EXP. NUMBER	EXPERIMENT/SUBJECT	DATE
1	Quantitative Gravimetric Analysis	09/24/09

NAME	LAB PARTNER	LOCKER/DESK NO.	COURSE & SECTION NO.
[redacted]			Chem 1A03 - L28

Read this entire page

Pre-lab Questions:

1. i) $24.67 + 9.42 - 0.2 = 3.4 \times 10^{1}$

ii) $6340 / 5348 * 2345 = 2.78 \times 10^{3}$

iii) $3.53 \times 10^{-3} M \times 96 mL = 3.4 \times 10^{-4}$ moles

1/1

2. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_{4(s)} + 2NaCl$

MR 1 1 1 2

V 0.01L 0.02L

C 0.200M

n 3.342×10^{-3} mol $\xleftarrow{\times 1}$ 3.342×10^{-3} mol

$n_{BaSO_4} = \frac{m}{MM} = \frac{0.7800g}{233.4g/mol} = 3.342 \times 10^{-3}$ mol

$BaCl_{2(s)} \rightleftharpoons Ba^{2+}{}_{(aq)} + 2Cl^{-}{}_{(aq)}$

MR 1 1 2

n 3.342×10^{-3} mol $\xrightarrow{\times 1}$ 3.342×10^{-3} mol

$C_{Ba^{2+}} = \frac{n_{Ba^{2+}}}{V} = \frac{3.342 \times 10^{-3} mol}{0.0100L} = 0.3342M$

* Sample of $BaCl_2$ is 100 fold less

$\therefore C_{Ba^{2+}} = 0.3342M / 100 = 3.34 \times 10^{-3} M$

½

Purpose: To demonstrate the technique of using quantitative gravimetric analysis; To use a solution of Na_2SO_4 to find the concentration of Pb^{2+} in an unknown sample

ok

Procedure: Please refer to the 2009 Chem 1A03 / 1E03 lab manual for a detailed procedure.

changes??

Observations: (unknown sample M)

	$Pb(NO_3)_2$	Na_2SO_4	$PbSO_{4(s)}$	$NaNO_3$
Molecular mass (g/mol)	331.21	142.05	303.27	85.00
mass (g)		0.37	0.4065	
moles (mol)	1.340×10^{-3}	$2.6[illegible] \times 10^{-3}$	1.349×10^{-3}	
Concentration (M)	0.1340	0.35		
Hazards	-cumulative poison in body -cause anemia, kidney damage, eyesight damage -corrosive -greater than 0.15mg/L is harmful	-mildly toxic if ingested -drinking water with > 500mg/L result in gastro-intestinal irritation	-cumulative poison in body -cause anemia, kidney damage, eyesight damage -corrosive -greater than 0.15mg/L is harmful	-irritation through ingestion, skin and eye contact -ingestion cause diarrhea, abdominal pain, dizziness, convulsions

what do your materials look like

is $PbSO_4$ a solid??

0/1

Sample Calculations

Given volume $Na_2SO_4 = 7.5mL$

concentration $Na_2SO_4 = 0.35M$

$n_{Na_2SO_4} = C \cdot V$
$= 0.35M \cdot 0.0075L$
$= 2.625 \times 10^{-3}$ mol

$m_{Na_2SO_4} = n \times MM$
$= 2.625 \times 10^{-3} mol \times 142.05 g/mol$
$= 0.37g$

7.8/10

LP 8/10 Late

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Report

Read this part

mass of filter paper = ~~0.1860g~~ 0.1870g

mass of weighing paper = 1.2405g

mass of filter + weighing paper + lead sulfate (sample M) = 1.8340g

m_{PbSO_4} = (mass of filter + weighing + solid) − (mass of filter) − (mass of weighing paper)

= 1.8340g − 1.2405g − 0.1870g

= 0.4065g

$n_{PbSO_4} = \frac{m}{MM} = \frac{0.4065g}{331.21 g/mol} = \cancel{1.340 \times 10^{-3} mol}$ $1.227 \times 10^{-3} mol$

$V_{PbSO_4} = 0.01L$

→ $C_{PbSO_4} = \frac{n}{V} = \frac{1.3404 \times 10^{-3} ml}{0.01L} = 0.1340M$

Original Sample (4000 fold less concentrated)

$C_{PbSO_4} = \frac{0.1340M}{4000} = 3.351 \times 10^{-5} M$

10% of Pb^{2+} is absorbed in blood

10% of $3.351 \times 10^{-5} = 3.351 \times 10^{-6} M$

$3.351 \times 10^{-6} \frac{mol}{L} \cdot \frac{303.266 g/mol}{mol} \cdot \frac{1000 mg}{g} = 1.016 mg/L$

references

(unknown)

$Pb(NO_3)_2 + Na_2SO_4 \rightarrow PbSO_4 + 2NaNO_3$

MR 1 1 1 2

n $1.227 \times 10^{-3} ml$ ← ×1 ← ~~$1.340 \times 10^{-3} ml$~~ $1.227 \times 10^{-3} ml$

$V_{Pb(NO_3)_2} = 0.01L$

$C_{Pb(NO_3)_2} = \frac{n}{V} = \frac{1.227 \times 10^{-3} ml}{0.01L} = 0.1227M$

concentration of original sample: (4000 fold less)

$C_{Pb(NO_3)_2} = \frac{0.1227M}{4000} = 3.0675 \times 10^{-5} M$

10% of Pb^{2+} is absorbed by bloodstream

$\therefore (0.1)(C_{Pb(NO_3)_2})$

$= 0.1 \times 3.0675 \times 10^{-5} M$

$= 3.068 \times 10^{-6} M$

$3.0675 \times 10^{-6} M \times \frac{331.21 g/mol}{mol} \times \frac{1000 mg}{g}$

$= 1.016 mg/L$

~~A person drinking this water would exhibit~~:

References:

Mallinckrodt Baker, Inc. (2009). MSDS: Sodium Nitrate. Retrieved September 23, 2009, from <www.jtbaker.com/msds/englishhtml/S4442.htm

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$n_{PbSO_4} = \frac{m}{MM} = \frac{0.4065g}{303.266 g/mol} = 1.340 \times 10^{-3} mol$

$Pb(NO_3)_2 + Na_2SO_4 \rightarrow PbSO_4 + 2NaNO_3$

mr 1 1 1 2

n $1.340 \times 10^{-3} mol$ $1.340 \times 10^{-3} mol$

$\times 1$

$V_{Pb(NO_3)_2} = 0.01L$

$c_{Pb(NO_3)_2} = \frac{n}{V} = \frac{1.340 \times 10^{-3} mol}{0.01L} = 0.1340 M$

0.135

concentration of original sample:

$c_{Pb(NO_3)_2} = \frac{0.1340 M}{4000} = 3.350 \times 10^{-5} M$

10% of Pb^{2+} is absorbed by blood

$0.1 \times 3.350 \times 10^{-5} M = 3.350 \times 10^{-6} M$

$3.350 \times 10^{-6} M \cdot \frac{303.266 g/mol}{mol} \cdot \frac{1000 mg}{g}$

$[Pb^{2+}] = 1.016$ mg/L

Should be Mass of lead not $PbSO_4$

A person drinking this water will have the following symptoms:
- developmental toxicity
- decrease in vitamin D metabolism
- decrease in nerve conduction velocity
- decrease in hemoglobin synthesis
- abdominal pain
- increased red blood cell degeneration
- kidney failure
- brain structure breakdown

ok.

3.5/4

Sources of Error:

- The vacuum filtration System was an inaccurate method to collect the precipate because there were precipitate that sticked to the side of the Buchner funnel and it was hard to scoop them off. Also there were precipate leaking down into the Erlenmeyer flask when filtering with the vacuum, resulting in loss of precipitate mass.

- The balance used to measure the mass of the filter, weighing paper and solid was not very accurate because there was air molecules that weighed down the balance. Also when the filter paper and solid were weighed on the balance, the machine's measured mass kept bouncing up and down

confusing

OK

To improve experiment:
- use more accurate method to ~~pretty~~ collect the precipitate and use a more air-tight sealed electronic balance to get accurate measurement

0.4/1 Sample was wet

Discussion & conclusion
⇓
work your errors into a discussion

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