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Geochemistry Calibration Lab. Book Vol. CAL-01
(CAL-01)

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8/1/89 BG

Purpose: to Calibrate glass volumetric flasks

Method: Wash ea. glassware w/ 10% nitric acid, rinse ea. 9 times w/ deionized wtr. Dry. Weigh ea. flask 5 times dry. Fill ea. flask 5 times w/ deion. wtr and weigh ea. time. ~~Date~~ Record wtr temp. Determ vol. & wt. of ea. flask. Mark flask accordingly.

FLASK	dry weight (g) SD	filled weight (g) SD	weight (g) wtr	vol (ml)
A 200ml	101.97	301.28 ±.00	199.31	
	101.97	301.36	199.39 avg	
	101.95	301.28	199.32 199.36	
	101.96	301.30	199.35 ±.05	
	101.95	301.38	199.43	
B 200ml	106.42	305.66	200.24	
	106.41	305.74	199.33	
	106.41	305.81	199.40 ~199.52	
	106.41	305.69	199.28	
	106.41	305.76	199.35	

Experiment was redone because wtr temp was not recorded during measurements.

Water density

Temp (°C)	ρ (g/cm³)
24.0	.9973
24.5	.9972
25.0	.9971
25.5	.9969
26.0	.9968
26.5	.9967
27.0	.9965

T: 22.5°C

Flask	dry weight (g)	filled weight (g)	weight wtr (g)	vol (ml)
A 200ml	101.85	301.40	199.55	
	101.87	301.34	199.47	
	101.86	301.45		
	101.86	301.34		
	101.87	301.27		
	~101.862	~301.36	~199.50	~200.04

T = 22.5°C

Flask	dry wt. (g)	filled wt (g)	wt water (g)	vol (ml)
200ml	106.31	305.76		
	106.30	305.70		
	106.30	305.78		
	106.31	305.78		
	106.29	305.79		
	~106.20	~305.762	~199.56	200.02
200ml	106.15	305.56		
	106.15	305.58		
	106.14	305.56		
	106.14	305.55		
	106.14	305.63		
	~106.144	~305.576	~199.432	199.89
T = 23.3				
D 200ml	102.23g	301.62		
	102.25	301.68		
	102.24	301.68		
	102.26	301.71		
	102.25	301.70		199.93
	~102.246	~301.678	~199.428	~~199.88~~
E 200ml	103.34	302.74		
T = 23.5	103.34	302.83		
	103.34	302.82		
	103.34	302.85		
	103.35	302.83		
	~103.35	~302.814	~199.464	199.98

8/1/89 BE

FLASK	dry wt (g)	filled wt (g)	STD ±.05 wtr wt (g)	vol (ml)
A 250ml	122.69	371.93		
T= 23.0°C	122.70	371.98		
	122.69	372.00		
	122.70	372.00		
	122.70	371.94	~ 249.27	249.87
	~122.696	~ 371.97		
B 250ml	120.88	369.93		
T=23.0°C	120.89	369.99		
	120.88	370.03		
	120.89	370.10		
	120.89	370.00		
	~120.886	~370.01	~249.124	249.72
C 250ml	122.32	371.51		
T=23°C	122.32	371.60		
	122.30	371.53		
	122.32	371.56		
	122.32	371.51	~249.226	249.83
	~122.316	~371.542		
D 250ml	121.33	370.50		
	121.37	370.54		
	121.37	370.60		
	121.38	370.61		
	121.37	370.58		
	~121.364	~370.566	~249.20	249.85

8/1/89 BE

FLASK	STD ±.00 dry wt (g)	STD ±.00 filled wt (g)	STD ±.05 wtr wt (g)	vol (ml)
E 250ml	117.39	366.61		
T=23°C	117.42	366.72		
	117.40	366.68		
	117.40	366.61		
	117.42	366.76		
	~117.406	~366.676	~249.27	249.87
A 100ml	64.18	163.93		
	64.18	163.92		
	64.16	163.94		
	64.15	163.92		
	64.16	163.92		
	~64.166	~163.926	~99.76	100.00

Water Densities

Temp (°C)	ρ (g/cm³)
22.0	.9978
22.3	.9977
22.5	.9977
23.0	.9976
23.3	.9975
23.5	.9974
23.8	.9974

8/~~8~~10/89 Ruth Elaine Blake (REB)

PURPOSE: Calibration of volumetric pipets

METHOD: Soak pipets in 4% HNO_3 bath overnite then rinse 5 times with reverse osmosis (R/O) water followed by rinse with deionized water (nanopure II) again, at least 5 times. (Allowed some pipets to dry in air.) Pipet volume will be determined by ~~multiplying~~ dividing the measured mass of dispensed deionized water by its density at the measured water temperature. Pipets will be rinsed with deionized water prior to use. Water will be dispensed from the pipets in two ways: 1) by gravity — will leave fluid in pipet tip and 2) by blowing fluid out of pipet using the manostat electric pipet filler/dispenser. This will ~~do~~ be done to see which method delivers more accurate volumes.

8/~~8~~10/89 (REB)

PIPET ~~ID~~	I.D.#	(before filling/dispensing) Water Temp °C	WATER MASS (g) GRAVITY DISPENSED	BLOWN-OUT
25ml	25-01	22.5	24.95	
TD 20°C	"	22.8	24.97	
	"	22.8	24.96	
	"	23.0	24.95	
	"	23.0	24.95	
	"	23.0		25.00
	"	23.0		25.01
	"	~~23.5~~ 23.0		25.00
	"	~~23.5~~ 23.0		25.04
	25-02	23.1	25.00	
	"	23.2 → 24 (after dispensing)	24.95	
	"	23.1 → 24	24.96	
	"	· → 24	24.92	
	"	23.5 → 24	24.94	
	"	→ 24	24.93	
	"	→ 24		25.00
	"	23.3 → 23.8		24.99
	"	23.3 → 23.9		25.00
	"	23.5 → 23.9		25.01
	"	23.5 → 23.5		25.00
	"	23.5 → 23.5		24.99
	25-03	23.5 → 23.7	24.98	
		~~2~~ → 24	24.96	
		→ 24	24.93	
		23.5 → 24	24.95	
		23.5 → 23.8	24.95	

8/10/89 RBB

PIPET	I.D. #	WATER TEMP °C BEFORE DISPENSING →	WATER TEMP °C AFTER DISPENSING	WATER MASS (g) GRAVITY DISPENSED	WATER MASS (g) BLOWN-OUT	CALC. VOL ml
25ml	25-03		23.8		24.99	
TD 20°C	(continued from p.7)		23.6		24.98	
	"	23.5	23.7		25.01	
	"		23.7		25.02	
	"	23.6	23.9		25.01	
	25-04	21.8	21.		25.01	
	"	21.85			25.06	
	"	21.90			25.01	
	"	21.90			25.01	
	"	21.95			25.01	
	"	22.10		24.93		
	"	22.17		24.95		
	"	22.15		24.94		
	"	22.20	22.8	24.94		
	"	22.2	22.8	24.94		
	25-05	22.~~86~~ 36			25.01	
	"	22.~~87~~ 37			25.01	
	"	22.~~9~~ 4			25.04	
	"	22.~~9~~4			24.99 ~~25.04~~	
	"	22.35			24.99	
	"	22.34			25.02	
	"	22.0		24.92		
	"	22.0		24.93		
	"	22.0		24.90		
	"	22.0		24.92		
	"	22.05		24.91		

Pipet	I.D. #	WATER TEMP °C BEFORE DISPENSING	WATER MASS (g) Gravity Dispensed	WATER MASS (g) Blown out	Calc. Volume
25ml	25-06	22.1		24.99	
TD 20°C		22.1		24.98	
		22.18		25.00	
		22.18		24.97	
1 DAY LATER (8/11/89)		22.63		25.01	
		22.60		24.98	
		22.60	24.91		
		22.60 → 23.17 after dispensing	24.91		
		22.8	24.87	~~24.87~~	
		22.8	24.93	~~24.93~~	
		22.8	24.90		
		22.8	24.90		
1ml	1-01	22.8	~~1.02~~	1.02	ρ = .9976 @ 23°C
TD @ 20°C		22.8		1.02	D = m/v
		22.8		1.00	v = m/D
		22.85		1.00	$\bar{x}$ = 1.01
		22.87		1.01	V ≃ 1.012 ml
		22.86	0.97 ~~0.98~~		
		22.86	1.00		
		22.87	0.99		
		22.85	1.00		$\bar{x}$ = .994
		22.85	1.01		V ≃ .9964

8/14/89 Barbara Sivert (BS)

Purpose: To calibrate volumetric flasks

Method: Each flask was washed w/ 4% Nitric Acid & rinsed w/ Rev. Osmosis wtr 5 times & again rinsed atleast 5 times w/ Nanopure I (deionized wtr) Each flask is weighed 3 times dry, then filled w/ deionized wtr & weighed again three times. Temperature of wtr is recorded. Each flask is then engraved w/ an identifier and the volume. A METTLER PM4000 Delta Range balance is used for weig

FLASK	dry wt (g)	filled (wt) (g)	wtr wt (g)	vol (ml)
F 250ml	122.95g	372.13	249.18	~~248.58~~
	122.93	372.07	249.14	~~248.54~~
Wtr temp:	122.94	372.15	249.21	248.61
22.8°C			$\bar{x}$ = 249.18	~ ~~248.67~~ 249.78
(.9976)				
G 250ml	121.91	371.10	249.19	~~248.59~~
	121.91	371.13	249.22	~~248.62~~
	121.91	371.16	249.25	~~248.65~~
			$\bar{x}$ = 249.22	~ ~~248.69~~ 248.82

8/14/89 BS

Room Temp 22.7°C

FLASK	dry wt (g) ST. DEV. ±.05	filled wt (g) ST. Dev ±.05	wtr wt (g) ST. Dev. ±.05	vol (ml)
H 250ml	122.35	371.55	249.20	~~248.60~~
	122.36	371.62	249.26	~~248.66~~
	122.37	371.62	249.25	~~248.65~~
			$\bar{x}$ = 249.24	~ ~~248.64~~ 249.84
I 250ml	120.68	369.95	~~249.27~~ ~~120.68~~	248.67
	120.67	~~370.0~~ 369.86	249.19	248.59
	120.65	369.90	249.25	248.65
			$\bar{x}$ = 249.24	~ ~~248.64~~ 249.84
F 200ml	104.13g	303.64	199.51	~~199.03~~
	~~104.13~~	303.67	199.54	~~199.06~~
	104.13	303.66	199.53	~~199.05~~
	104.13	303.56	199.43	~~198.95~~
			$\bar{x}$ = 199.50	~ ~~199.03~~ 199.98
~~G 200ml~~				
G 100ml	62.85	162.62	99.77	.9957
Wtr temp:	62.84	162.58	99.74	99.54
20.9°C	62.84	162.63	99.79	99.59
(.9980)			$\bar{x}$ = 99.77	~ ~~99.57~~ 99.97
C 100ml	64.60	164.32	99.72	~~99.52~~
(20.9°C)	64.62	164.30	99.68	~~99.48~~
	64.62	164.31	99.69	~~99.49~~
			$\bar{x}$ = 99.70	~ ~~99.50~~ 99.90

 8/14/89

8/15/89 Ruth Elaine Blake

STDev. of all weights (±.05)

FLASK	dry wt (g)	filled wt (g)	wtr wt (g)	Vol (ml)
D 100ml	64.02	163.73	99.71	~~99.50~~
	64.03	163.80	99.77	~~99.56~~
	64.02	163.74	99.72	~~99.51~~
			$\bar{x}$ = 99.73	~~99.52~~ 99.93
E 100ml	63.94	163.69	99.75	~~99.54~~
	63.93	163.69	99.76	~~99.55~~
	63.93	163.74	~~101.04~~?	~~100.83~~
				~~99.97~~ 99.95
F 100ml	62.69	162.45	99.76	~~99.55~~
	62.70	162.48	99.78	~~99.57~~
T = 21.5°C	62.70	162.49	99.72	~~99.51~~
			$\bar{x}$ = 99.75	~~99.54~~ 99.96
G 100ml	62.25	162.06	99.81	~~99.60~~
	62.26	161.95	99.69	~~99.48~~
21.5°C	62.25	162.00	99.75	~~99.54~~
			$\bar{x}$ = 99.75	~~99.54~~ 99.96
H 100ml	64.37	164.05	99.68	~~99.47~~
	64.39	164.13	99.74	~~99.53~~
21.5°C	64.37	164.14	99.77	~~99.56~~
			$\bar{x}$ = 99.73	~~99.52~~ 99.94

→ Calibration of volumetric pipets continued from 8/10/89

Pipet	WATER TEMP °C BEFORE DISPENSING	MASS of water (g) Gravity Dispensed	MASS of water (g) BLOWN-OUT	CALCULATED VOLUME
1ml	~~20.01~~ 20.10		1.02	ρ = .9979 @ 21.5
TD @ 20°C	20.16		1.01	ρ = .9978 @ 22.0
1-02	21.70		0.99	
	21.75		1.01	v ≈ 1.0097
	21.74		1.01	
	21.76		1.02	$\bar{x}$ = 1.0075
	21.80	0.98		
	21.84	0.98		
	21.84	1.01		
	21.86	0.99		
	21.90	1.01		
	21.90	1.00		
	21.90	1.00		$\bar{x}$ = .9957
10ml TD @ 20°C				v ≈ .9979
10-01	21.92	10.01		
	21.92	9.97		
	21.93	10.00		
	21.93	9.98		
	21.93) (22.30)	9.99		
	21.90	9.97		

WATER MASS (g)

REB 8/15/89

Pipet	WATER TEMP °C BEFORE FILLING	GRAVITY DISPENSED	BLOWN-OUT	CALC. VOLUME
10-01	21.90	10.01		ρ = .9978
10 ml TD	21.90	~~10.00~~ 10.01		
@ 20°C	21.9		10.00	
	21.9		10.03	$\bar{x}$ = 9.9925 } GRAVITY DISPENSED VALUES
				v ≃ 10.0145
~~8/17/89~~ 10-02	21.6		9.9849	(AQ 240 balance)
10 ml TD	21.6		10.02	(PM 4600 balance)
@ 20°C	21.6		10.05	ρ = .9979 @ 21.5
	21.6		10.03	ρ = .9978 @ 22.0
	21.6 (22.1) →	after dispensing	10.04	v = m/D
	21.68		10.04	$\bar{x}$ = 10.04 v ≃ 10.06
	21.7	9.97		
	21.75	9.98		
	21.85	9.98		ρ = .9977 @ 22.3 + 22.5
	21.9	9.98		
	21.9	9.97		$\bar{x}$ = 9.976
				v ≃ 9.9980
10-03	22.0	9.97		ρ = .9978
10 ml TD	22.05 (23.0)	9.98		
@ 20°C	22.1	9.97		
	22.15	9.98		$\bar{x}$ = 9.975 v ≃ 9.9970
	22.2	9.98		ρ = .9977 v ≃ 10.003
	22.9	10.00		ρ = .9976 v ≃ 10.02

8/16/89

Barbara Everett

Calibration of volumetric flasks - cont. from 8/14/89

The Analytical Balance METTLER AE240 was used.

STD. dev of all weight ± .05

FLASK	dry wt (g)	filled wt (g)	wtr Wt (g)	vol (ml) g/30
A 50 ml	34.597	84.57 1 RP	49.97 1	
Temp:	34.597	84.57 0	49.97 0	~~50.09~~
~~20.2°C~~	34.597	84.~~57~~ 49	49.~~97~~ 89	50.02
(÷ ~~.9977~~)	T = 22.5		$\bar{x}$ = 49.90	RP 8/18
St Dev of vol ±.05 ml				
B 50 ml	34.49	84.~~44~~ 36 RP	49.~~95~~ 87	
	34.49	84.~~46~~ 36 RP	49.~~97~~ 87	~ ~~50.07~~
Temp:	34.49	84.~~47~~ 35	49.~~98~~ 86	49.99
~~20.9°C~~ 22.7			~ ~~49.97~~ 49.87	RP 8/18
(÷ ~~.9980~~)				
C 50 ml	34.42	84.36	49.94	
	34.42	84.39	49.97	~ 50.05
T = 20.9°C	34.42	84.35	49.93	
(÷ .9980)			~ 49.95	
D 50 ml	34.24	84.175	49.94	
(÷ .9980	34.24	84.187	49.95	~ 50.03
T = 21°C	34.24	84.146	49.91	
			~ 49.93	

8/16/89

FLASK	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
E 50ml	34.01	83.91	49.90	
T=21.4°C	34.01	83.93	49.92	
(.9979)	34.01	83.92	49.91	~50.02
F 50ml	34.96	84.85	49.90	
T=21.65°C	34.96	84.895	49.93	~49.9950
(.9979)	34.96	84.82	49.86	~50.0
			~49.89	
G 50ml	34.06	83.96	49.90	
T=21.7°C	34.06	83.96	49.90	~~49.798~~
?	34.06	83.97	49.91	~50.00
(.9979)			~49.903	
H 50ml	34.496	84.43	49.93	
T=21.7°C	34.496	84.43	49.93	~50.03
(.9979)	34.496	84.42	49.92	
			~49.927	
I 50ml	34.03	83.97	49.94	
T=21.7°C	34.03	83.94	49.91	~50.03
(.9979)	34.03	83.96	49.93	
			~49.93	

8/16/89

FLASK	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
J 50ml	32.71	82.64	49.93	
T=21.9°C	32.71	82.65	49.94	~50.05
	32.71	82.66	49.95	
(.9978)				
K 50ml	34.68	84.59	49.91	
T=21.9°C	34.68	84.61	49.93	~50.03
	34.68	84.59	49.91	
(.9978)			~49.92	
A=25ml	20.84	45.79	24.95	
T=21.9°C	20.84	45.799	24.96	~25.02
(.9978)	20.84	45.796	24.96	
			~24.96	
B 25ml	20.30	45.23	24.93	
T=22.15°C	20.30	45.197	24.897	~24.97
	20.30	45.23	24.93	
(.9978)			~24.92	
C 25ml	20.76	45.70	24.94	~24.97
T=22.15°C	20.76	45.69	24.93	
(.9978)	20.76	45.66	24.90	
			~24.92	

BG 8/16/89

FLASK	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
D 25ml	20.30	45.23	24.93	
	20.30	45.21	24.91	~24.99
T=22.4°C	20.30	45.24	24.94	
(.9977)			~24.93	
E 25ml	20.098	45.07	24.97	
	20.098	45.06	24.96	25.03
T=22.4°C	20.097	45.07	24.97	
(.9977)			~24.97	
F 25ml	20.91	45.83	24.92	
	20.91	45.86	24.95	24.995
T=21.8°C	20.91	45.870	24.96	~25.0
(.9978)			~24.94	
G 25ml	20.72	45.67	24.95	
	20.72	45.67	24.95	~24.995
T=21.8°C	20.72	45.63	24.91	~25.0
(.9978)			~24.94	
H 25ml	20.49	45.47	24.98	
	20.49	45.41	24.92	~24.99
T=22.4	20.49	45.42	24.93	
(.9977)			~24.933	

BG 8/16/89

Flask	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
I 25ml	19.79	44.74	24.95	
	19.79	44.70	24.91	~24.99
T=22.4	19.79	44.71	24.92	
(.9977)			~24.93	
J 25ml	20.58	45.53	24.95	
	20.58	45.56	24.98	~25.03
T=22.4	20.58	45.57	24.99	
(.9977)			~24.97	
K 25ml	20.54	45.49	24.95	
	20.54	45.46	24.92	~24.99
T=22.7	20.54	45.47	24.93	
(.9976)			~24.93	
L 25ml	19.55	44.47	24.92	~24.98
	19.55	44.47	24.92	
T=22.7	19.55	44.46	24.91	
(.9976)				

8/17/89 RCB → Pipet Calibration Continued

→ CHANGE IN PROCEDURE: To minimize the water temperature increase between filling the pipet & emptying it (into a collection reservoir on the balance with previously dispensed water already in it), Pipetted water will be dispensed into an empty ~~[illegible]~~ beaker for each trial weighing

Pipet	WATER TEMP °C BEFORE	AFTER	MASS OF WATER (g) GRAVITY DISPENSED	ρ at T	CALCULATED VOLUME
1-01	22.4	22.5	1.0026		
1ml TD	22.4	22.4	0.9991		
@20°C	22.4		1.0002		
	22.35	22.5	0.9991		
	22.35		0.9990		
	22.33		1.0067		
	22.4		0.9984		
	22.4	23.0	0.9944		
	22.35		1.0055		
			$\bar{X}$ =	0.9977	$\bar{X}$ = 1.0008
	22.3		0.9960		V ≈ 1.003
1-02	22.3		1.00		

RCB 8/17/89

PIPET	WATER TEMP °C BEFORE	AFTER	MASS OF WATER (g) GRAVITY DISPENSED	ρ at T	CALCULATED VOLUME
#5-01	22.37		4.99	.9977	
5ml TD	22.37	22.5	5.00	"	
@20°C	22.35	22.4	5.00	"	
	22.36		4.98	"	$\bar{X}$ = 4.99
	22.36		4.97	"	V ≈ 5.0015 ml
	22.36	22.7	5.00	"	
5-02	22.4	22.5	5.00	.9977	
5ml TD	22.4	"	4.98	"	
@20°C	22.4	22.2	4.97	"	
	22.4	22.35	4.99	"	$\bar{X}$ = 4.984
	22.4		4.98	"	V ≈ 4.995 ml
5-03	22.4		4.99	.9977	
	22.4		4.97	"	
	22.4		4.99	"	
	22.4		4.98	"	$\bar{X}$ = 4.982
	22.4		4.98	"	V ≈ 4.9935 ml
20-01	22.0		19.92		8/18/89 RCB
20ml TD	22.1	22.1	19.91		
@20°C	22.0	22.1	19.91		
	22.0	22.0	19.92		
	22.0	21.75	19.91		

PIPET	TEMP OF WATER °C BEFORE	AFTER	MASS of water (g) GRAVITY DISPENSED	~~fac~~ f@T	Calculated ~~volume~~
20-02	22.0	22.1	19.93		
20ml TD	22.0	22.2	19.94		
@ 20°C	22.0	22.1	19.93		
	22.1	22.25	19.93		
	22.1	22.5	19.92		
8/24/89					
100-01	21.8	22.0	99.62	.9978	
100 ml	21.85	22.2	99.63	.9978	
TD @ 20°C	22.0	22.2	99.66	"	$\bar{x} = \frac{99.64}{.9978} \Rightarrow 99.86$ ml
45 sec.	22.0	22.2	99.64	"	99.87 ml
	22.2	22.3	99.64	.9977	$\bar{v} \approx 99.86$ ml
100-02	22.35 ~~21.85~~	22.8	99.60	.9976	

Purpose: Calibration of volumetric flasks
Method: Continuing procedures from previous calibrations.
The analytical balance is the Mettler AE 240.
Standard deviation of weights is ± .05 g.

FLASK	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
A 10ml	13.948	23.915 ~~23.968~~	9.967 ~~10.008~~	9.99
	13.948	23.928 ~~23.985~~	9.980 ~~10.037~~	~~10.0498~~
Wtr T=21.85°C	13.948	23.910 ~~23.986~~	9.962 ~~10.038~~	
(.9978)		9/12/89 MJN T=21.5, ρ=.9979	9.970 ~~10.0377~~	
B 10ml	13.476	23.429 ~~23.495~~	9.953 ~~10.017~~	
	13.476	23.428 ~~23.490~~	9.952 ~~10.012~~	~~10.05~~
21.85°C	13.476	23.423 ~~23.488~~	9.947 ~~10.002~~	9.97
(.9978)		T=22.5, ρ=.9977	9.951 ~~10.010~~	
C 10ml	13.540	23.520 ~~23.579~~	9.980 ~~10.039~~	10.00
	13.540	23.534 ~~23.579~~	9.994 ~~10.039~~	~~10.05~~
21.85°C	13.540	23.507 ~~23.560~~	9.967 ~~10.020~~	
(.9978)		9/12/89 MJ T=22.0, ρ=.9978	9.980 ~~10.0327~~	
D ml	13.662	23.654 ~~23.699~~	9.992 ~~10.037~~	
	13.662	23.653 ~~23.695~~	9.991 ~~10.033~~	~~10.06~~
21.85°C	13.662	23.646 ~~23.702~~	9.984 ~~10.040~~	10.01
(.9978)		9/12/89 MJ T=22, ρ=.9978	9.989 ~~10.037~~	

Flask	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
E 10ml	13.734	23.798	9.799	
T=21.9°C	13.734	23.762	10.028	10.06
	13.734	23.758	10.024	10.02
ρ(.9978)		9/12/89 AB T=21.0 ρ=.9986	~10.0387 10.003	
F 10ml	13.803	23.826	9.997 10.023	
	13.803	23.841	9.992 10.038	10.06
21.9°C	13.803	23.848	10.004 10.045	9.99
ρ(.9978)		9/12/89 AB T=22, ρ=.9978	~10.0353	
G 10ml	13.599	23.588	9.989	
	13.599	23.543	9.974	
21.9°C	~~14.016~~			10.00
ρ=(.9978)	13.599	23.584	9.985	9.97
		9/12/89 AB T=23, ρ=.9976	~9.9827	
H 10ml	14.016	24.015 23.966	9.999	
	14.016	23.997	9.987	10.01
21.9°C	14.016	24.014 23.966	9.998	9.88
ρ=(.9978)		T=23, ρ=.9976	~~9.9978~~ 9.9927	
I 10ml	13.855	23.830	9.981	
	13.855	23.842	9.987	10.00
21.9°C	13.855	23.835	9.980	9.96
ρ(.9978)		T=23, ρ=.9976	9.9827	

Flask	dry wt (g)	filled wt (g)	wtr wt (g)	vol (ml)
J 10ml	13.499	23.502	10.003	
22°C	13.499	23.500	10.001	10.02
(ρ=.9978)	13.499	23.499	9.999	9.98
		9/12/89 AB T=23	~10.001	
K 10ml	14.114	24.148	10.034	
	14.114	24.162	10.048	10.06
22°C	14.114	24.142	10.028	10.01
ρ=.9978		9/12/89 AB T=22.0 ρ=.9978	~10.0367	
L 10ml	13.784	23.781	9.997	
	13.784	23.808	10.024	10.03
22°C	13.784	23.785	10.000	9.97
		9/12/89 AB T=22.5, ρ=.9977	~10.007 9.951	
ρ=.9978				

NOTE: This Laboratory Notebook came under Controlled status / September 7, 1989.

[illegible] Center QA

No further entries [illegible] 11/11/92