27 The pH of 0.2 M $\text{Ba}(\text{OH})_2$ will be _____. $\text{Ba}(\text{OH})_2 \rightarrow \text{Ba}^{+2} + 2 \text{OH}^-$

a) 0.4

b) 13.3

c) 13.6

d) 0.6



B-28 How much NaOH is needed to prepare 546 mL solution with a pOH=2.50?



a) 69.06 g

b) 1.7 g

c) 0.002 g

d) 0.07 g

$$\text{pOH} = 2,50$$

$$[\text{OH}^-] = 10^{-\text{pOH}}$$

$$= \text{shift log}(-\text{pOH})$$

$$= 3,16 \times 10^{-3}$$

$$n = M \times V_L$$

$$3,16 \times 10^{-3} \times \frac{546}{1000} = 1,72 \times 10^{-3}$$

$$\text{mass NaOH} = 1,72 \times 10^{-3} \times 40$$

$$= 0,069 = 0,07 \text{ g}$$

B-29 A 0.040 M monoprotic acid solution is 2.5% ionized. Its K_a value is _____.

a) 2.5×10^{-5} b) 3.4×10^{-3} c) 5.2×10^{-6}

d) 0.001

B-30 Which of the following solution is more basic

a) solution A ($[\text{H}^+] = 1 \times 10^{-2} \text{ M}$)b) solution B ($[\text{H}^+] = 2 \times 10^{-3} \text{ M}$)

$$\% \text{ ionization} = \frac{[\text{H}^+]}{[\text{HA}]} \times 100$$

$$2,5 = \frac{[\text{H}^+]}{0,04} \times 100 \longrightarrow \text{H}^+ = 1 \times 10^{-3}$$

$$\text{H}^+ = \sqrt{K_a(\text{acid})} \quad \text{نصف الجذر} \quad \text{H}^2 = K_a(\text{acid}) \Rightarrow K_a = \frac{[\text{H}^+]^2}{[\text{acid}]} = 2,5 \times 10^{-5}$$

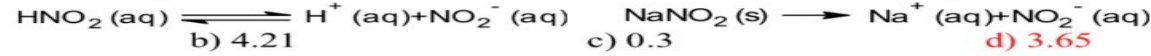
B

e) solution C ($[H^+] = 1 \times 10^{-6} M$)

d) solution D ($[H^+] = 0.5 \times 10^{-4} M$)

کے حل میں تر کر H معلق ہے۔ B کی نسبت زیادہ زیادہ، زیادہ تر تر کر H
بڑے اعلیٰ تر تر کر H

B-31 Calculate the pH of a solution that is 0.5 M HNO₂ ($K_a = 4.5 \times 10^{-4}$) and 1.0 M NaNO₂



a) 11.4

b) 4.21

c) 0.3

d) 3.65

$$\begin{aligned} pH &= pK_a + \log \frac{(A) - salt}{(HA) - acid} \\ &= -\log 4.5 \times 10^{-4} + \log \frac{(1)}{(0.5)} = 3.65 \end{aligned}$$

B-32 Calculate the pH after 0.10 mol of NaOH is added to 1.00 L of the above solution



a) 3.79

b) 3.65

c) 10.3

d) 3.41

ہلکے سے زیادہ تر تر کر H معلق ہے۔ B کی نسبت زیادہ زیادہ، زیادہ تر تر کر H

$$\begin{aligned} [A^-] &= [A_0] + \text{added base} = 1 - 0.10 = 0.9 \\ [HA] &= [HA_0] - \text{added base} = 0.5 - 0.1 = 0.4 \\ pH &= -\log 4.5 \times 10^{-4} + \log \frac{(0.9)}{(0.4)} \\ &= 3.79 \end{aligned}$$

B**B-33** The solubility of the ionic compound M_2X_3 , having a molar mass of 288 g/mol, is 3.6×10^{-7} g/L. Calculate the K_{sp} of the compound. $M_2X_3(s) \rightleftharpoons 2M^{+3}(aq) + 3X^{-2}(aq)$ a) 7.2×10^{-41} b) 1.1×10^{-43} c) 5.7×10^{-40} d) 1.5×10^{-34} 

$$[M^{+3}] = 2S$$

$$[X^{-2}] = 3S$$

$$K_{sp} = [M^{+3}]^2 [X^{-2}]^3$$

$$K_{sp} = [2S]^2 [3S]^3$$

$$K_{sp} = 108 S^5$$

$$K_{sp} = 108 (1.25 \times 10^{-9})^5$$

$$K_{sp} = 108 \times 3.05 \times 10^{-45}$$

$$= 3.29 \times 10^{-43}$$

$S = \text{Molar Solubility}$

$= \frac{\text{solubility}}{\text{Molar mass}}$

$= \frac{3.6 \times 10^{-7}}{288}$

$$= 1.25 \times 10^{-9}$$

$$= 1.25 \times 10^{-9}$$

Choose the correct answer

A-1 Express 3.6 μm in Tm ?

- a) 3.6×10^{-18} Tm b) 3.6×10^6 Tm c) 3.6×10^{12} Tm d) 3.6×10^{-6} Tm

A-2 The correct formula for copper (I) carbonate is:

- a) $\text{Cu}_2(\text{CO}_3)_2$ b) $\text{Cu}(\text{CO}_3)_2$ c) CuCO_3 d) Cu_2CO_3

A-3 The density of benzene (C_6H_6) is 0.85 g/mL at 48° C. How many benzene molecules are present in 5.0 mL of benzene at this temperature?

- a) 3.3×10^{22} b) 1.3×10^{21} c) 2.6×10^{24} d) 5.1×10^{26}

A-4 Calculate the mass of (Fe_2O_3) required to react completely with 25 g of (Al)

according to the following equation $\text{Fe}_2\text{O}_3 (s) + 2\text{Al} (s) \rightarrow 2\text{Fe} (l) + \text{Al}_2\text{O}_3 (s)$

- a) 25 g b) 40.2 g c) 12.5g d) 74.07 g

A-5 Calculate the volume needed to prepare a solution contain 3.2 g of FeCl_3 and concentration of 0.2M?

- a) 0.098 ml b) 295.4 ml c) 98.5 ml d) 0.295 ml

A-6 Which of these elements is chemically similar to Vanadium (V)?

- a) Cr b) Mo c) Ta d) Ti

A-7 The empirical formula for $\text{C}_8\text{H}_{20}\text{O}_4$ is

- a) CHO b) $\text{C}_6\text{H}_{15}\text{O}_3$ c) $\text{C}_4\text{H}_{10}\text{O}_2$ d) $\text{C}_2\text{H}_5\text{O}$

A-8 An example of ploy atomic ion is :

- a) PO_4^{3-} b) P_4 c) Mg^{+2} d) S^{-2}

A-9 Chlorine consists of two isotopes the first isotope with a mass of 34.968 amu and natural abundance of 75.78 %, and the second isotope with natural abundance of 24.22 %. If the average atomic mass of chlorine is 35.45 amu. Calculate the mass of the second isotope of chlorine?

- a) 34.523 amu b) 38.167 amu **c) 36.956 amu** d) 35.213 amu

A-10 A 32.00 mL sample of 0.2 M nitric acid is introduced into a flask, and water is added until the volume of the solution reaches 250. mL. What is the concentration of nitric acid in the final solution?

- a) 2.6×10^2 M b) 2.6×10^{-3} M c) 2.6 M **d) 2.6×10^{-2} M**

A-11 Calculate the total pressure of a mixture of two gases (A+B) in 1 L container at 27°C. Gas A has 3 mole and the number of mole of gas B is 3.52 mole ?

- a) 67.2 atm **b) 160.4 atm** c) 106.95 atm d) 87.1 atm

A-12 At what temperature will a fixed amount of gas with a volume of 150 L at 288 K and 760 mmHg occupy a volume of 198 L at a pressure of 640 mm Hg?

- a) 320.13 °C b) 100 °C c) 47.13 °C d) 259.1 °C

A-13 Which of the following is not gas under atmospheric conditions?

- a) P b) Ar c) O₂ d) Kr

A-14 What is the maximum number of electrons in an atom that can have the following quantum numbers: $n = 3, m_s = +\frac{1}{2}$?

- a) 3 b) 18 c) 9 d) 2

A-15 A mixture of three gases has a total pressure of 1.82 atm at 298 K. The mixture is analyzed and is found to contain 1.27 mol CO₂, 3.04 mol CO, and 1.50 mol Ar. What is the partial pressure of CO?

- a) 0.55 atm b) 0.40 atm c) 0.47 atm d) 0.95 atm

A-16 The elements in Group 8A are known by what name?

- a) Halogen b) Alkali meatal c) Nobel gases d) Alkali earth metal

A-17 The outermost electron configuration for Sb :

- a) $3s^23p^4$ b) $5s^25p^3$ c) $5s^25p^2$ d) $4s^24p^1$

A-18 Which of these elements has the lowest first ionization energy?

- a) K b) Ge c) Ca d) Rb

A-19 What is the total number of valance electrons in NF_3 ?

- a) 20 b) 16 c) 26 d) 24

A-20 Which is the correct equilibrium constant expression for the following reaction?



- a) $\frac{[\text{H}_2\text{O}]^3}{[\text{H}_2]^3}$ b) $\frac{[\text{H}_2\text{O}]^3[\text{Fe}]^2}{[\text{Fe}_2\text{O}_3][\text{H}_2]^3}$ c) $\frac{[\text{H}_2]^3}{[\text{H}_2\text{O}]^3}$ d) $\frac{[\text{Fe}_2\text{O}_3][\text{H}_2]^3}{[\text{Fe}]^2[\text{H}_2\text{O}]^3}$

A-21 The equilibrium constant K_p is not applicable for the reaction _____.

- a) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \leftrightarrow 2\text{NH}_3(\text{g})$ b) $\text{C}_6\text{H}_5\text{COOH}(\text{aq}) \leftrightarrow \text{C}_6\text{H}_5\text{COO}^-(\text{aq}) + \text{H}^+(\text{g})$
c) $2\text{CO}_2(\text{g}) \leftrightarrow 2\text{CO}(\text{g}) + \text{O}_2(\text{g})$ d) $\text{H}_2\text{O}(\text{g}) + \text{C}(\text{s}) \leftrightarrow \text{CO}(\text{g}) + \text{H}_2(\text{g})$

A-22 The equilibrium constant, K_c , for the reaction $\text{I}_2(\text{g}) \leftrightarrow 2\text{I}(\text{g})$, is 3.8×10^{-5} at 727°C .

The value of K_p for the equilibrium $2\text{I}(\text{g}) \leftrightarrow \text{I}_2(\text{g})$ at the same temperature is _____.

- a) 3.12×10^{-3} b) 2.63×10^4 c) 648 d) 320.9

A-23 For the reaction $\text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g}) \leftrightarrow \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$, $K_c = 1.87$ at 700°C . Calculate the concentration of H_2 present at equilibrium if a mixture of 0.300 moles of CO and 0.300 moles of H_2O is heated to 700°C in a 10.0 L container?

- a) 0.03 M **b) 0.017 M** c) 0.013M d) 0.173 M

A-24 Which can alter the value of the equilibrium constant?

- a) adding catalyst **b) decreasing the temperature**
c) increasing the pressure d) increasing the concentration of reactant

A-25 The equilibrium $\text{PCl}_5(\text{g}) \leftrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, can be shifted toward more product formation by _____. $\Delta H = 92.5 \text{ kJ}$

- a) decreasing the pressure** b) decreasing the volume
c) decreasing the temperature d) Adding PCl_3

A-26 The conjugate base of benzoic acid (C_6H_5COOH), is _____.

- a) OH^{-1} b) C_6H_5OH c) $C_6H_5COO^{-1}$ d) $COOH$

A-27 Calculate the concentration of $[H^+]$ in 0.08 M $Ba(OH)_2$ solution _____.



$$[H^+] = \frac{K_w}{[OH^-]} = \frac{1 \times 10^{-14}}{2 \times 0.08} = 6.25 \times 10^{-14} \text{ M}$$

A-28 How much NaOH is needed to prepare 921 mL solution with a pH=10?



$$pH=14-pOH = 14 - 10 = 4$$

$$[H^+] = 10^{-pH} = \text{Shift log}(-4) = 1 \times 10^{-4} \text{ M}$$

$$n \text{ mols} = M \times V \text{ in L}$$

$$= 1 \times 10^{-4} \times 0.921 = 9.21 \times 10^{-5}$$

$$\text{Mass} = n \text{ mols} \times M_w$$

$$= 9.21 \times 10^{-5} \times 40$$

$$= 3.68 \times 10^{-3} \text{ g}$$

NaOH



A-29 Which of the following is true for a solution having $\text{pOH} > 7$?

- a) $[\text{H}^+] < 10^{-7} \text{ M}$ b) $[\text{OH}^-] > 10^{-7} \text{ M}$ c) It is a basic solution. **d) $[\text{H}^+] > 10^{-7} \text{ M}$**

$$\text{pH} + \text{pOH} = 14$$

كلما كان الـ بي اوتش كبير كلما كان الـ بي اتش صغير وهذا يعني ان تركيز ايونات الهيدروجين عالي

$$[\text{H}^+] > 10^{-7} \text{ M}$$

A-30 What is the K_a of a 0.00335 M solution of HA at 25 °C and $\text{pH}=2.9$?



- a) 3.2×10^{-5} **b) 4.7×10^{-4}** c) 9.7×10^{-3} d) 2.5×10^3

A-31 Calculate the percent ionization of 0.040 M monoprotic acid solution with $K_a = 3.6 \times 10^{-5}$?

- a) 1.3 % b) 2.0 % **c) 3.0 %** d) 4.2 %

A-32 For the reaction $2\text{NCl}_3 \text{ (g)} \rightleftharpoons \text{N}_2 \text{ (g)} + 3\text{Cl}_2 \text{ (g)}$

an analysis for the mixture at equilibrium is performed at a certain temperature. It is found that $[\text{N}_2]=4.0 \text{ M}$, $[\text{Cl}_2]=5.0 \text{ M}$, and $[\text{NCl}_3]=5.0 \text{ M}$. Calculate K_c for the reaction at this temperature.

- a) 0.05** b) 4 c) 1.79 d) 20

A-33 The solubility of the ionic compound M_2X_3 is 3.6×10^{-7} g/L with $K_{sp} = 3.3 \times 10^{-43}$.
 calculate the molar mass of the compound



a) 112.9 g/mol

b) 288 g/mol

c) 3.5×10^{-3} g/mol

d) 325.6 g/mol

A-34 Calculate the pH of a solution that is 2.0 M HNO_2 ($K_a = 4.5 \times 10^{-4}$) and 1.0 M $NaNO_2$



$$pH = pK_a + \log \frac{[A^-]}{[HA]}$$

Base
 ↓
 Acid

$$pK_a = -\log K_a$$