Chemistry 141 Name key

Dr. Cary Willard

Quiz 3a (20 points) September 11, 2013

Exactly 250.0 mL of 0.1532 M hydrochloric acid was added to a beaker containing 175.0 mL of 0.1044 M lead(II) nitrate. Write and balance the equation for the reaction that occurs. (Remember that lead(II) chloride is insoluble.) Use an IE table to solve the problem.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | x=19.10 mmol |  | x=18.27 mmol |  |  |  |  |
|  | 2 HCl | + | Pb(NO3)2 | 🡪 | PbCl2 | + | 2 HNO3 |
| I | 38.30 mmol |  | 18.27 mmol |  | 0 mmol |  | 0 mmol |
|  | -2x |  | -x |  | +x |  | +2x |
| E | 38.30-2x=1.56 mmol |  | 18.27-x=0 mmol |  | x=18.27 mmol |  | 2x=36.54 mmol |

1. Which reactant is limiting?

Lead nitrate

1. What is the value of x?

18.27 mmol

1. Determine the mass of PbCl2 produced by the reaction.

$$18.27 mmol PbCl\_{2}×\frac{278.1 mg PbCl\_{2}}{1 mmol PbCl\_{2}}×\frac{1 g PbCl\_{2}}{1000 mg PbCl\_{2}}=5.081 g PbCl\_{2}$$

1. Determine the number of moles and the concentrations of the following ions in solution

Mol Pb+2 = \_\_\_\_\_0 mol \_\_\_\_\_\_\_\_\_ [Pb+2] = \_\_\_\_~ 0 M\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mol H+1 = (0.00176+0.03654)=0.03830 mol [H+1] = \_\_\_\_\_0.09012 M\_\_\_\_\_\_\_\_\_\_\_\_

Mol Cl-1 = \_\_\_\_\_\_0.00176 mol\_\_\_\_ [Cl-1] = \_\_\_\_\_0.00414 M\_\_\_\_\_\_\_\_\_\_\_\_

Mol NO3-1 = \_\_\_0.03654 mol \_\_\_\_\_ [NO3-1] = \_\_\_\_0.08598 M \_\_\_\_\_\_\_\_\_\_

1. Determine the pH of the final solution. pH = 1.0452

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Quiz 3b (20 points) September 11, 2013

Exactly 150.0 mL of 0.1532 M hydrochloric acid was added to a beaker containing 175.0 mL of 0.1044 M lead(II) nitrate. Write and balance the equation for the reaction that occurs. (Remember that lead(II) chloride is insoluble.) Use an IE table to solve the problem.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | x=11.49 mmol |  | x=18.37 mmol |  |  |  |  |
|  | 2 HCl | + | Pb(NO3)2 | 🡪 | PbCl2 | + | 2 HNO3 |
| I | 22.98 mmol |  | 18.27 mmol |  | 0 mmol |  | 0 mmol |
|  | -2x |  | -x |  | +x |  | +2x |
| E | 22.98-2x=0 mmol |  | 18.27-x=6.78 mmol |  | x=11.49 mmol |  | 2x=22.98 mmol |

1. Which reactant is limiting?

Hydrochloric acid

1. What is the value of x?

11.49 mmol

1. Determine the mass of PbCl2 produced by the reaction.

$$11.49 mmol PbCl\_{2}×\frac{278.1 mg PbCl\_{2}}{1 mmol PbCl\_{2}}×\frac{1 g PbCl\_{2}}{1000 mg PbCl\_{2}}=3.195 g PbCl\_{2}$$

1. Determine the number of moles and the concentrations of the following ions in solution

Mol Pb+2 = \_\_\_0.00678 mol\_\_\_\_\_ [Pb+2] = \_\_\_\_\_0.0209 M\_\_\_\_\_\_\_\_\_\_\_\_\_

Mol H+1 = \_\_\_\_0.02298 mol\_\_\_\_\_ [H+1] = \_\_\_\_\_0.07071 M\_\_\_\_\_\_\_\_\_\_\_\_\_

Mol Cl-1 = \_\_ ~0 mol\_\_\_\_\_\_\_ [Cl-1] = \_\_\_\_\_\_~ 0 M\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mol NO3-1 = 2(.00678)+.02298=0.03674 mol \_ [NO3-1] = \_\_\_\_\_\_\_0.1124 M\_\_\_\_\_\_\_\_\_\_

1. Determine the pH of the final solution. pH = 1.1505