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Last KeyFirst Answer

Question 1 Consider the following system at equilibrium at 500 K:

5 Points

The production of $\text{PCl}_3(\text{g})$ is favored by:

Indicate True or False for each of the following:

 Increasing the temperature.T Decreasing the volume.F Decreasing the pressure.T Adding PCl_5 .T Removing Cl_2 .T

Question 2 Consider the following system at equilibrium at 573 K:

4 Points



If the Volume of the equilibrium system is suddenly decreased at constant temperature:

The reaction must:

 Run in the forward direction. Run in the reverse direction. Remain the sameThe number of moles of Cl_2 will: Increase. Decrease. Remain the same

Question 3 Write a net ionic equation to show that ammonia behaves as a base in water.

4 Points



Question 4 Assign each species on the left to a category on the right.

8 Points

 NaOH3

1. Strong Acid

 HNO_2 2

2. Weak Acid

 HCN2

3. Strong Base

 $\text{C}_9\text{H}_7\text{N}$ 4

4. Weak Base

Question 5 An aqueous solution has a hydroxide ion concentration of $1.0 \times 10^{-5} \text{ M}$.

6 Points

 What is the hydronium ion concentration in this solution? 1.0×10^{-9} M Is this solution acidic, basic or neutral?basic

Question 12 A 1L buffer solution contains 0.25 mol of NaCN and 0.15 mol of HCN.
8 Points (Chose a number from the list on the right that best describes what happens upon -)

- Addition of 0.05 mol of HCl will cause the [HCN] to 2 1. Increase significantly
- Addition of 0.05 mol of HCl will cause the pOH to 3(2) 2. Increase
- Addition of 0.05 mol of NaOH will cause the [HCN] to 5 3. Increase slightly
- Addition of 0.2 mol of NaOH will cause the pH to 1 4. Decrease significantly
- 5. Decrease
- 6. Decrease slightly

Question 13 Write a balanced nuclear equation for the following:

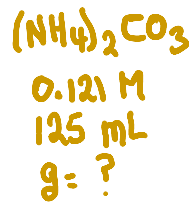
8 Points

- $^{238}_{92}\text{U}$ undergoing alpha emission: $\frac{^{238}_{92}\text{U}}{\quad} = \frac{^4_2\text{He}}{\quad} + \frac{^{234}_{90}\text{Th}}{\quad}$
- $^{137}_{55}\text{Cs}$ undergoing beta decay: $\frac{^{137}_{55}\text{Cs}}{\quad} = \frac{^{137}_{56}\text{Ba}}{\quad} + \frac{^0_{-1}\text{e}}{\quad}$
- $^{10}_6\text{C}$ undergoing positron emission: $\frac{^{10}_6\text{C}}{\quad} = \frac{^{10}_5\text{B}}{\quad} + \frac{^0_{+1}\text{e}}{\quad}$
- $^{51}_{24}\text{Cr}$ undergoing electron capture: $\frac{^{51}_{24}\text{Cr}}{\quad} + \frac{^0_{-1}\text{e}}{\quad} = \frac{^{51}_{23}\text{V}}{\quad}$

Question 14 You need to make an aqueous solution of 0.121 M ammonium carbonate for an experiment in lab, using a 125 mL volumetric flask. How much solid ammonium carbonate should you add?

8 Points

Must show work



$$(\text{NH}_4)_2\text{CO}_3: 2(14.01 + 4.04) + 12.01 + 48.00 = 96.11 \text{ g} \cdot \text{mol}^{-1}$$

$$\# \text{mol } (\text{NH}_4)_2\text{CO}_3 = 0.121 \times 0.125 = 1.51 \times 10^{-2}$$

$$\frac{1.51 \times 10^{-2} \text{ mol } (\text{NH}_4)_2\text{CO}_3}{1 \text{ mol}} \times \frac{96.11 \text{ g}}{1 \text{ mol}} = 1.45 \text{ g}$$

1.45 g

Question 15 How many moles of hydrochloric acid will be formed upon the complete reaction of 1.5 moles of water with excess chlorine gas?

4 Points



Must show work and include a balanced chemical equation.



$$\frac{1.5 \text{ mol H}_2\text{O} \mid 5 \text{ HCl}}{3 \text{ H}_2\text{O}} = 2.5 \text{ mol HCl}$$

2.5

mol

Question 16 How many grams of solid aluminum hydroxide are required to neutralize 15.5 mL of a 2.65 M solution of perchloric acid.

8 Points

Must show work and include a balanced chemical equation.



$$\text{g?} \quad \quad \quad \begin{array}{l} 15.5 \text{ mL} \\ 2.65 \text{ M} \end{array}$$

$$\# \text{ mol HClO}_4 = 2.65 \times 0.0155 = 4.11 \times 10^{-2} \text{ mol}$$

$$\frac{4.11 \text{ mol HClO}_4 \mid 1 \text{ Al}(\text{OH})_3}{3 \text{ HClO}_4} = 1.37 \times 10^{-2} \text{ mol Al}(\text{OH})_3$$

$$\text{Al}(\text{OH})_3 : 26.98 + 3(16.00 + 1.01) = 78.01 \text{ g} \cdot \text{mol}^{-1}$$

$$\frac{1.37 \times 10^{-2} \text{ mol Al}(\text{OH})_3 \mid 78.01 \text{ g}}{1 \text{ mol}} = 1.07 \text{ g}$$

1.07

g

Exam III Score