Assignment 5

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-09-12, 23:59 IST.

Assume the activity same as concentration unless specified.

1) Consider the following points: 4 points

(i). Increases in ionic strength cause a decrease in the pKa of an acid, if the fully-protonated form of the acid is an uncharged species.
(ii). Sodium Acetate is not a strong base.
(iii). The value of $a_0$ plus $a_1$ must always equal unity for a monoprotic acid.

Which statements are correct:

- (ii), (iii)
- (i), (ii), (iii)
- (i), (ii)
- (i), (iii)

No, the answer is incorrect.

Score: 0

Accepted Answers:

(ii), (iii)

2) A 500-mL water sample is collected out of which 200 ml is titrated with 0.03 N sulfuric acid to an endpoint of pH 4.5. The titration consumes 50 ml of sulfuric acid. The total alkalinity of 500 ml water sample as CaCO$_3$ is: -

- 187.5 mg/l
- 375 mg/l
- 93.75 mg/l
- 75 mg/l

No, the answer is incorrect.

Score: 0

Accepted Answers:

375 mg/l
added, and to the second beaker, NH\textsubscript{3} is added until the pH = 10.5. If the pH in beaker 1 is ‘x’ and ammonia added to beaker 2 is ‘y molar’ then, the value of ‘x’ and ‘y’ is (ignore activity correction):

- x = 11.5, y = 0.009 M
- x = 10, y = 0.006 M
- x = 10, y = 0.009 M
- x = 11.5, y = 0.006 M

No, the answer is incorrect.
Score: 0
Accepted Answers:
- x = 10, y = 0.006 M

4) While preparing the logC-pH graph for 10^{-4} M NH\textsubscript{4}Cl (pK\textsubscript{a}=9.24), the correct linear equation for [NH\textsubscript{3}] when pH<pK\textsubscript{a}

- p(NH\textsubscript{3}) = 13.24 - pH
- p(NH\textsubscript{3}) = 5.24 - pH
- p(NH\textsubscript{3}) = pH - 13.24
- p(NH\textsubscript{3}) = - 5.24 + pH

No, the answer is incorrect.
Score: 0
Accepted Answers:
- p(NH\textsubscript{3}) = 13.24 - pH

5) Consider the statements:

(i). The stronger the acid, the weaker its conjugate base.
(ii). An acidic buffer consists of a weak acid and its conjugate base supplied as a salt.
(iii). If strong acid is added to a solution containing approximately equal amounts of CH\textsubscript{3}COO\textsuperscript{-1} and CH\textsubscript{3}COOH then pH increases.

Which statement is/are false-

- (i), (ii), (iii)
- (ii), (iii)
- (i), (iii)
- (iii)

No, the answer is incorrect.
Score: 0
Accepted Answers:
- (iii)

6) Common Data type question (for 6 & Q7):

Consider the two condition given below:

**Condition.1:** 10^{-3} M Na\textsubscript{2}CO\textsubscript{3} is added to make a solution (closed system).

**Condition.2:** 10^{-3} M Na\textsubscript{2}CO\textsubscript{3} is added to make a solution and it equilibrates with atmospheric CO\textsubscript{2} and NH\textsubscript{3} is also present at a partial pressure of 10^{-5} atm.

(Note: - VMinteq can also be used to solve this questions)

Find the correct options regarding the questions below:

As compared to Condition.1, in Condition.2 CO\textsubscript{2}(g)
7) Difference in \(\text{CO}_3\) (TOTCO\(_3\)) between condition 1 and 2 is:  
- 5.11*10\(^{-4}\) M  
- 3.65*10\(^{-3}\) M  
- 2.75*10\(^{-3}\) M  
- 4.95*10\(^{-3}\) M  

No, the answer is incorrect.  
Score: 0  
Accepted Answers: 
Enteres the solution

8) A monoprotic acid (HX) of concentration 5*10\(^{-3}\) M is mixed in a 0.05M NaCl solution and the measured pH of the solution is 2.827 (Note: a pH meter measures the activity, not concentration of protons). Determine the pH of a 2*10\(^{-3}\) M NaX solution in 0.05 M NaCl. (Note: - ignore activity correction only if the ionic strength I < 0.1 M)  
- pH=5.2  
- pH=7.22  
- pH=6.6  
- pH=7.98  

No, the answer is incorrect.  
Score: 0  
Accepted Answers: 
pH=7.22

9) In the logC-pH graph below, the pK\(_a\) values are:  
- pk\(_{a1}\) = 5.5, pk\(_{a2}\) = 8.2, pk\(_{a3}\) = 9.3  
- pk\(_{a1}\) = 5.5, pk\(_{a2}\) = 8.2, pk\(_{a3}\) = 6.8
No, the answer is incorrect.
Score: 0
Accepted Answers:
\[ p_{k_{a1}} = 5.5, \quad p_{k_{a2}} = 9.3, \quad p_{k_{a3}} = 6.8 \]