HW02 - Water, Acids & Bases II

1 7 points

Select all seven strong acids below:

- [ ] HF
- [ ] HCl
- [ ] HI
- [ ] HBr
- [ ] H_2SO_4
- [ ] HAt
- [ ] $HClO_4$
- [ ] HNO_3
- [ ] NaOH
- [ ] HClO
- [ ] $HClO_3$

2 5 points

What is the pH of a 0.044 M HI solution?
Note: Report your answer to two sig figs (pH = X.XX)

Type your answer...

3 5 points

What is the $[OH^-]$ when 0.0023 moles of $Ca(OH)_2$ are placed in 654 mL water? Assume complete dissociation of $Ca(OH)_2$.

- ○ 0.0035 M
- ○ .0070 M
- ○ 2.15 M
- ○ 3.5×10^{-6} M
- ○ 12.0 M

4 5 points

Use the data here to rank the following weak acids from **weakest** to **strongest**.

HIO
CH_3COOH
HCN
HF
HNO_2

- ○ HIO < HCN < CH_3COOH < HNO_2 < HF
- ○ HCN< HIO < CH_3COOH < HNO_2 < HF
- ○ HNO_2 < HF < HIO < HCN < CH_3COOH
- ○ HF < HNO_2 < CH_3COOH < HCN < HIO

5 5 points

A 0.5 M sample of a weak acid, HA_1 , has a pH = 4.24. A 0.5 M sample of another weak acid, HA_2, has a pH = 5.66. Which weak acid has the larger K_a value?

- ○ HA_2
- ○ HA_1
- ○ Both will have the same value of K_a

6 5 points

The generic weak acid HA has a percent ionization equal to 10.8% at a 0.025 M concentration. What is the pH?
Note: Report your answer to two sig figs (pH = X.XX)

Type your answer...

7 3 points

Which of the following represents a generic neutralization reaction of a strong acid and strong base?

- ○ Acid + Base → Salt + Water
- ○ Acid + Base → Weak Base + Water
- ○ Acid + Base → Weak Acid + Water
- ○ Acid + Base → Acid + Water
- ○ Acid + Water → Base + Salt
- ○ Base + Water → Acid + Salt

8 5 points

Consider the classic strong acid/base neutralization reaction of hydrochloric acid (HCl) and sodium hydroxide (NaOH) from HW01.

$$HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(\ell)$$

How many mL of 0.0448 M NaOH are needed to neutralize 32.0 mL of 0.0291 M HCl ?

- ○ 36.3 mL
- ○ 20.8 mL
- ○ 24.8 mL
- ○ 33.7 mL
- ○ 27.1 mL
- ○ 49.3 mL

9 5 points

A titration experiment is set up to fully neutralize a strong acid (HCl) using a strong base (NaOH). The HCl has a concentration of 0.01 M and a volume of 100 mL. The NaOH also has a concentration of 0.01 M. What volume of NaOH is needed to fully neutralize the HCl?

- ○ 50 mL
- ○ 200 mL
- ○ 100 mL
- ○ 250 mL
- ○ 20 mL
- ○ 500 mL

10 5 points

Barium hydroxide is a strong base that dissociates based on the following reaction:

$Ba(OH)_2(aq) \rightarrow Ba^{2+}(aq) + 2OH^-(aq)$

What volume of 0.005 M HCl (strong acid) is needed to fully neutralize a 500 mL 0.005 M $Ba(OH)_2$ solution?

- 1.00 L
- 500 mL
- 1.00 mL
- 750 mL
- 250 mL
- 2.50 L

11 5 points

What is the pH at the equivalence point of a titration involving a strong acid titrant and strong base analyte?

- pH = 7
- pH < 7
- pH > 7

12 5 points

What is the pH at the equivalence point of a titration involving a strong acid titrant and a weak base analyte?

- pH = 7
- pH < 7
- pH > 7

13 5 points

What is the pH at the equivalence point of a titration involving a strong base titrant and a weak acid analyte?

- pH > 7
- pH = 7
- pH < 7

14 5 points

Neutralizing an olympic size swimming pool is conceptually very similar to performaing a massive titration experiment. Suppose a 700 thousand gallon swimming pool has a pH = 9.33 which is a bit too high for swimming. Calculate how many gallons of 10 M HCl (strong acid) it will take to neutralize the swimming pool to pH = 7. Report your answer to exactly 2 significant figures.

Type your answer...

15 5 points

What atmospheric component is responsible for the natural acidity of rain?

- Carbon dioxide
- Sulfuric acid
- Ozone
- Oxygen

16 5 points

Which two methods can be used to make sea water drinkable?

- [ ] distillation
- [ ] osmosis
- [ ] reverse osmosis
- [ ] flocculation

17 5 points

The pH of rain water falling through an unpolluted atmosphere is closest to...

- 4.8
- 5.4
- 7.0
- 8.7

18 5 points

Most aquatic life in lakes cannot survive in water with a pH less than...

- 5
- 7
- 8
- 14

19 5 points

The acid neutralizing capacity of a lake or stream most often derives from the presence of _____ in the surrounding soil or rock.

- $CaCO_3$
- HNO_3
- NaOH
- H_3O^+

20 5 points

When Lake Travis is full, it holds about 369 billion gallons. If we pretend that Lake Travis has a neutral pH (pH = 7), approximately how many moles of H^+ are present in the lake? 1 gal = 3.785 L

- 1.40×10^5 moles
- 3.69×10^4 moles
- 3.69×10^9 moles
- 1.39×10^8 moles
- 138 moles
- 4.65×10^8 moles
- 1.00×10^{-7} moles