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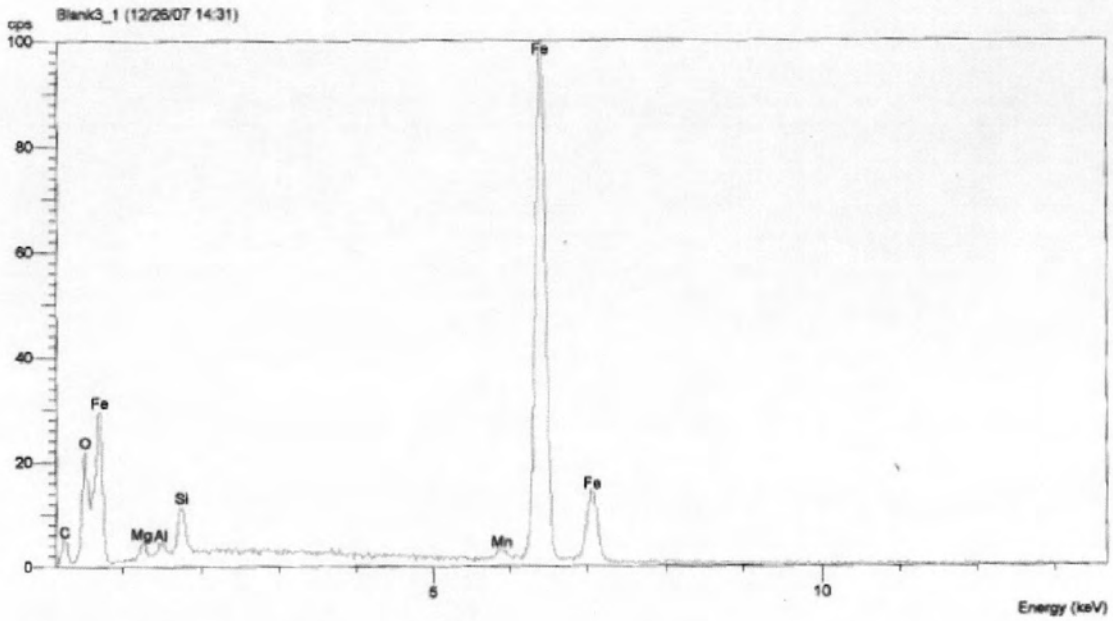
APPENDICES

APPENDIX A

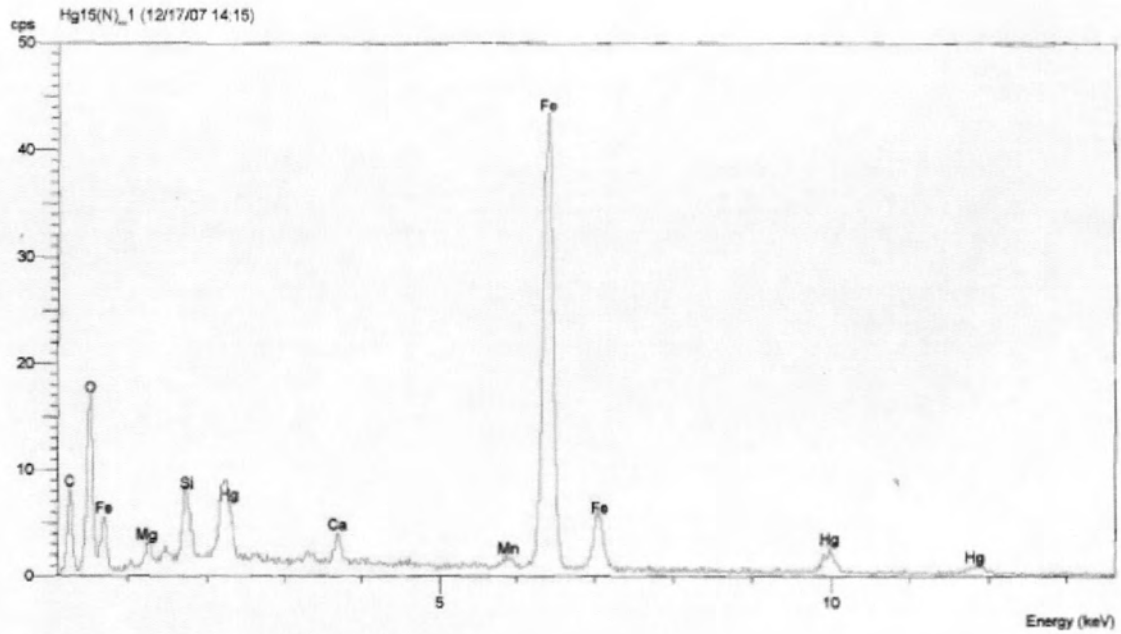
The Analysis results of EDS of blank and Hg treatment samples



Elmt	Spect. Type	Element %	Atomic %
C K	ED	9.02	25.04
O K	ED	12.19	25.38
Mg K	ED	1.06	1.45
Al K	ED	0.64	0.80
Si K	ED	2.25	2.67
Mn K	ED	0.92	0.56
Fe K	ED	73.91	44.10
Total		100.00	100.00

* = <2 Sigma

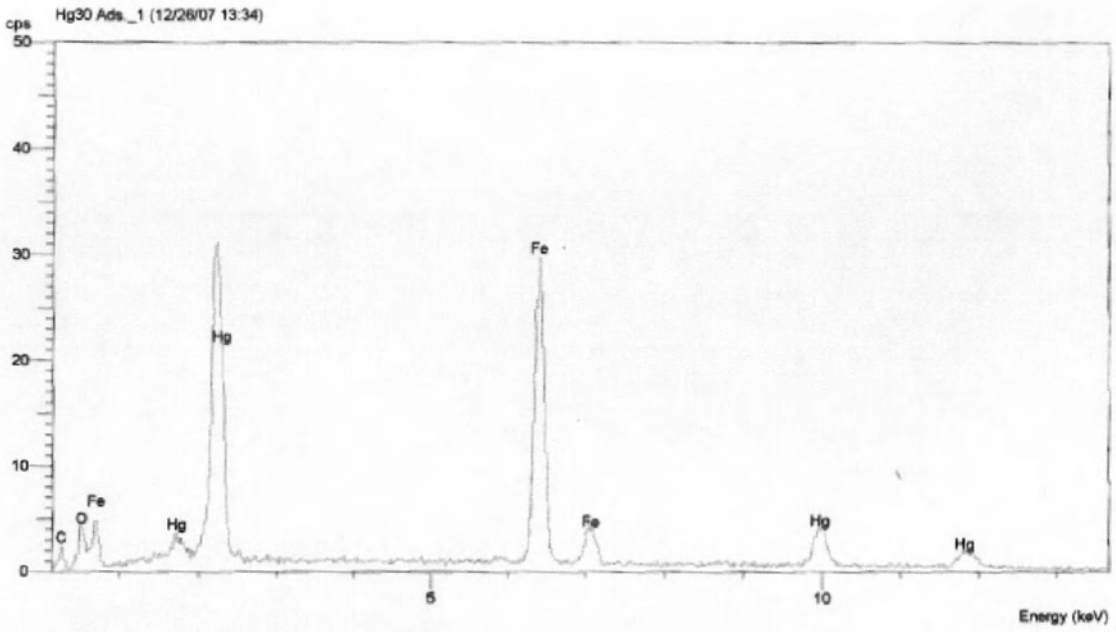
Figure 1-A EDS result of blank



Elmt	Spect. Type	Element %	Atomic %
C K	ED	18.35	39.13
O K	ED	21.36	34.19
Mg K	ED	0.98	1.03
Si K	ED	2.10	1.92
Ca K	ED	1.07	0.69
Mn K	ED	0.93	0.43
Fe K	ED	47.04	21.57
Hg M	ED	8.17	1.04
Total		100.00	100.00

* = <2 Sigma

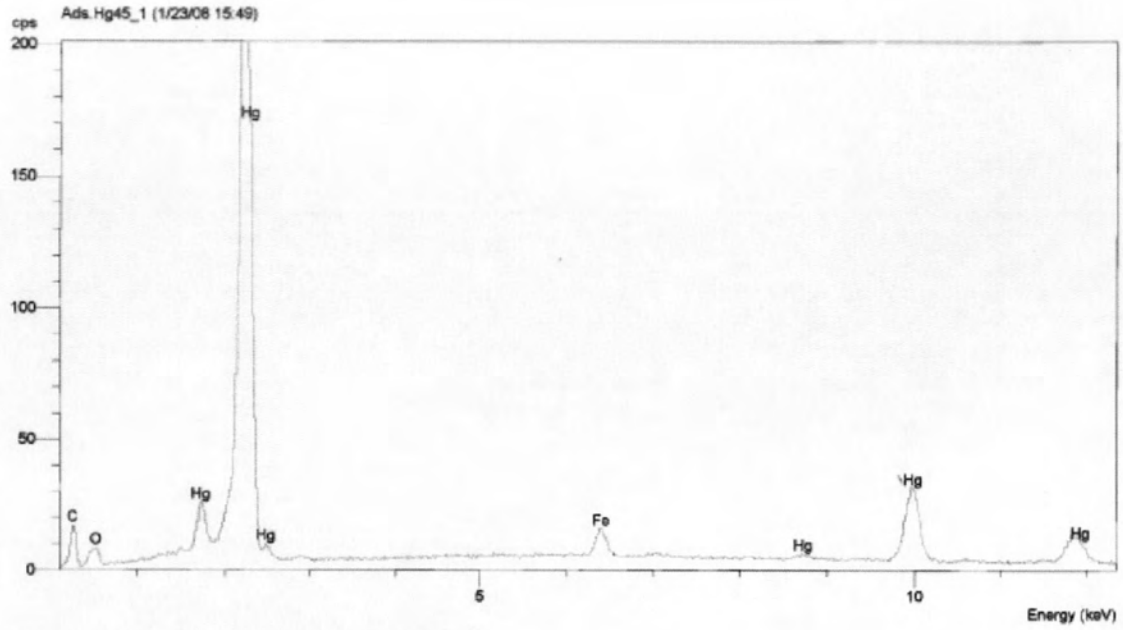
Figure 2-A EDS result of 15 day Hg treatment



Elmt	Spect. Type	Element %	Atomic %
C K	ED	5.79	24.95
O K	ED	7.54	24.38
Fe K	ED	42.35	39.24
Hg M	ED	44.32	11.44
Total		100.00	100.00

* = <2 Sigma

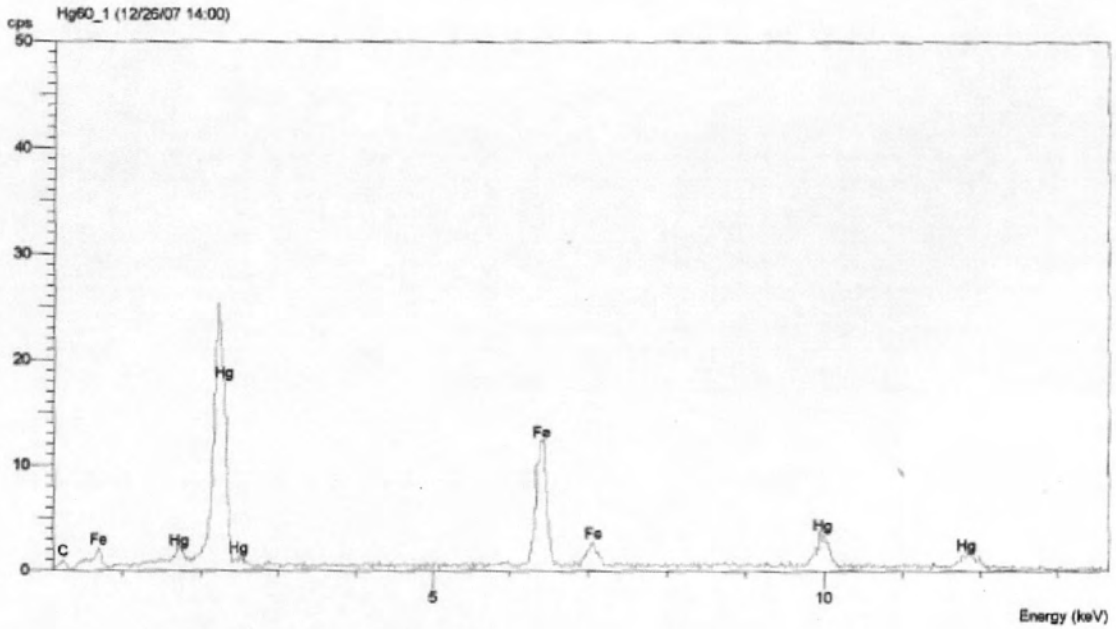
Figure 3-A EDS result of 30 day Hg treatment



Elmt	Spect. Type	Element %	Atomic %
C K	ED	13.13	60.78
O K	ED	3.84	13.33
Fe K	ED	4.01	3.99
Hg M	ED	79.02	21.90
Total		100.00	100.00

* = <2 Sigma

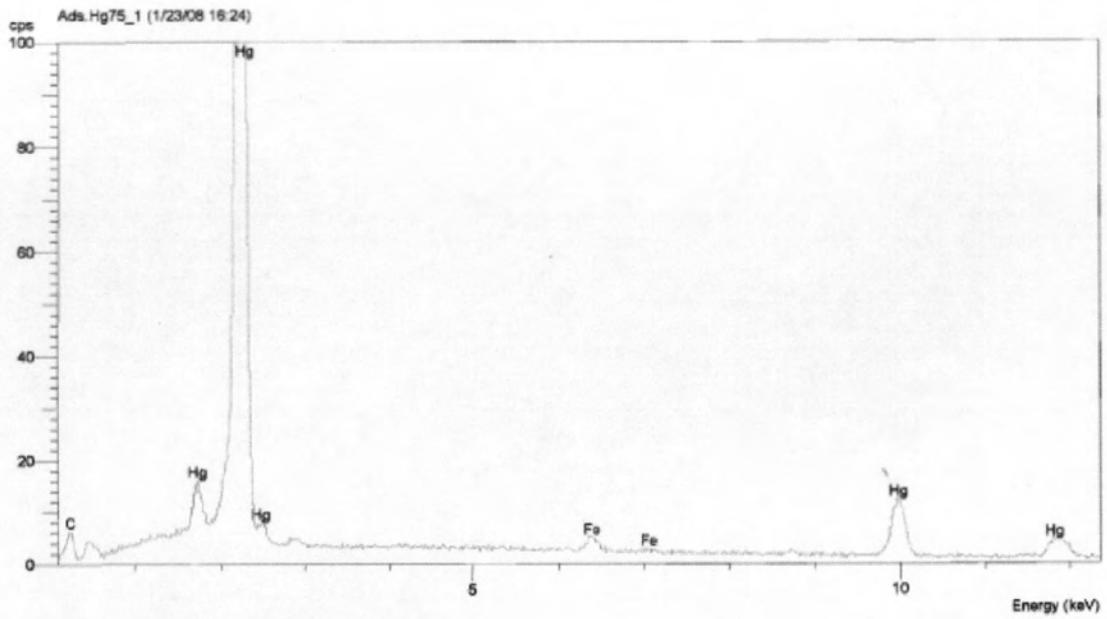
Figure 4-A EDS result of 45 day Hg treatment



Elmt	Spect. Type	Element %	Atomic %
C K	ED	5.39	33.10
Fe K	ED	33.74	44.53
Hg M	ED	60.87	22.37
Total		100.00	100.00

* = <2 Sigma

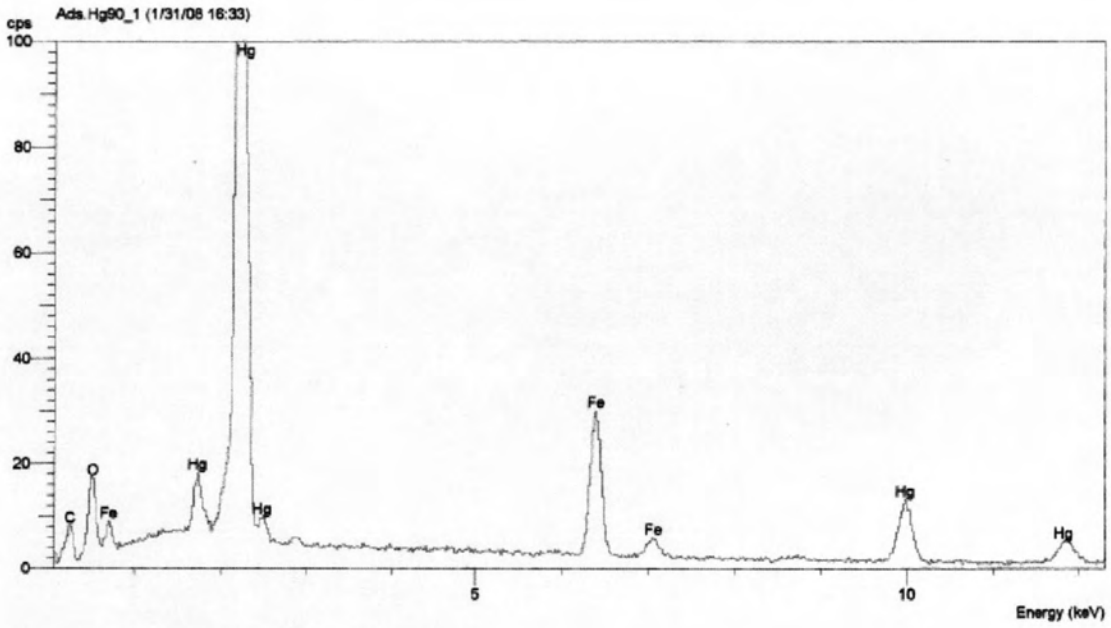
Figure 5-A EDS result of 60 day Hg treatment



Elmt	Spect. Type	Element %	Atomic %
C K	ED	9.04	61.11
Fe K	ED	1.96	2.84
Hg M	ED	89.01	36.04
Total		100.00	100.00

* = <2 Sigma

Figure 6-A EDS result of 75 day Hg treatment



Elmt	Spect. Type	Element %	Atomic %
C K	ED	8.64	34.11
O K	ED	12.96	38.43
Fe K	ED	14.55	12.35
Hg M	ED	63.85	15.10
Total		100.00	100.00

* = <2 Sigma

Figure 7-A EDS result of 90 day Hg treatment

APPENDIX B

The Analysis results of XRD of Hg treatment samples

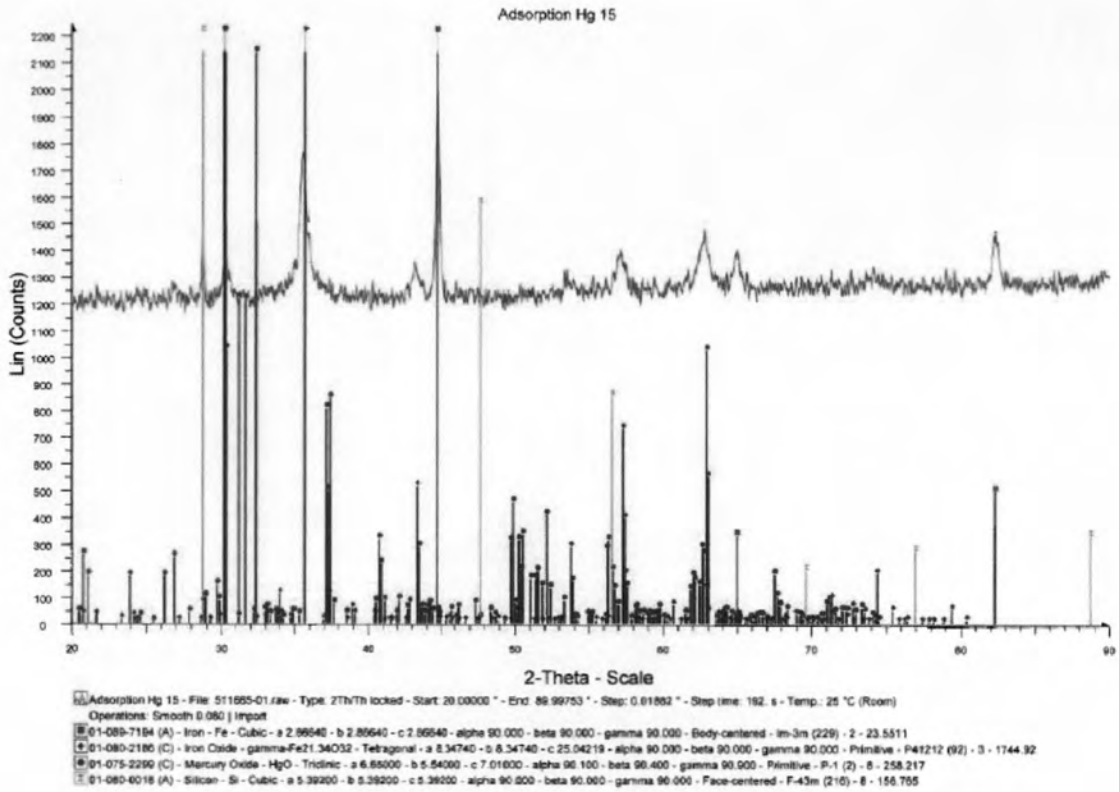


Figure 1-B XRD result of 15 days Hg treatment

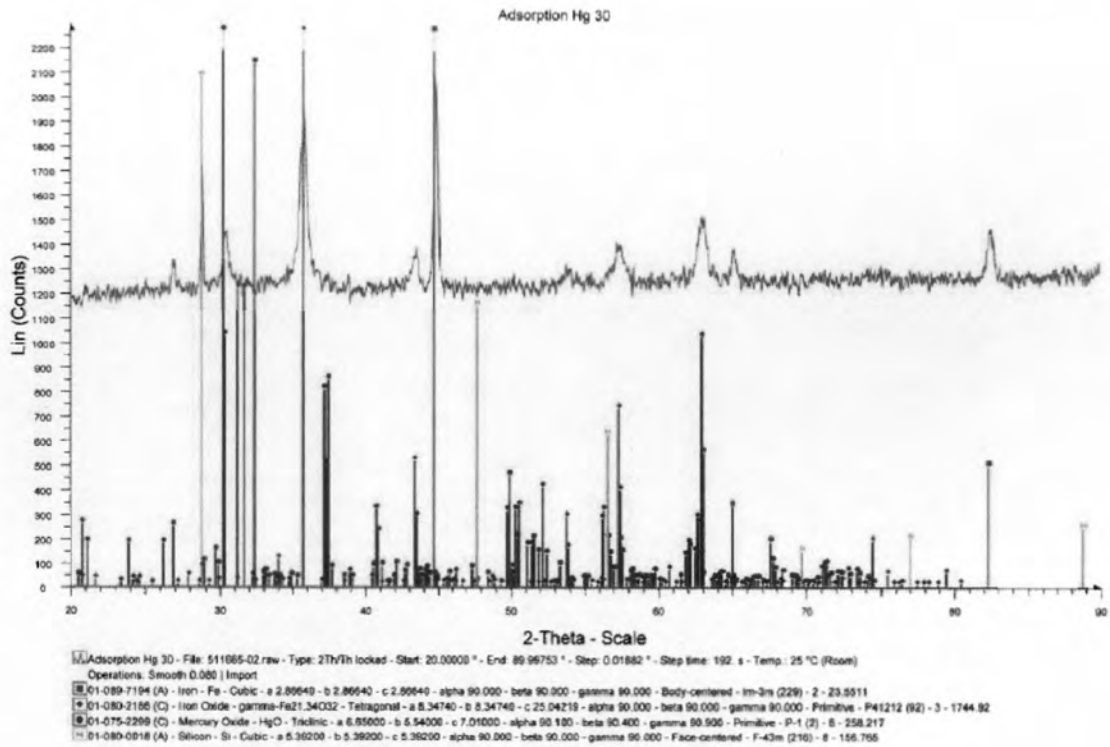


Figure 2-B XRD result of 30 days Hg treatment

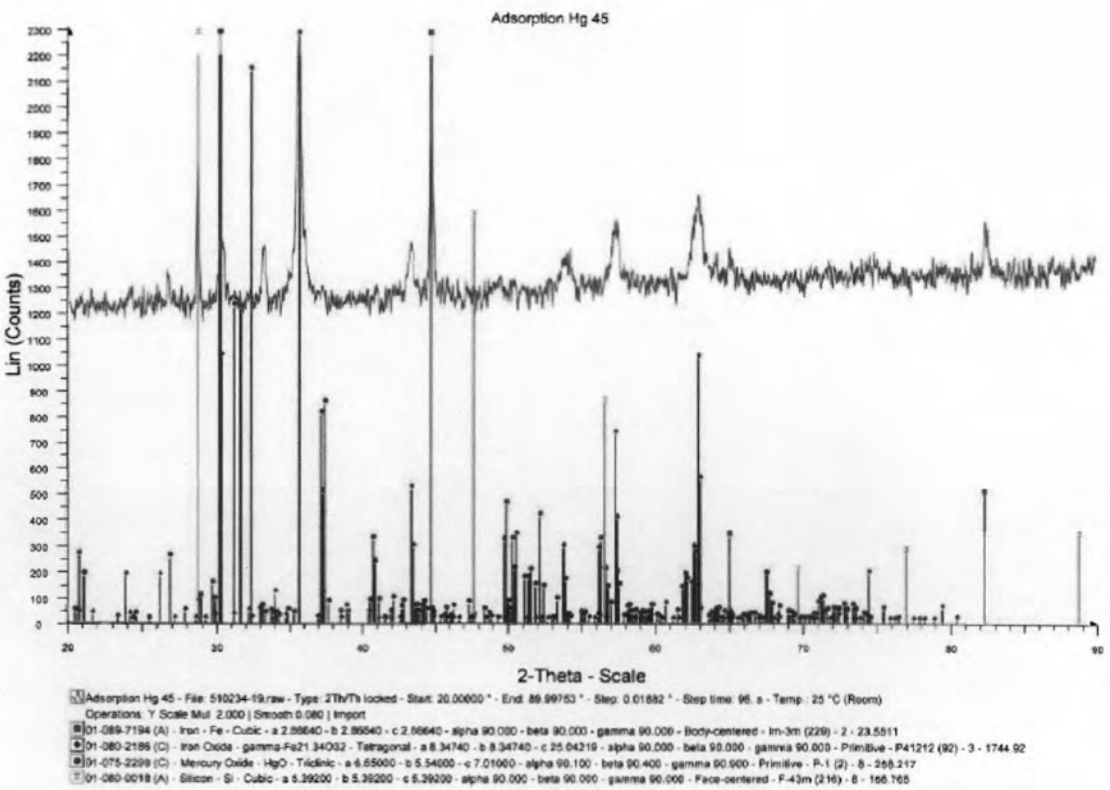


Figure 3-B XRD result of 45 days Hg treatment

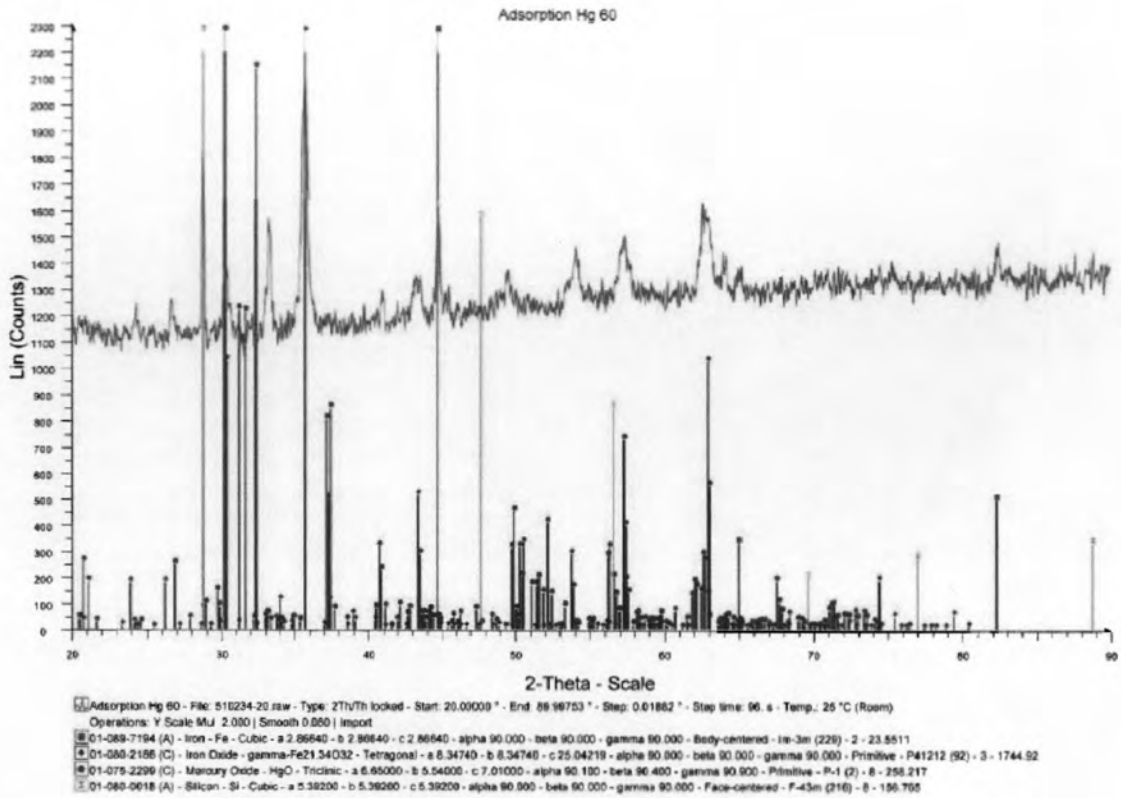


Figure 4-B XRD result of 60 days Hg treatment

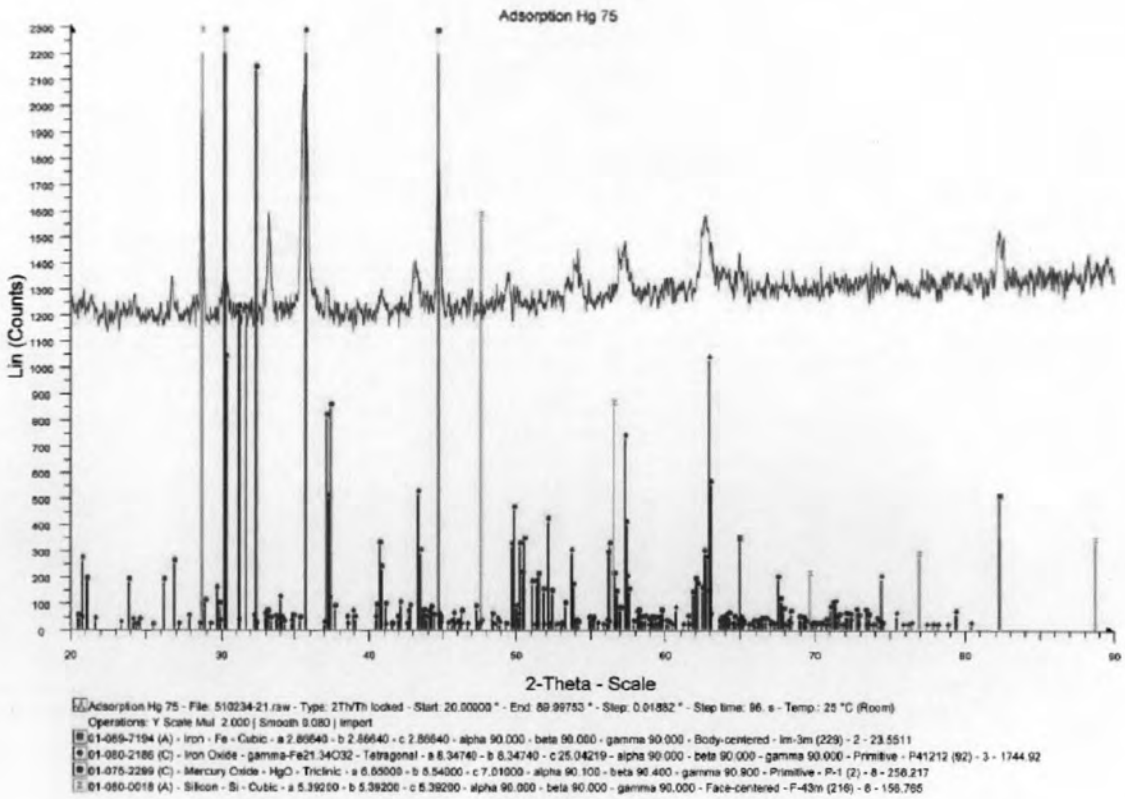


Figure 5-B XRD result of 75 days Hg treatment

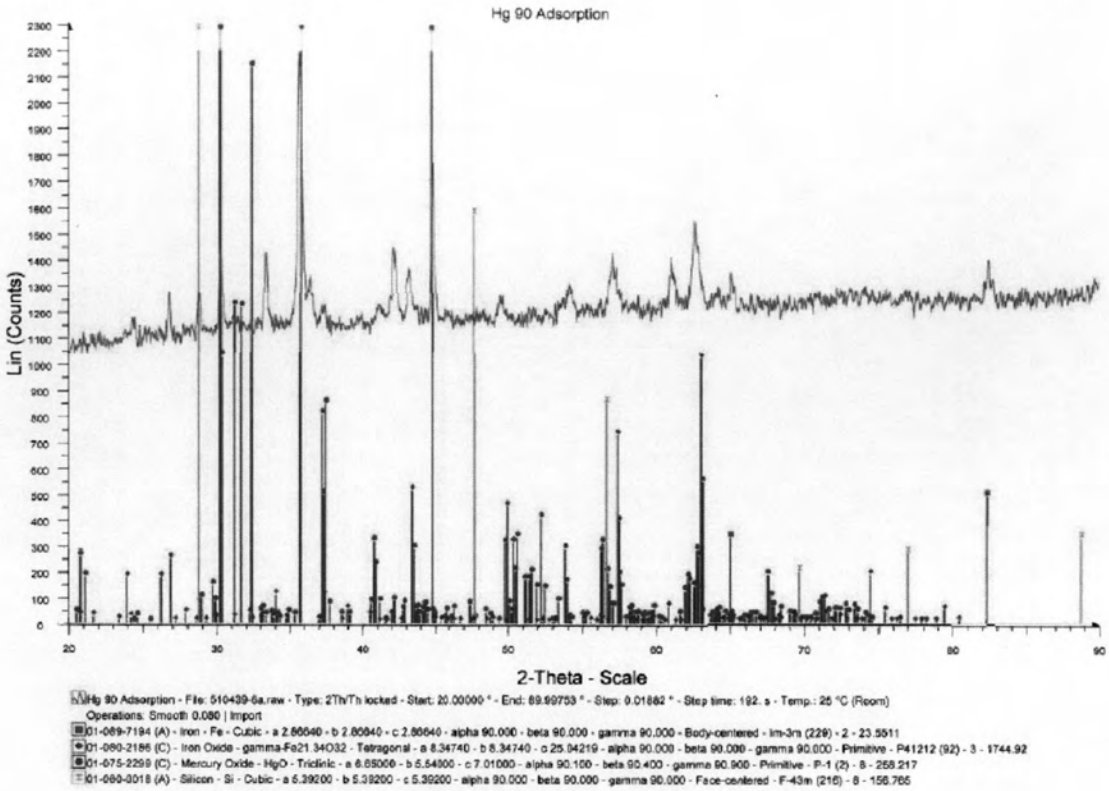
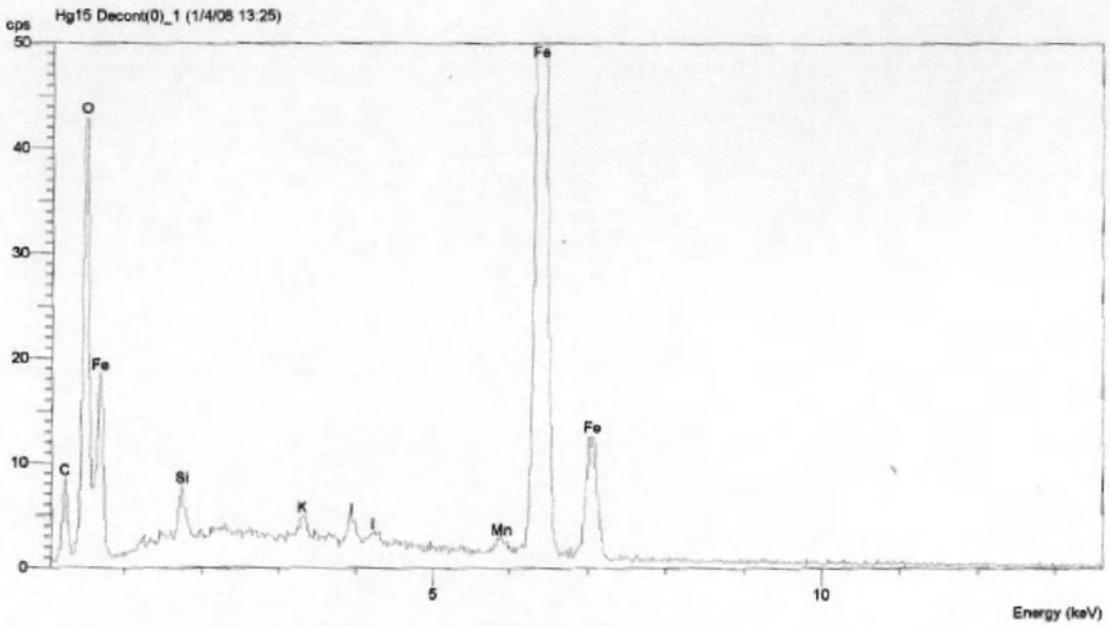


Figure 6-B XRD result of 90 days Hg treatment

APPENDIX C

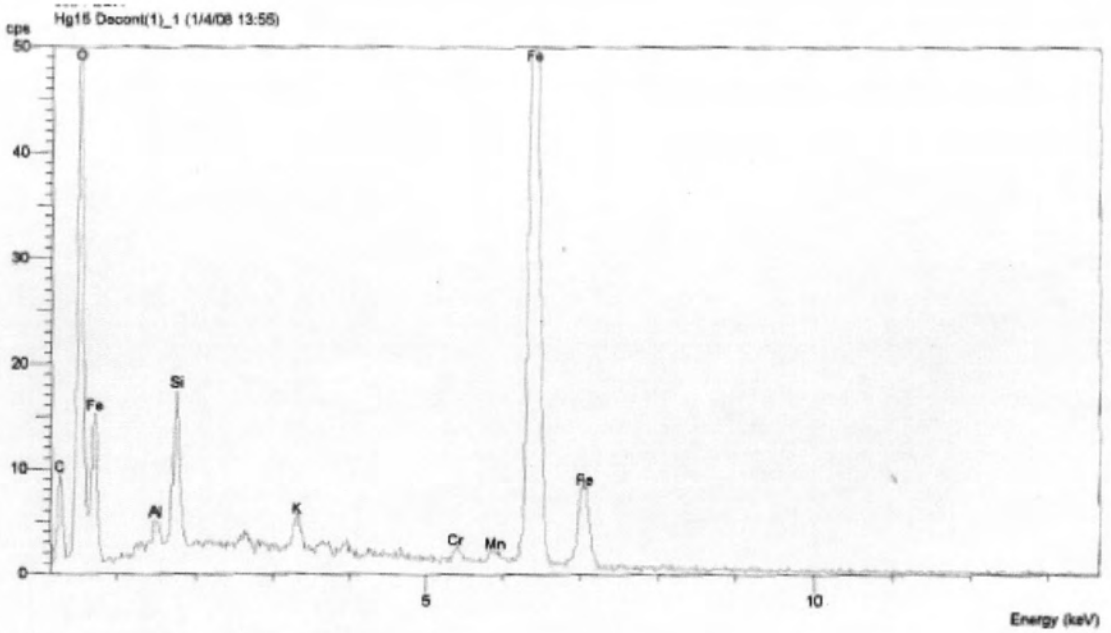
The Analysis results of EDS of Hg decontaminated samples



Elmt	Spect. Type	Element %	Atomic %
C K	ED	10.91	25.36
O K	ED	24.17	42.20
Si K	ED	0.91	0.91
K K	ED	0.44	0.31
Mn K	ED	0.77	0.39
Fe K	ED	60.71	30.36
I L	ED	2.09	0.46
Total		100.00	100.00

* = <2 Sigma

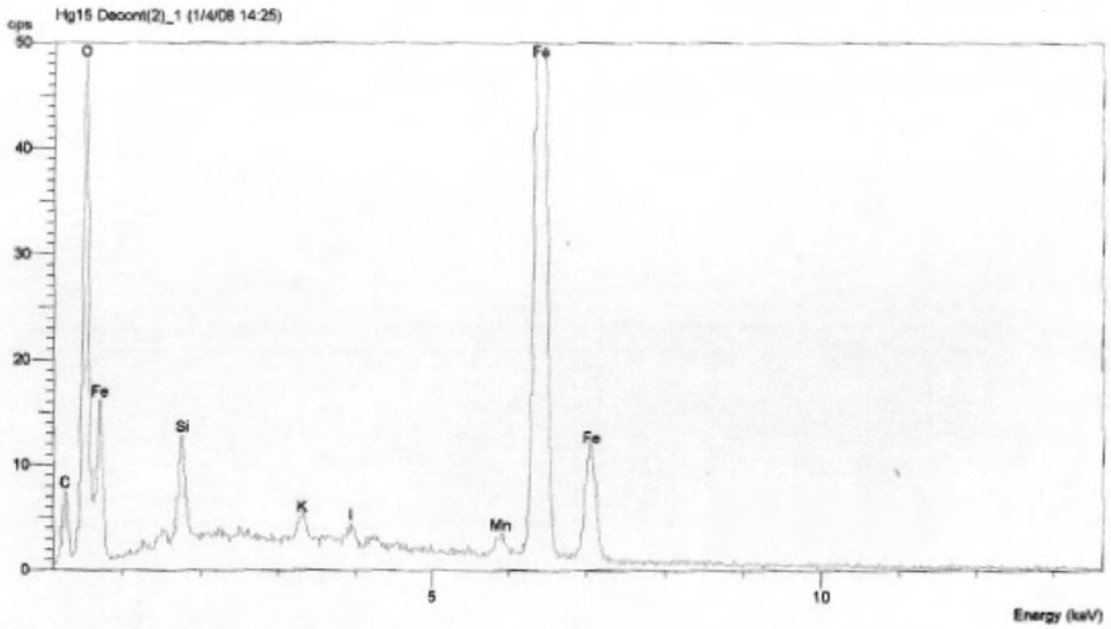
Figure 1-C EDS result of 15 days Hg contaminated sample with 0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	15.15	29.97
O K	ED	38.23	44.89
Al K	ED	0.68	0.60
Si K	ED	3.38	2.86
K K	ED	0.88	0.54
Cr K	ED	0.48	0.22
Mn K	ED	0.57	0.25
Fe K	ED	40.63	20.68
Total		100.00	100.00

* = <2 Sigma

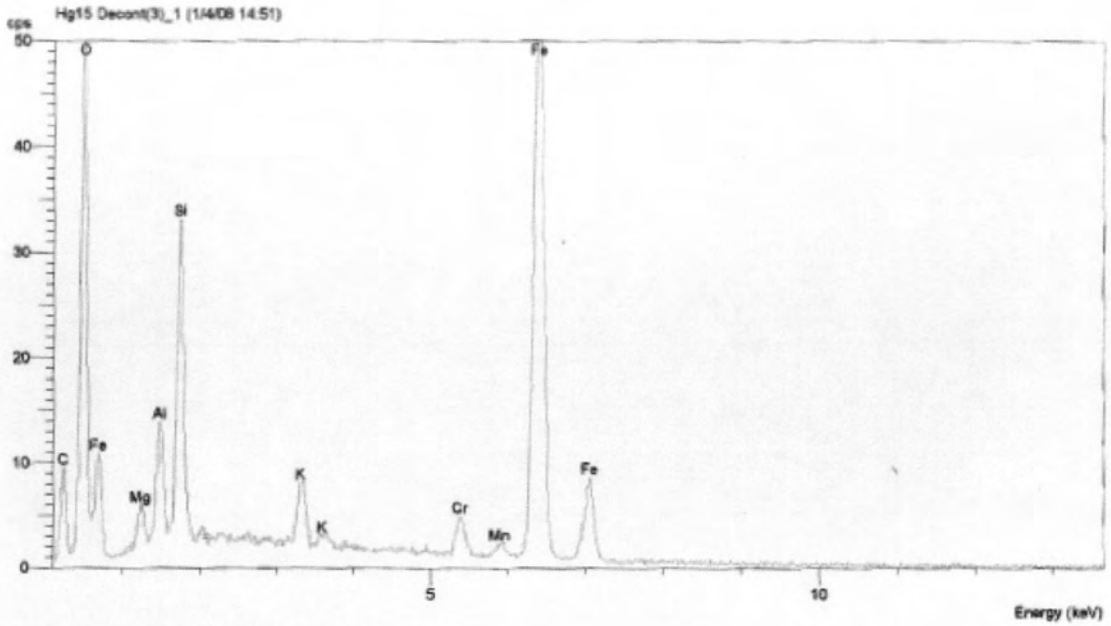
Figure 2-C EDS result of 15 days Hg contaminated sample with 0.2 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	10.12	22.94
O K	ED	26.69	45.43
Si K	ED	2.27	2.20
K K	ED	0.58	0.40
Mn K	ED	0.98	0.49
Fe K	ED	57.86	28.21
I L	ED	1.49	0.32
Total		100.00	100.00

* = <2 Sigma

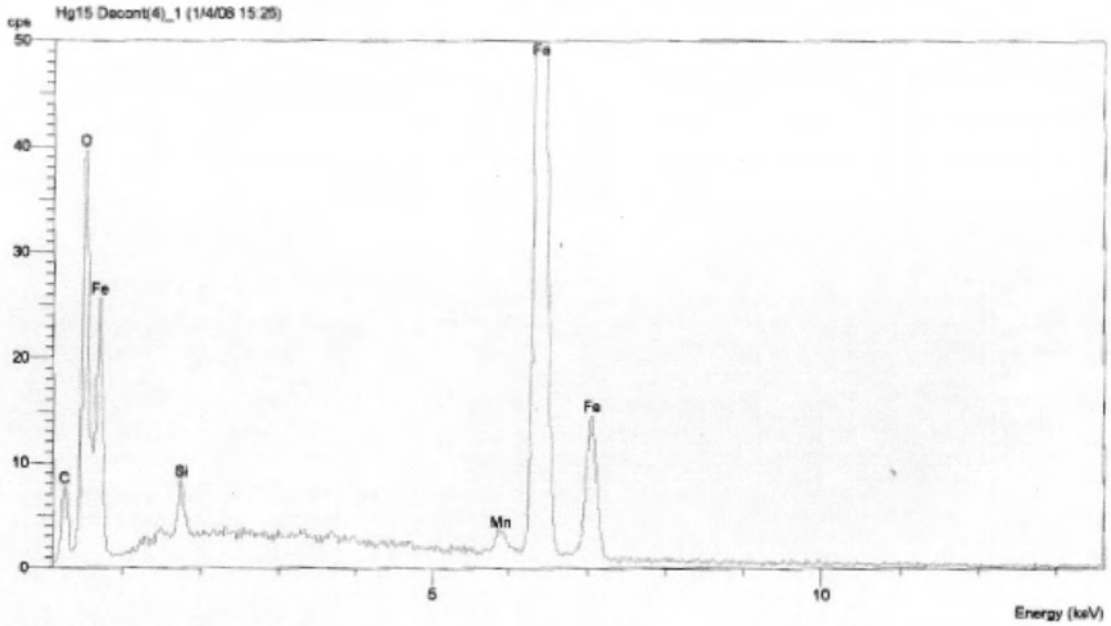
Figure 3-C EDS result of 15 days Hg contaminated sample with 0.4 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	14.91	28.60
O K	ED	30.64	44.11
Mg K	ED	1.17	1.11
Al K	ED	2.76	2.36
Si K	ED	6.50	5.33
K K	ED	1.61	0.95
Cr K	ED	1.58	0.70
Mn K	ED	0.48	0.20
Fe K	ED	40.35	16.65
Total		100.00	100.00

* = <2 Sigma

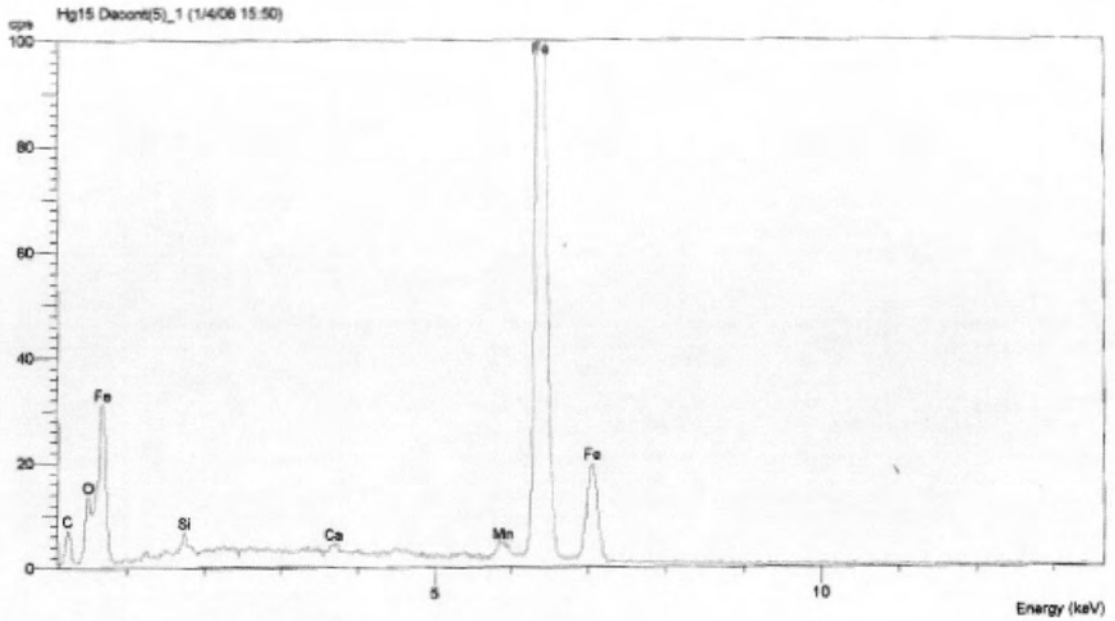
Figure 4-C EDS result of 15 days Hg contaminated sample with 0.6 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	10.83	26.09
O K	ED	21.00	37.98
Si K	ED	1.16	1.20
Mn K	ED	1.03	0.54
Fe K	ED	65.98	34.19
Total		100.00	100.00

* = <2 Sigma

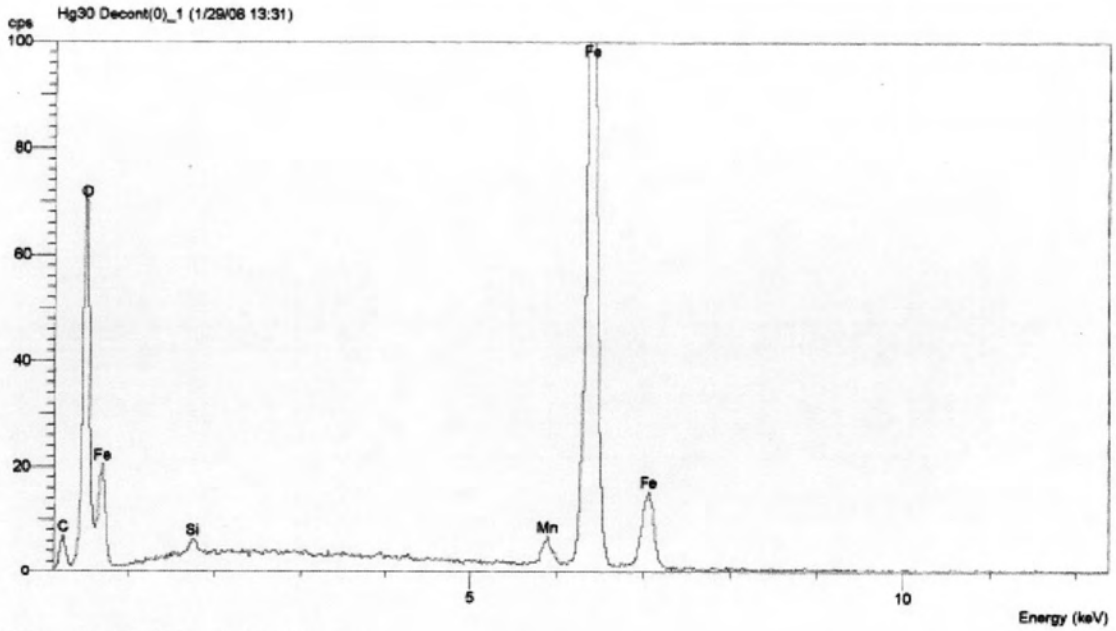
Figure 5-C EDS result of 15 days Hg contaminated sample with 0.8 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	8.87	28.14
O K	ED	5.36	12.76
Si K	ED	0.72	0.98
Ca K	ED	0.38	0.36
Mn K	ED	1.41	0.98
Fe K	ED	83.25	56.78
Total		100.00	100.00

* = <2 Sigma

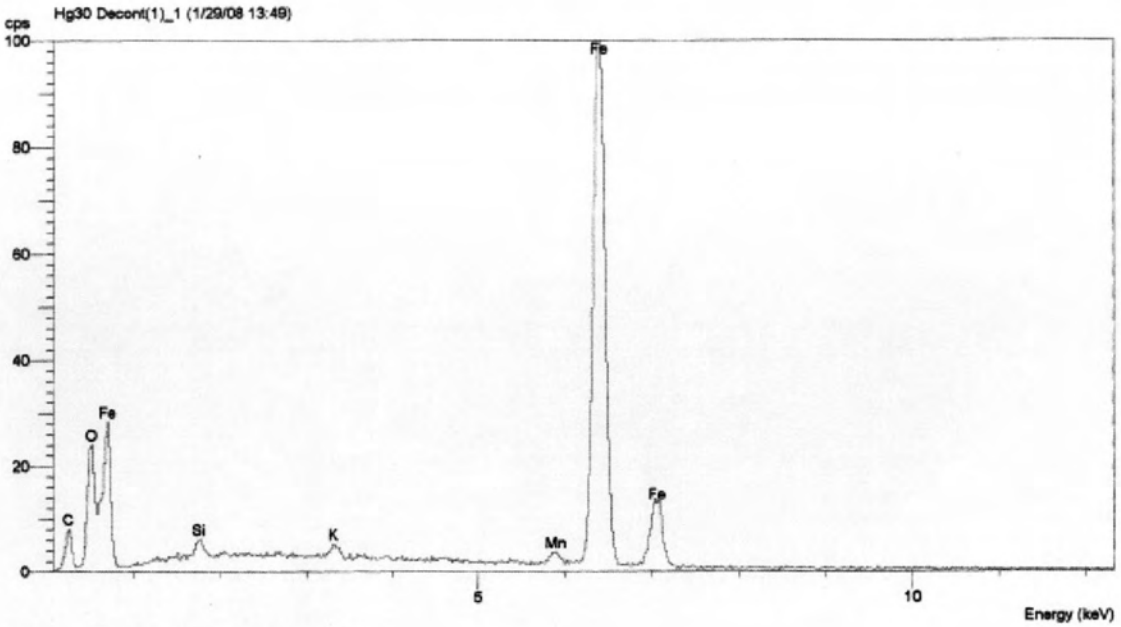
Figure 6-C EDS result of 15 days Hg contaminated sample with 1.0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.08	16.52
O K	ED	29.27	51.29
Si K	ED	0.47	0.47
Mn K	ED	2.11	1.08
Fe K	ED	61.07	30.65
Total		100.00	100.00

* = <2 Sigma

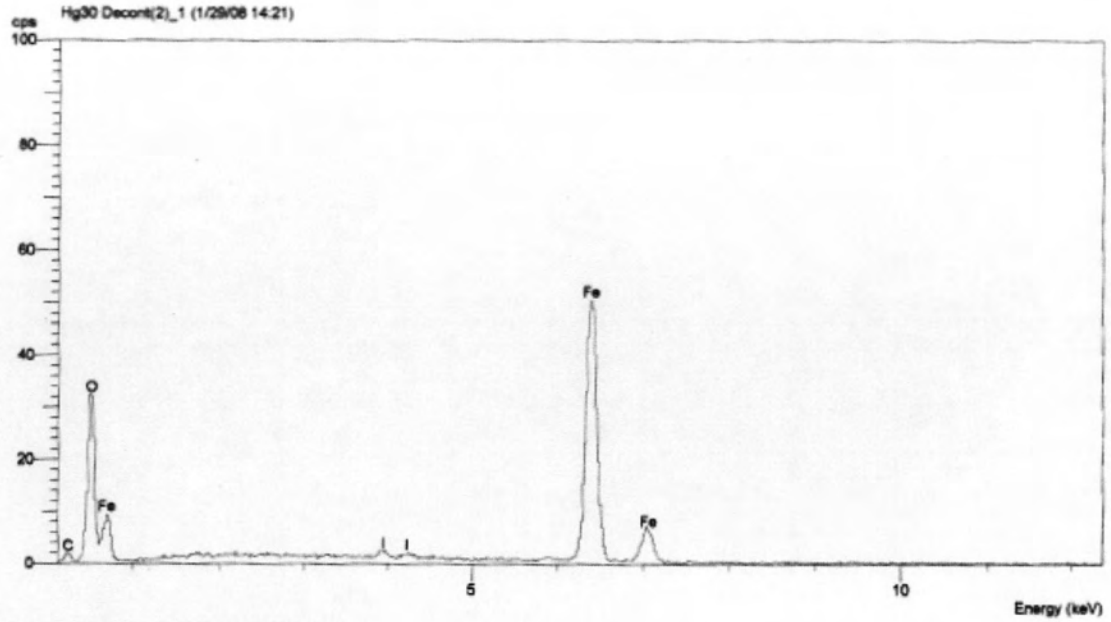
Figure 7-C EDS result of 30 days Hg contaminated sample with 0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	12.34	31.73
O K	ED	13.94	26.91
Si K	ED	0.81	0.89
K K	ED	0.62	0.49
Mn K	ED	1.22	0.69
Fe K	ED	71.06	39.29
Total		100.00	100.00

* = <2 Sigma

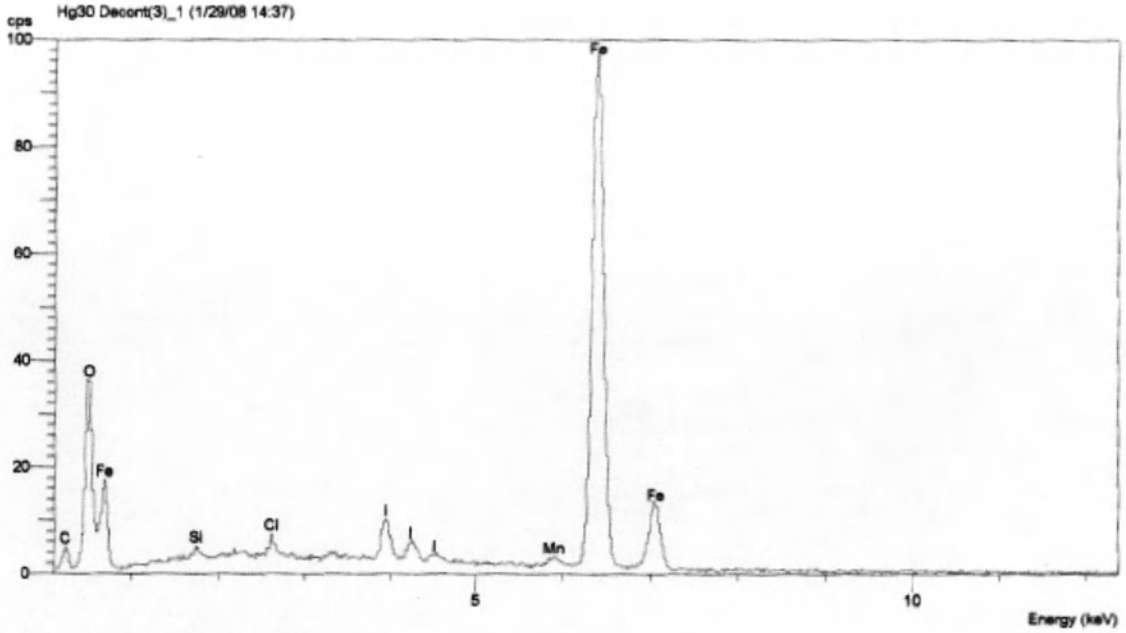
Figure 8-C EDS result of 30 days Hg contaminated sample with 0.2 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	4.22	10.39
O K	ED	29.99	55.41
Fe K	ED	63.71	33.72
I L	ED	2.08	0.49
Total		100.00	100.00

* = <2 Sigma

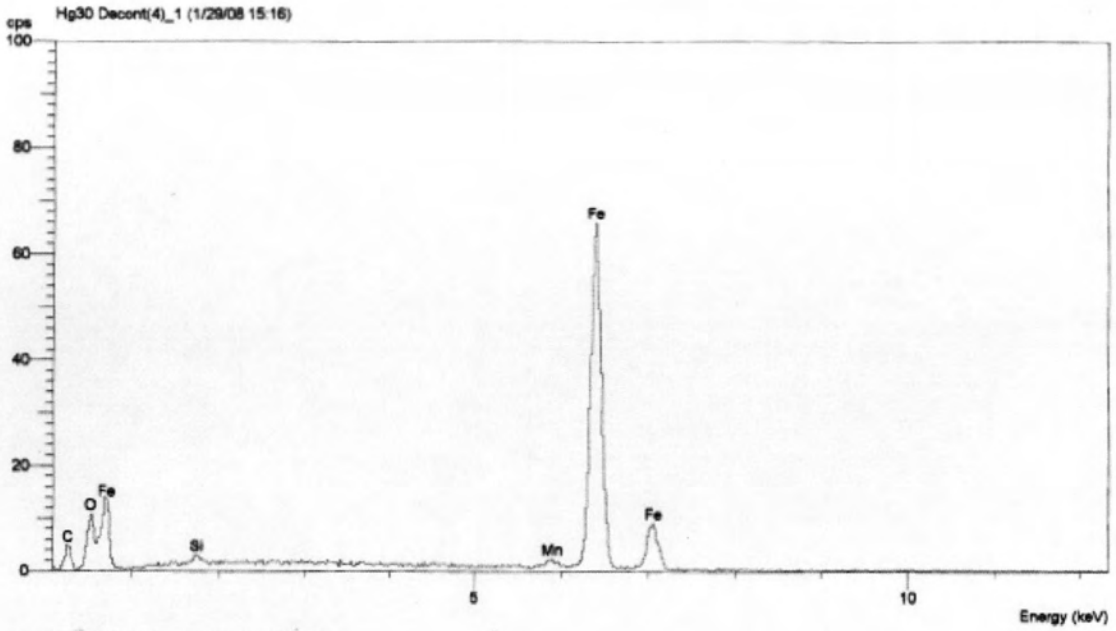
Figure 9-C EDS result of 30 days Hg contaminated sample with 0.4 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	6.51	17.89
O K	ED	19.42	40.03
Si K	ED	0.43	0.50
Cl K	ED	0.73	0.68
Mn K	ED	0.77	0.46
Fe K	ED	65.60	38.74
I L	ED	6.54	1.70
Total		100.00	100.00

* = <2 Sigma

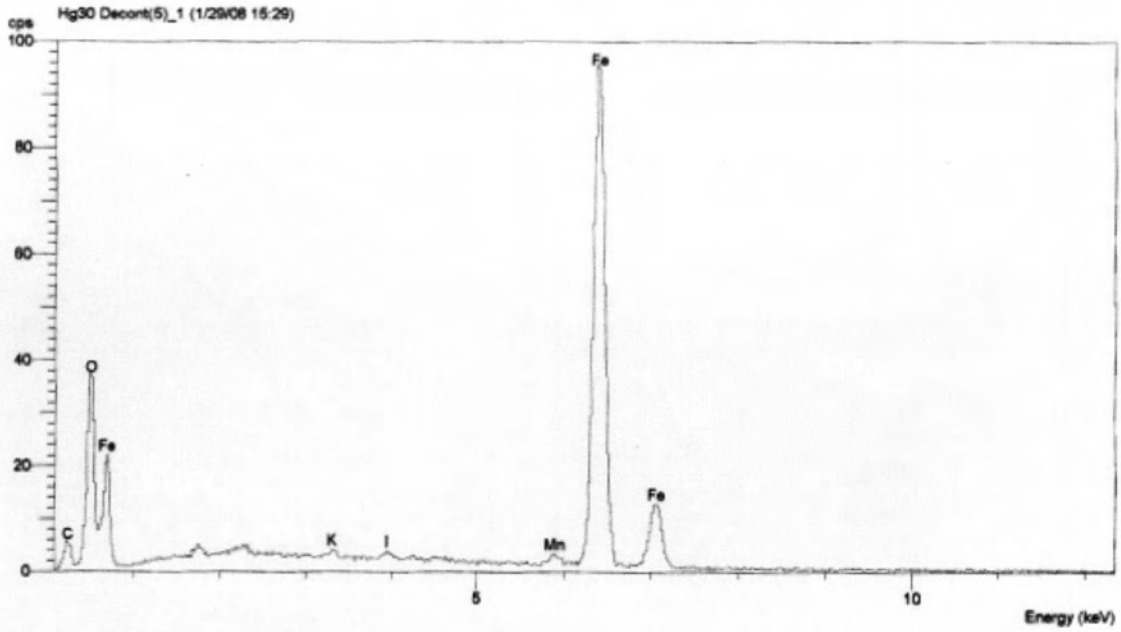
Figure 10-C EDS result of 30 days Hg contaminated sample with 0.6 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	13.19	35.38
O K	ED	9.87	19.87
Si K	ED	0.62	0.71
Mn K	ED	1.21	0.71
Fe K	ED	75.11	43.33
Total		100.00	100.00

* = <2 Sigma

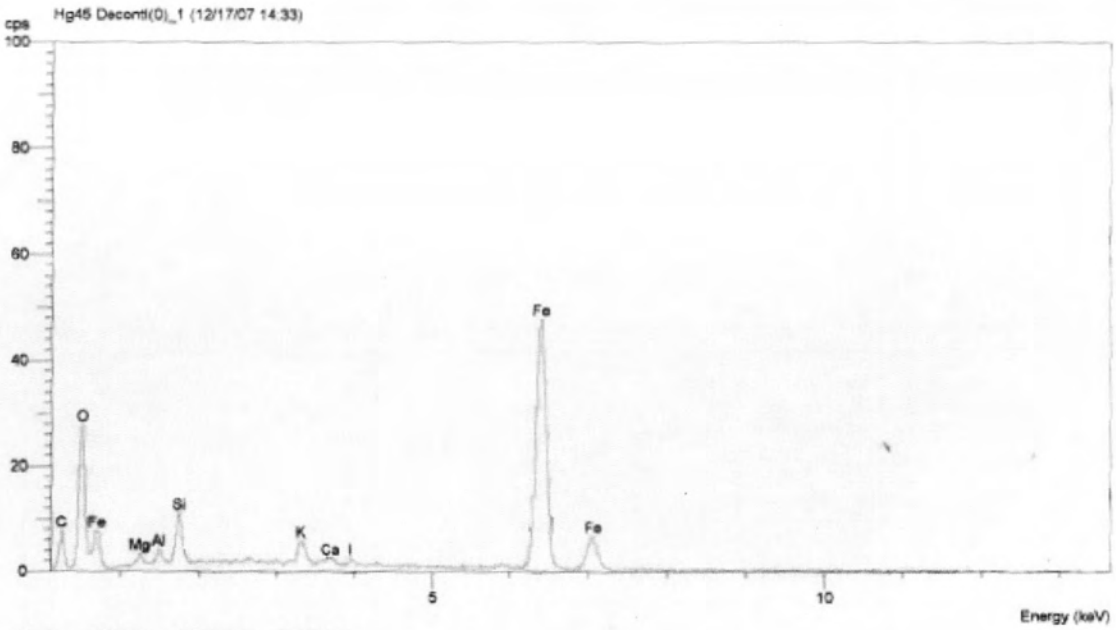
Figure 11-C EDS result of 30 days Hg contaminated sample with 0.8 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	8.45	21.33
O K	ED	21.64	41.00
K K	ED	0.32	0.25
Mn K	ED	1.01	0.56
Fe K	ED	67.42	36.59
I L	ED	1.15	0.27
Total		100.00	100.00

* = <2 Sigma

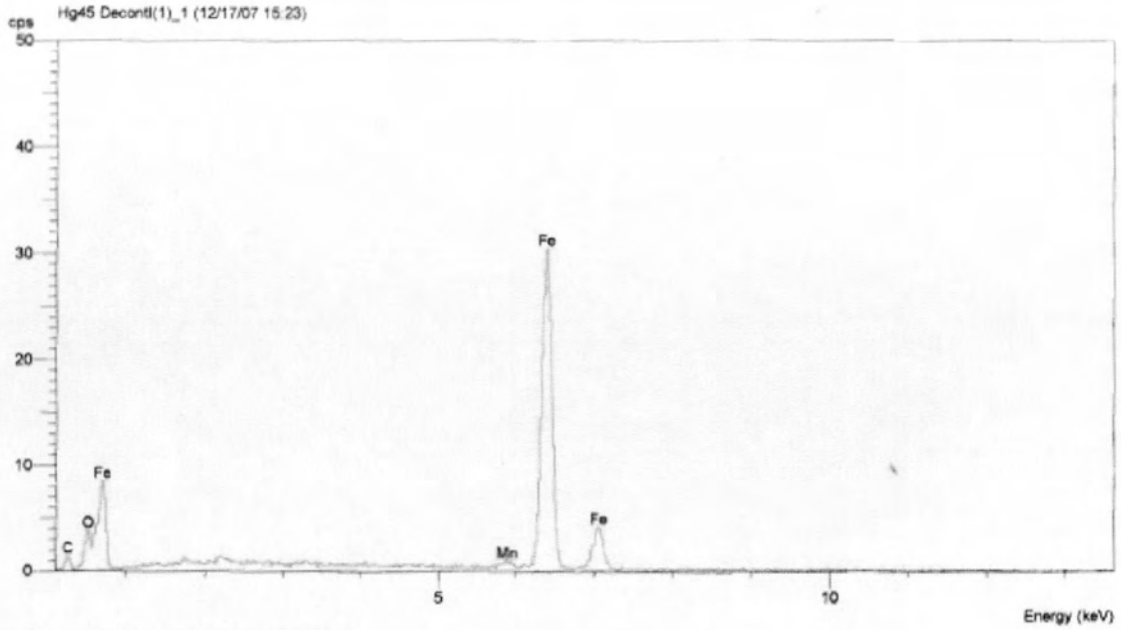
Figure 12-C EDS result of 30 days Hg contaminated sample with 1.0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	14.54	29.46
O K	ED	28.47	43.31
Mg K	ED	1.00	1.01
Al K	ED	0.90	0.81
Si K	ED	2.84	2.46
K K	ED	1.56	0.97
Ca K	ED	0.54	0.33
Mn K	ED	0.56	0.25
Fe K	ED	48.73	21.24
I L	ED	0.87	0.17
Total		100.00	100.00

* = <2 Sigma

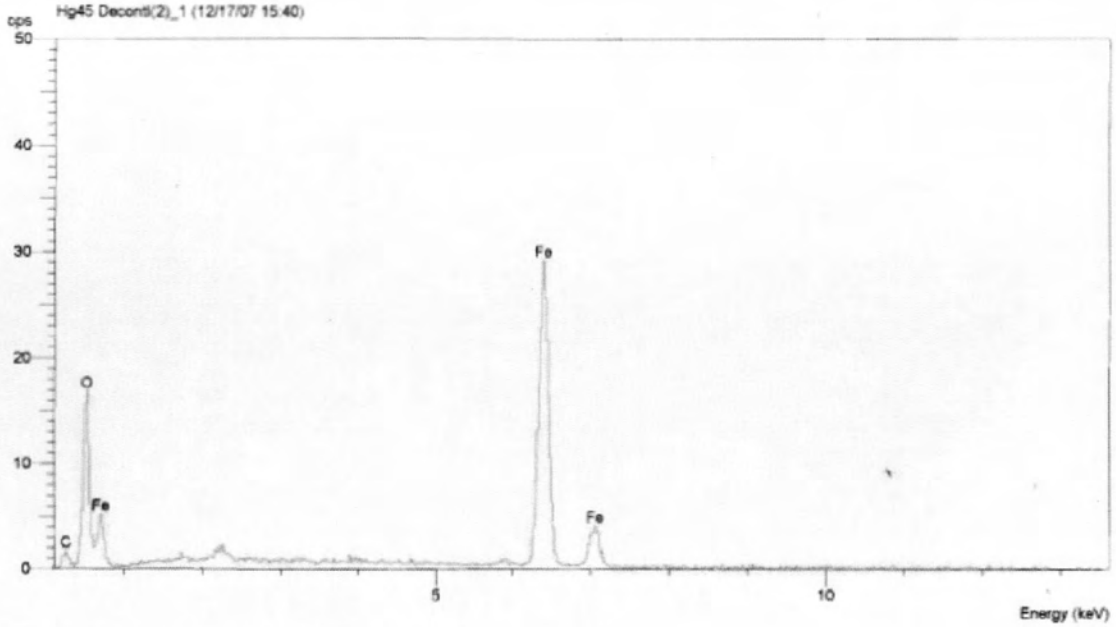
Figure 13-C EDS result of 45 days Hg contaminated sample with 0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	6.73	21.90
O K	ED	7.38	18.02
Mn K	ED	1.23	0.88
Fe K	ED	84.65	59.20
Total		100.00	100.00

* = <2 Sigma

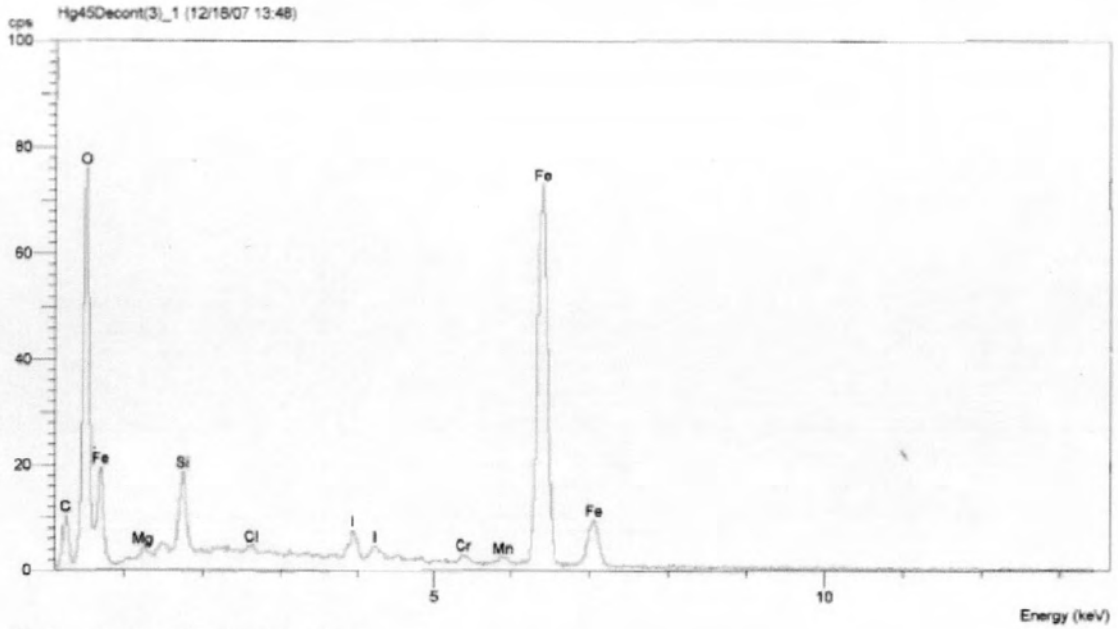
Figure 14-C EDS result of 45 days Hg contaminated sample with 0.2 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.11	16.69
O K	ED	29.00	51.08
Fe K	ED	63.89	32.23
Total		100.00	100.00

* = <2 Sigma

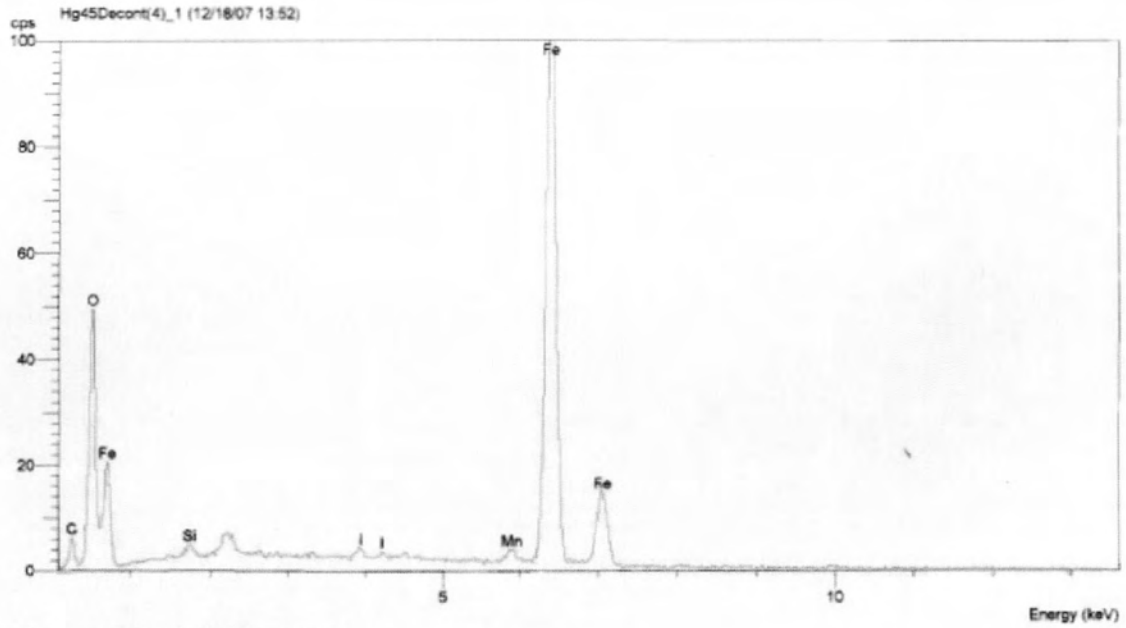
Figure 15-C EDS result of 45 days Hg contaminated sample with 0.4 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	13.00	26.09
O K	ED	33.19	49.99
Mg K	ED	0.48	0.48
Si K	ED	2.97	2.55
Cl K	ED	0.30	0.20
Cr K	ED	0.56	0.26
Mn K	ED	0.58	0.26
Fe K	ED	45.03	19.43
I L	ED	3.90	0.74
Total		100.00	100.00

* = <2 Sigma

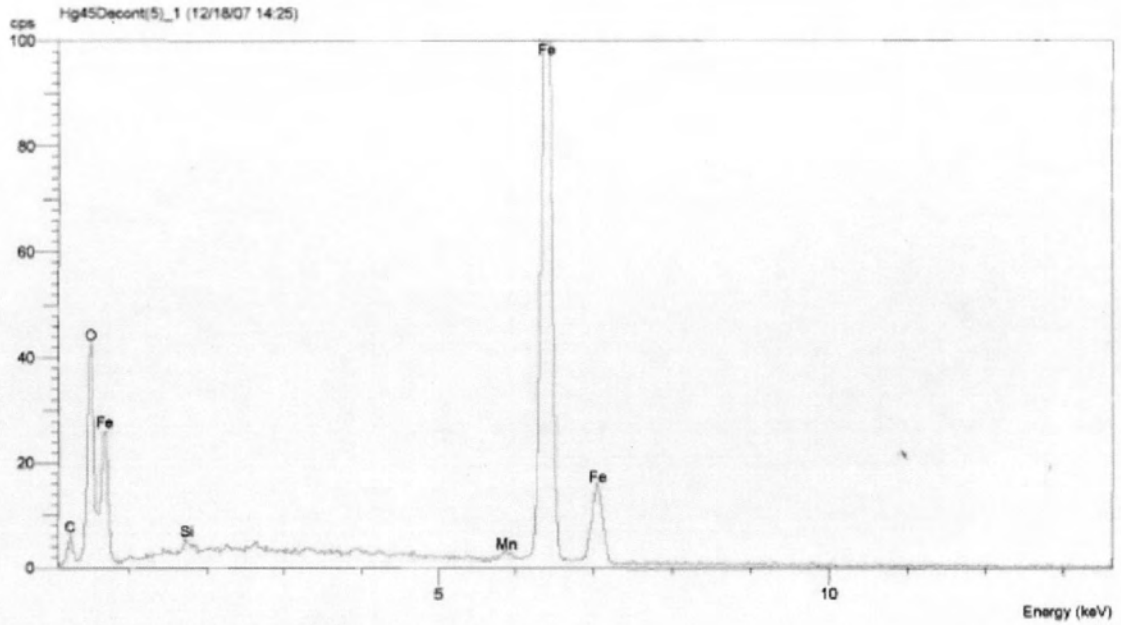
Figure 16-C EDS result of 45 days Hg contaminated sample with 0.6 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.61	19.12
O K	ED	23.07	43.54
Si K	ED	0.44	0.47
Mn K	ED	1.13	0.62
Fe K	ED	66.45	35.93
I L	ED	1.32	0.31
Total		100.00	100.00

* = <2 Sigma

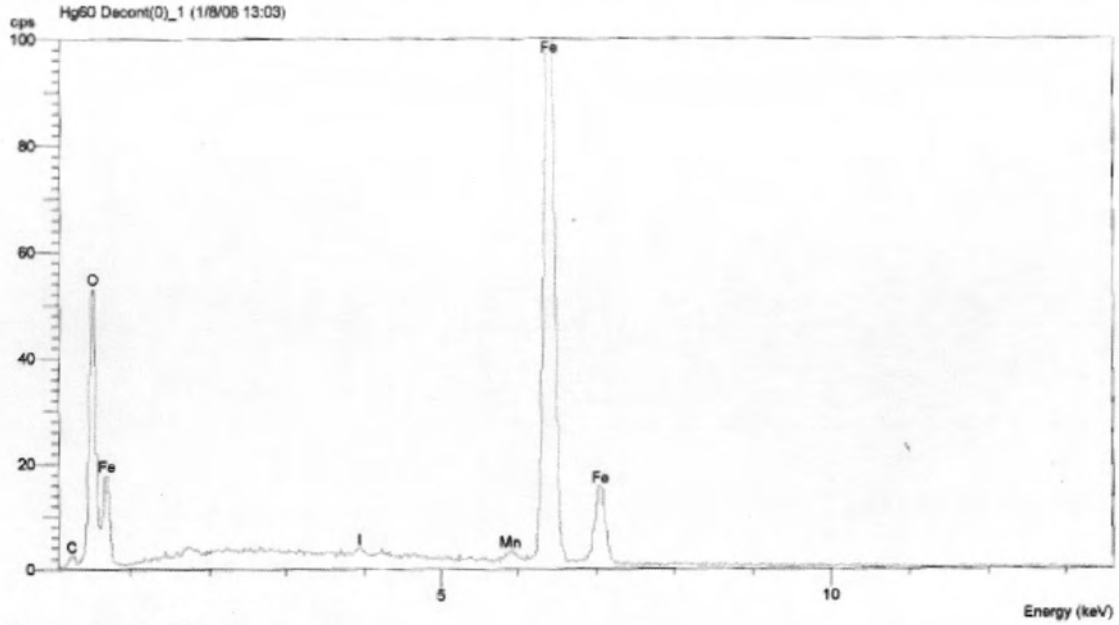
Figure 17-C EDS result of 45 days Hg contaminated sample with 0.8 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.48	19.72
O K	ED	19.50	38.61
Si K	ED	0.44	0.49
Mn K	ED	0.74	0.42
Fe K	ED	71.85	40.75
Total		100.00	100.00

* = <2 Sigma

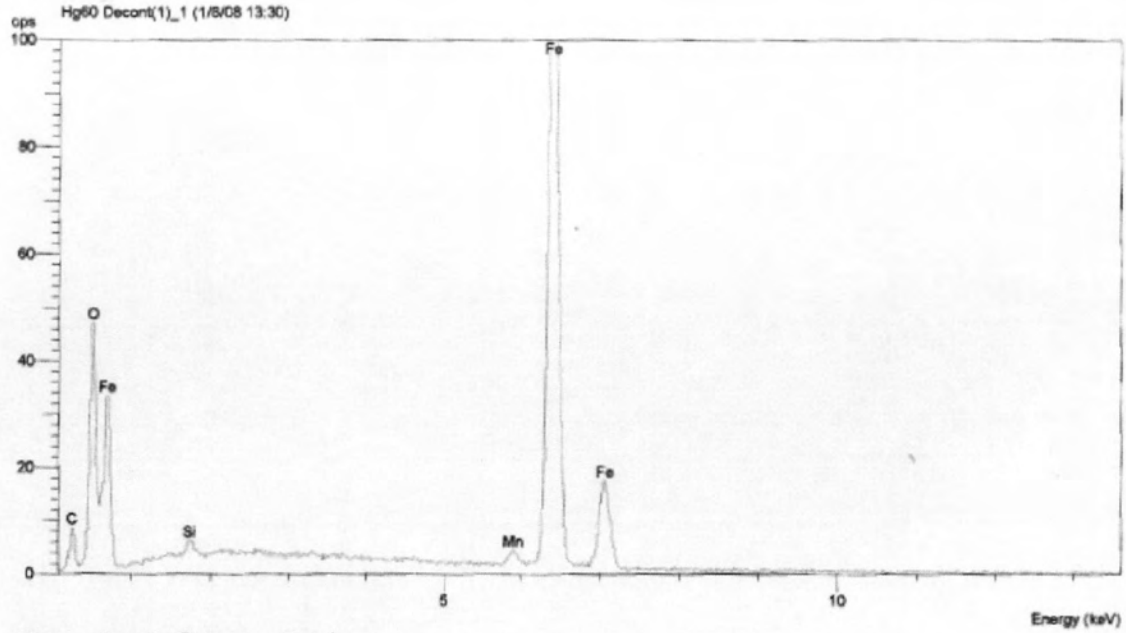
Figure 18-C EDS result of 45 days Hg contaminated sample with 1.0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	3.55	9.70
O K	ED	23.21	47.59
Mn K	ED	0.78	0.46
Fe K	ED	71.47	41.99
I L	ED	0.99	0.26
Total		100.00	100.00

* = <2 Sigma

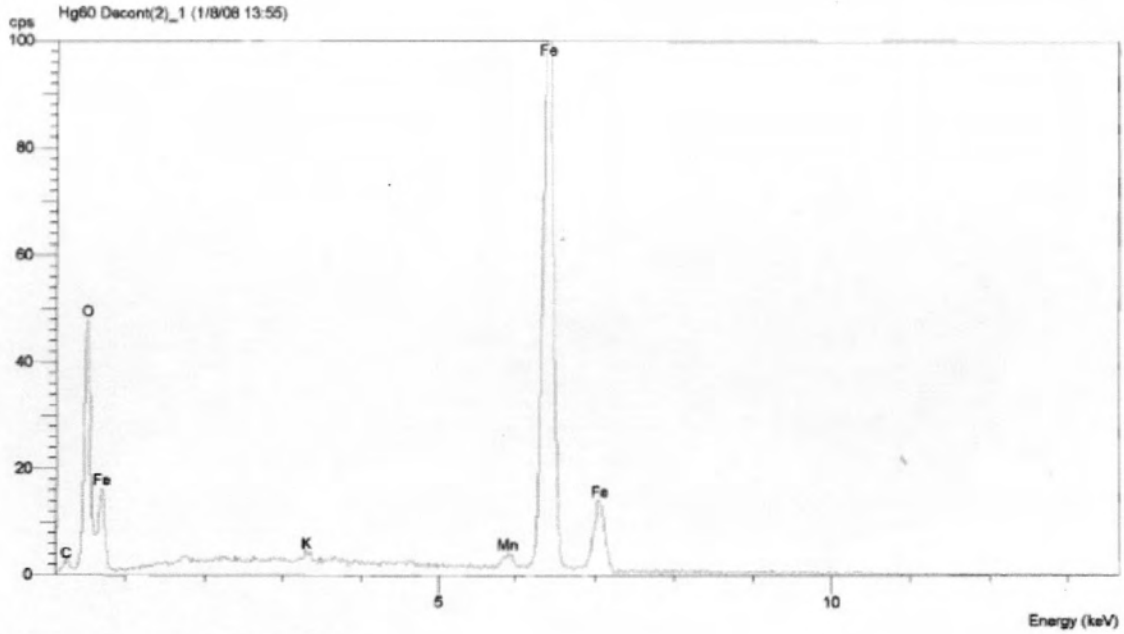
Figure 19-C EDS result of 60 days Hg contaminated sample with 0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	9.58	23.77
O K	ED	20.85	38.82
Si K	ED	0.53	0.57
Mn K	ED	1.12	0.61
Fe K	ED	67.91	36.23
Total		100.00	100.00

* - <2 Sigma

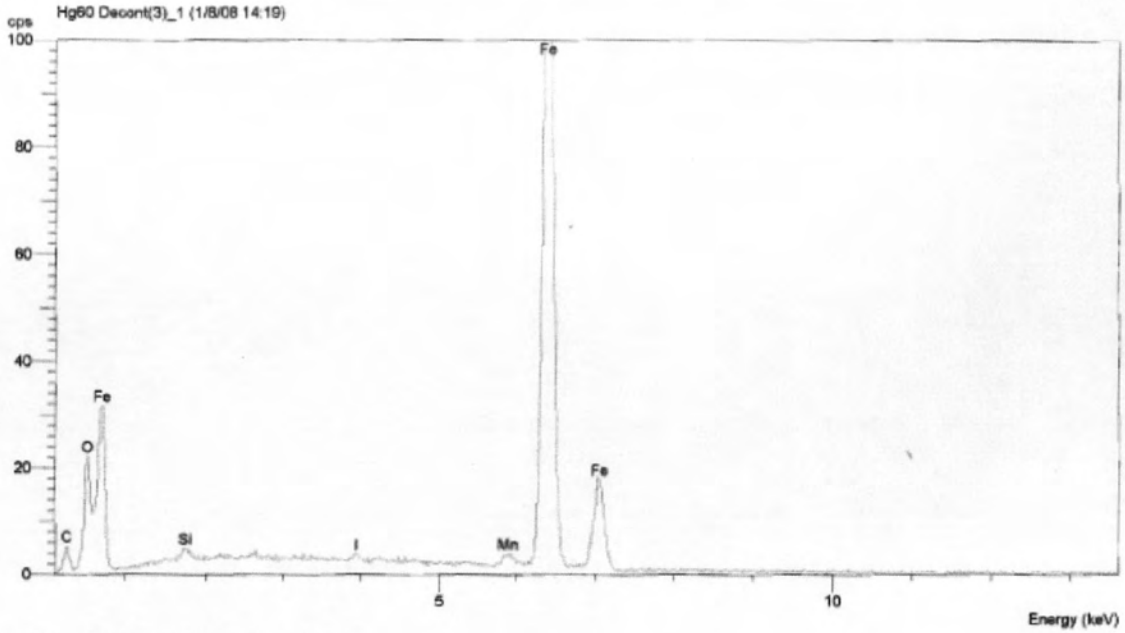
Figure 20-C EDS result of 60 days Hg contaminated sample with 0.2 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	3.90	10.50
O K	ED	23.35	47.22
K K	ED	0.44	0.37
Mn K	ED	1.38	0.81
Fe K	ED	70.94	41.10
Total		100.00	100.00

* = <2 Sigma

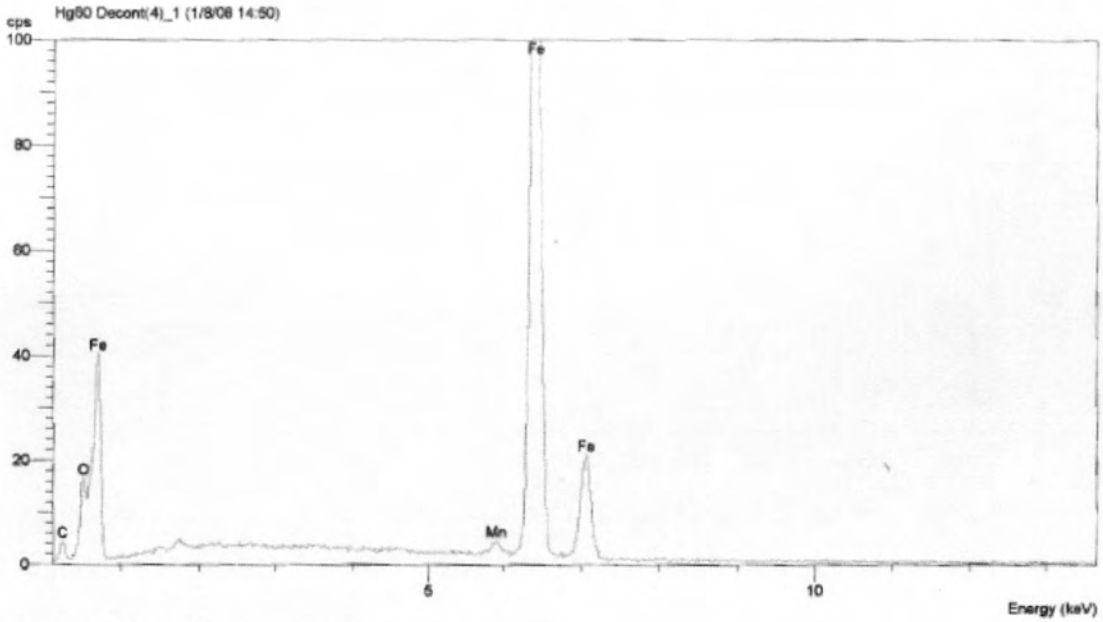
Figure 21-C EDS result of 60 days Hg contaminated sample with 0.4 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	6.47	20.30
O K	ED	9.86	23.24
Si K	ED	0.45	0.60
Mn K	ED	1.02	0.70
Fe K	ED	81.27	54.88
I L	ED	0.94	0.28
Total		100.00	100.00

* = <2 Sigma

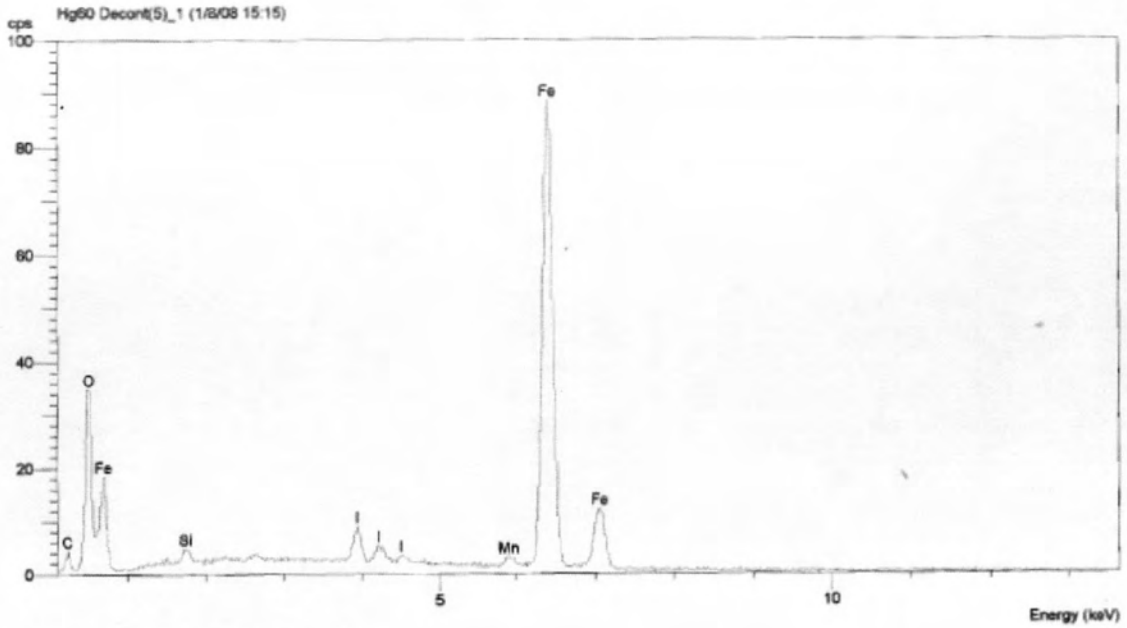
Figure 22-C EDS result of 60 days Hg contaminated sample with 0.6 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	5.32	18.35
O K	ED	6.18	15.99
Mn K	ED	1.12	0.84
Fe K	ED	87.39	64.82
Total		100.00	100.00

* = <2 Sigma

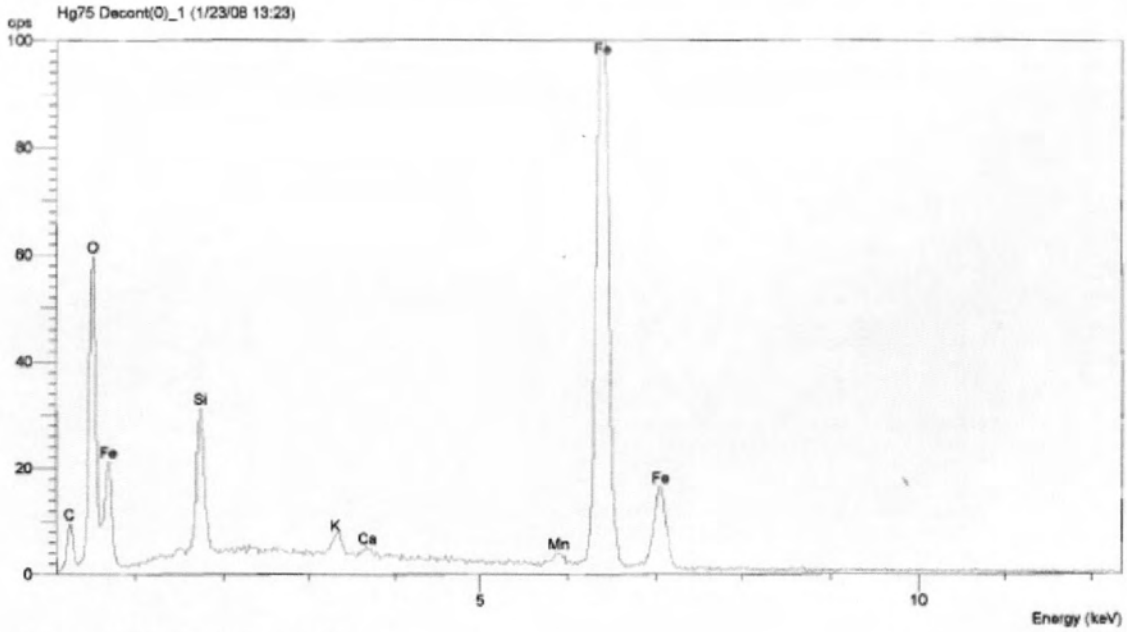
Figure 23-C EDS result of 60 days Hg contaminated sample with 0.8 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	5.98	16.39
O K	ED	20.25	41.68
Si K	ED	0.67	0.79
Mn K	ED	1.04	0.62
Fe K	ED	66.11	38.98
I L	ED	5.95	1.54
Total		100.00	100.00

* = <2 Sigma

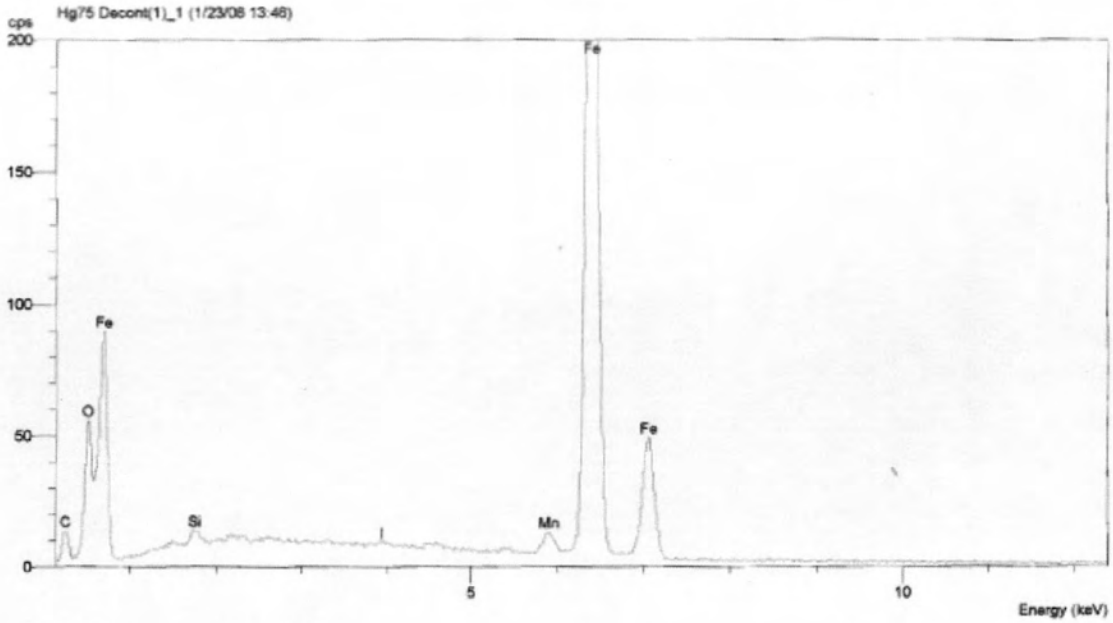
Figure 24-C EDS result of 60 days Hg contaminated sample with 1.0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	10.29	23.32
O K	ED	25.33	43.10
Si K	ED	4.15	4.02
K K	ED	0.68	0.47
Ca K	ED	0.29	0.19
Mn K	ED	0.80	0.40
Fe K	ED	58.46	28.50
Total		100.00	100.00

* = <2 Sigma

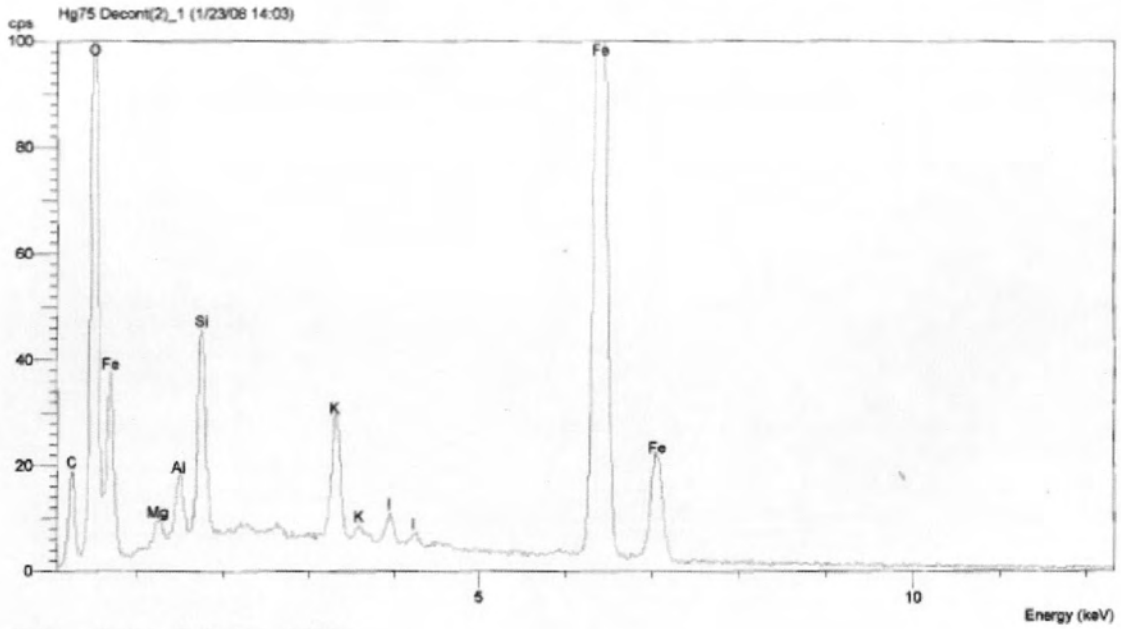
Figure 25-C EDS result of 75 days Hg contaminated sample with 0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.14	22.30
O K	ED	9.10	21.31
Si K	ED	0.45	0.60
Mn K	ED	1.43	0.98
Fe K	ED	81.46	54.69
I L	ED	0.42	0.13
Total		100.00	100.00

* = <2 Sigma

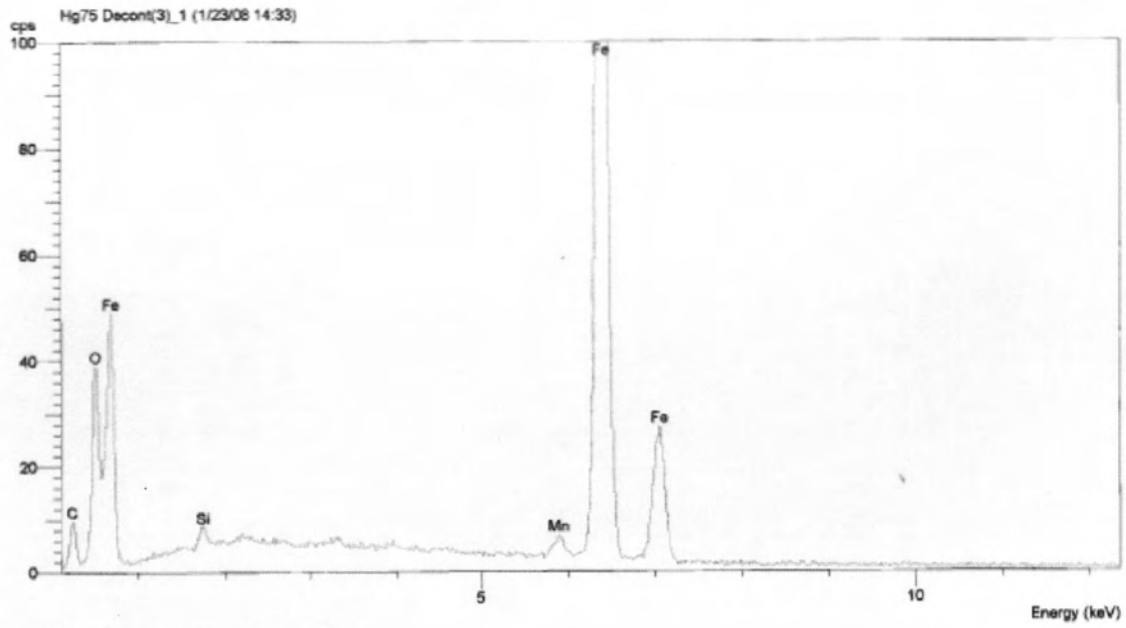
Figure 26-C EDS result of 75 days Hg contaminated sample with 0.2 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	11.17	22.53
O K	ED	33.75	51.12
Mg K	ED	0.65	0.65
Al K	ED	1.15	1.04
Si K	ED	3.56	3.07
K K	ED	2.42	1.50
Fe K	ED	45.52	19.76
I L	ED	1.79	0.34
Total		100.00	100.00

* = <2 Sigma

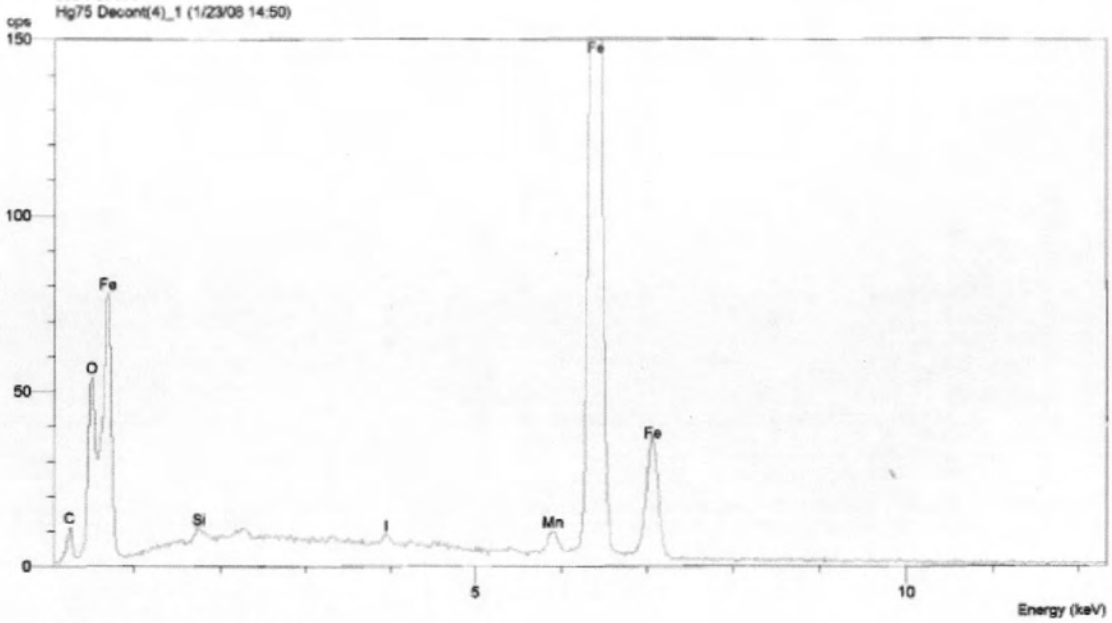
Figure 27-C EDS result of 75 days Hg contaminated sample with 0.4 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	8.36	24.30
O K	ED	11.61	25.33
Si K	ED	0.56	0.70
Mn K	ED	1.26	0.80
Fe K	ED	78.21	48.88
Total		100.00	100.00

* = <2 Sigma

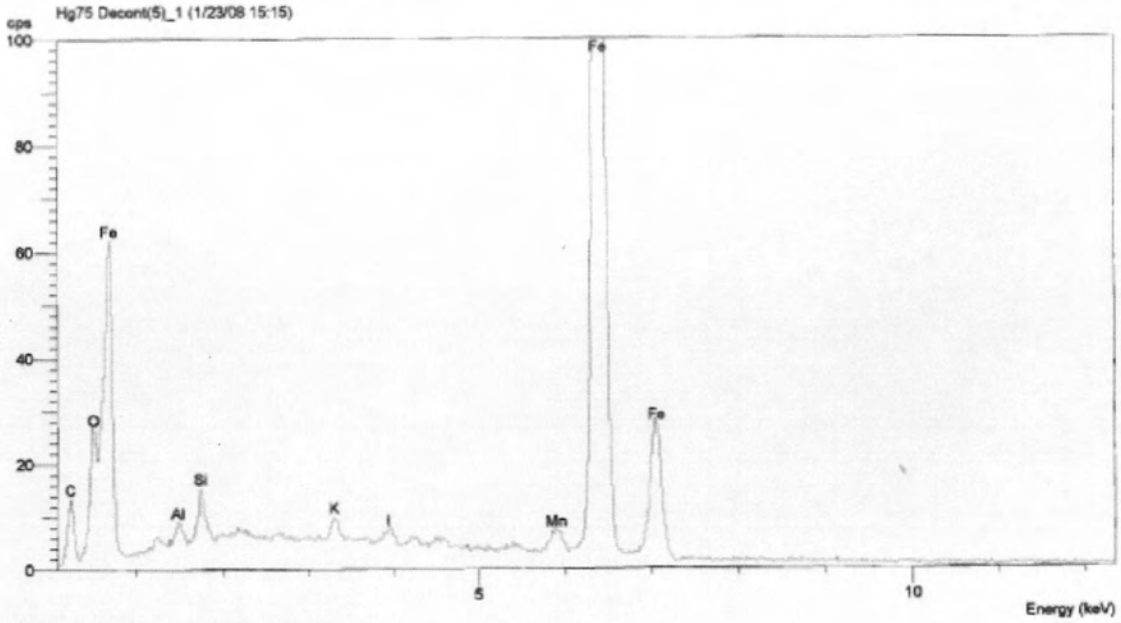
Figure 28-C EDS result of 75 days Hg contaminated sample with 0.6 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	6.94	20.83
O K	ED	11.90	26.82
Si K	ED	0.38	0.49
Mn K	ED	1.55	1.01
Fe K	ED	78.32	50.58
I L	ED	0.91	0.26
Total		100.00	100.00

* = <2 Sigma

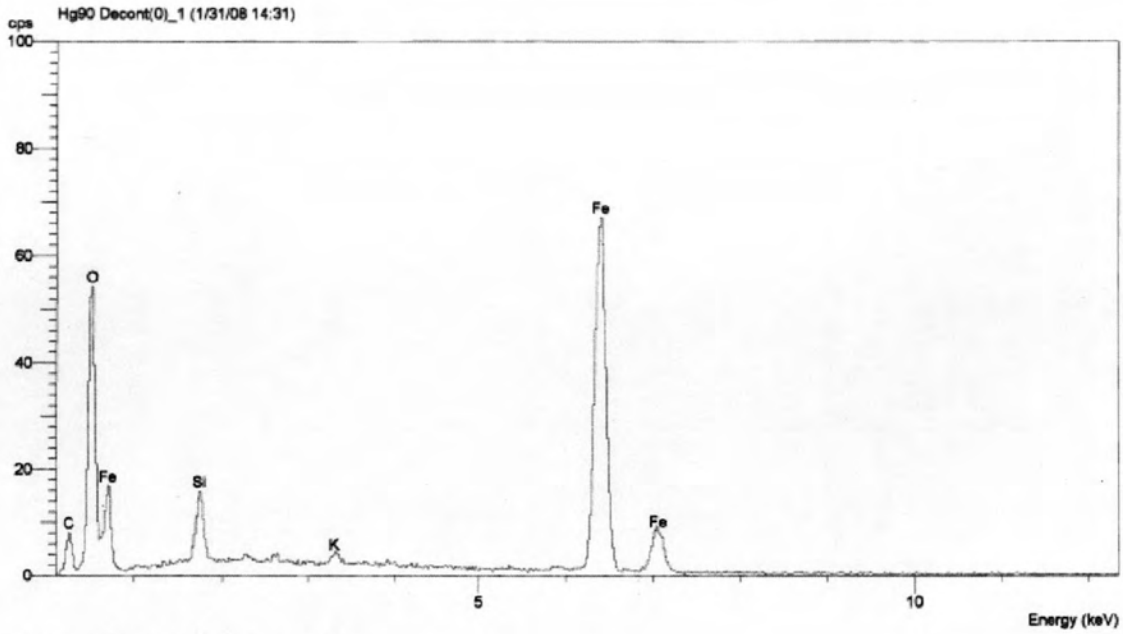
Figure 29-C EDS result of 75 days Hg contaminated sample with 0.8 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	11.35	32.83
O K	ED	7.26	15.76
Al K	ED	0.62	0.80
Si K	ED	1.21	1.49
K K	ED	0.54	0.48
Mn K	ED	1.40	0.89
Fe K	ED	76.13	47.35
I L	ED	1.49	0.41
Total		100.00	100.00

* = <2 Sigma

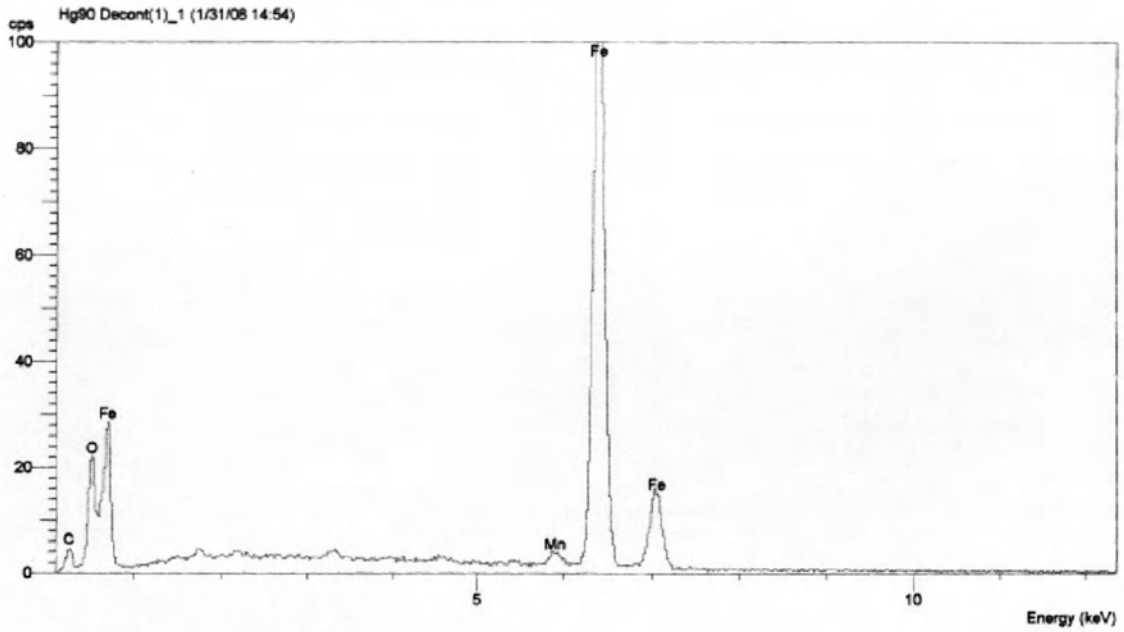
Figure 30-C EDS result of 75 days Hg contaminated sample with 1.0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	11.80	23.56
O K	ED	34.78	52.12
Si K	ED	3.03	2.59
K K	ED	0.55	0.34
Fe K	ED	49.84	21.39
Total		100.00	100.00

* = <2 Sigma

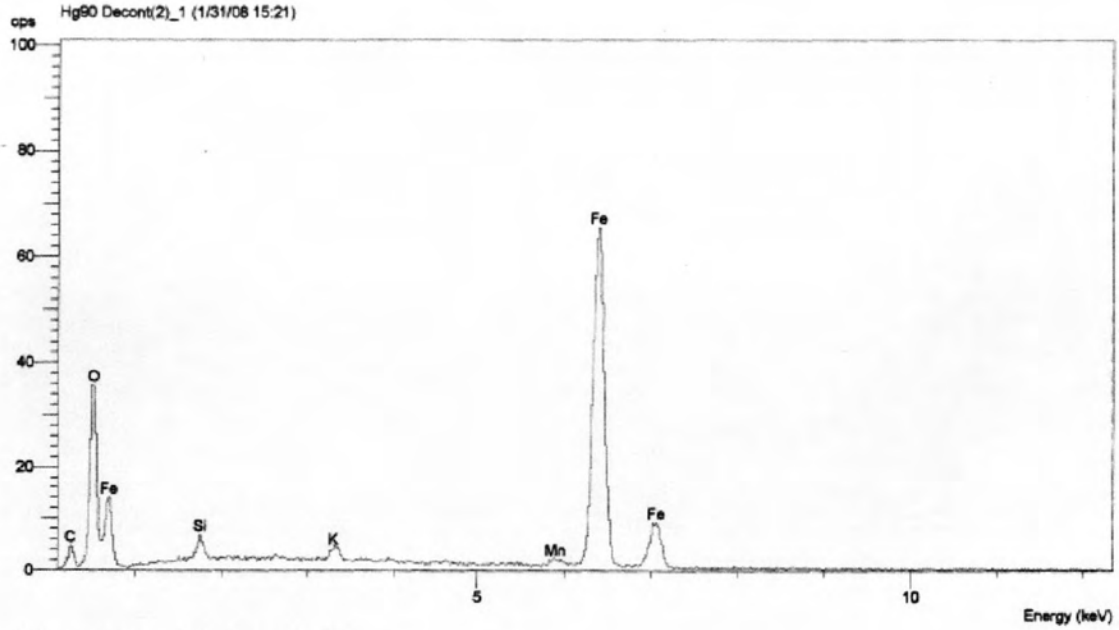
Figure 31-C EDS result of 90 days Hg contaminated sample with 0 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.34	22.00
O K	ED	11.35	25.55
Mn K	ED	1.40	0.92
Fe K	ED	79.91	51.52
Total		100.00	100.00

* = <2 Sigma

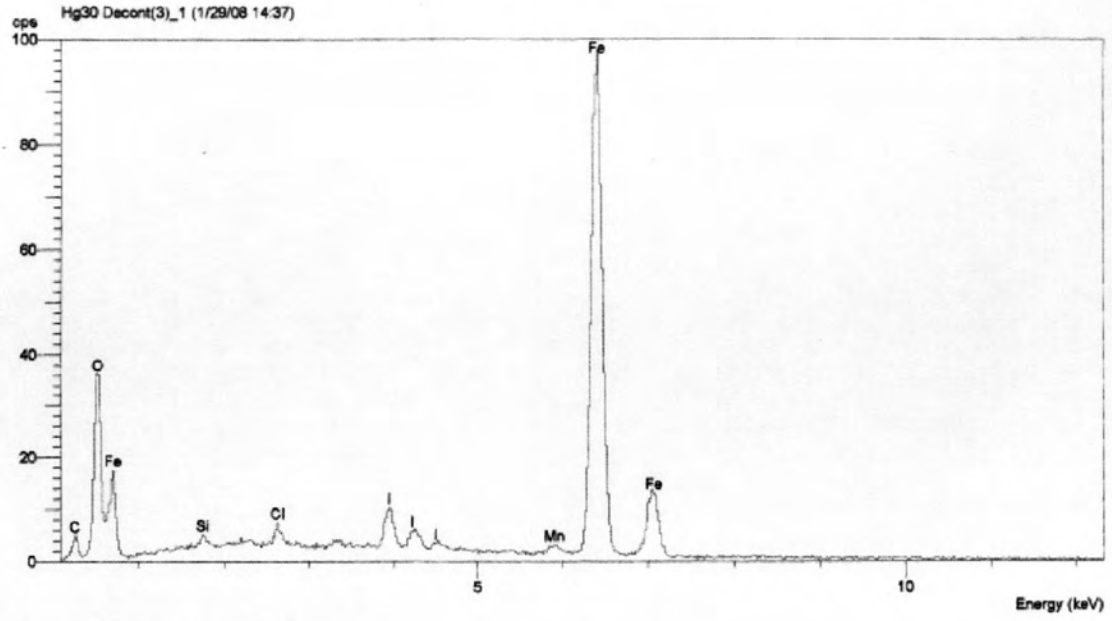
Figure 32-C EDS result of 90 days Hg contaminated sample with 0.2 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	9.01	20.65
O K	ED	27.44	47.23
Si K	ED	1.21	1.19
K K	ED	0.90	0.63
Mn K	ED	0.93	0.46
Fe K	ED	60.52	29.84
Total		100.00	100.00

* = <2 Sigma

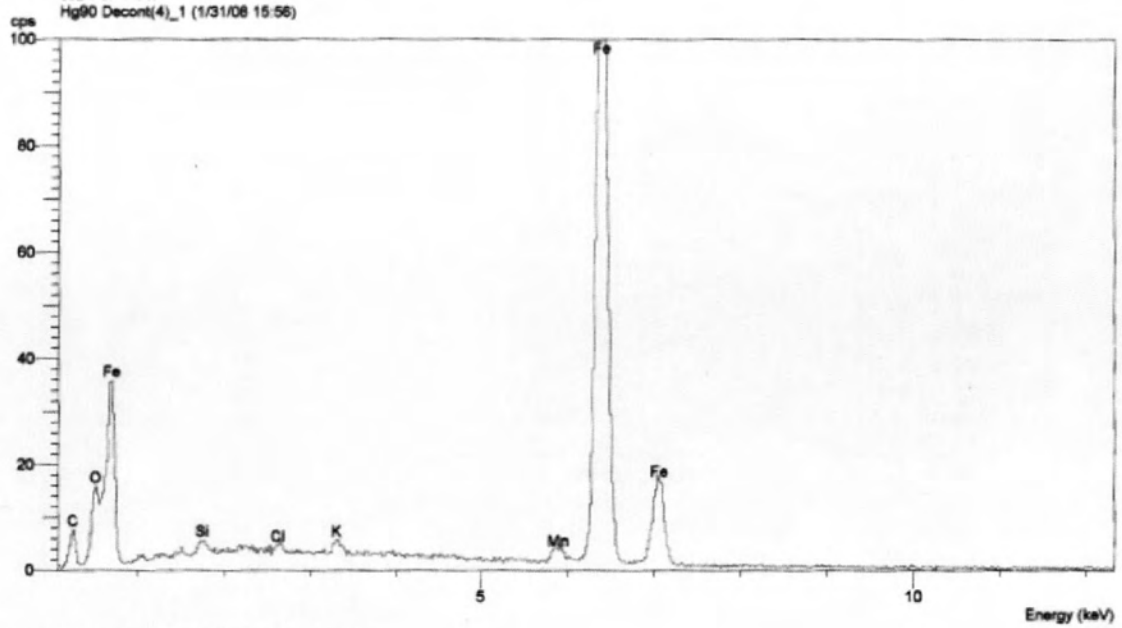
Figure 33-C EDS result of 90 days Hg contaminated sample with 0.4 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	6.51	17.89
O K	ED	19.42	40.03
Si K	ED	0.43	0.50
Cl K	ED	0.73	0.68
Mn K	ED	0.77	0.46
Fe K	ED	65.60	38.74
I L	ED	6.54	1.70
Total		100.00	100.00

* = <2 Sigma

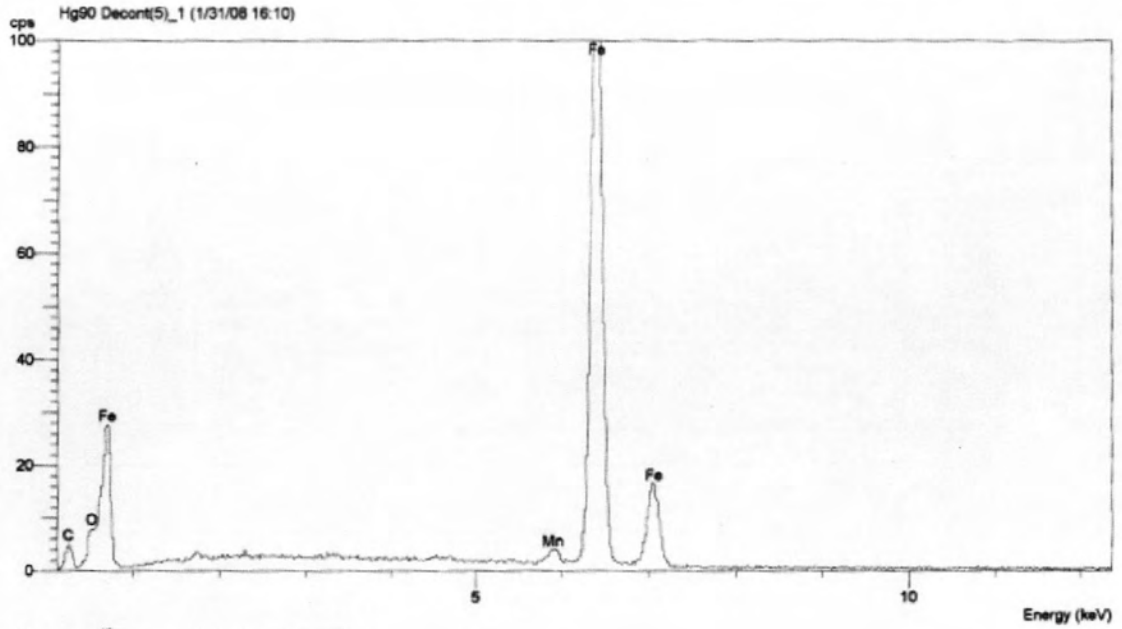
Figure 34-C EDS result of 90 days Hg contaminated sample with 0.6 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	10.34	30.61
O K	ED	7.36	16.35
Si K	ED	0.61	0.77
Cl K	ED	0.31	0.31
K K	ED	0.54	0.49
Mn K	ED	1.41	0.91
Fe K	ED	79.43	50.56
Total		100.00	100.00

* = <2 Sigma

Figure 35-C EDS result of 90 days Hg contaminated sample with 0.8 M Iodine



Elmt	Spect. Type	Element %	Atomic %
C K	ED	7.95	26.97
O K	ED	3.24	8.24
Mn K	ED	1.49	1.10
Fe K	ED	87.32	63.68
Total		100.00	100.00

* = <2 Sigma

Figure 36-C EDS result of 90 days Hg contaminated sample with 1.0 M Iodine

APPENDIX D

The Analysis results of XRD of Hg decontaminated samples

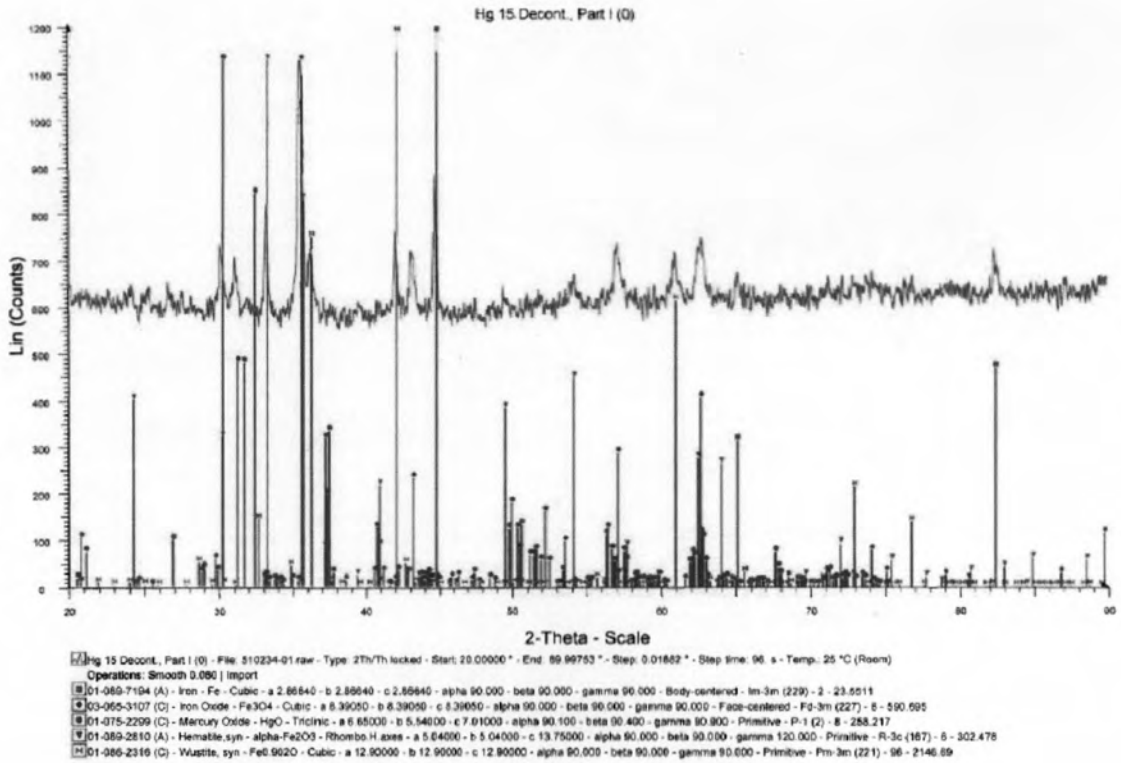


Figure 1-D XRD result of 15 days Hg contaminated sample with 0 M Iodine

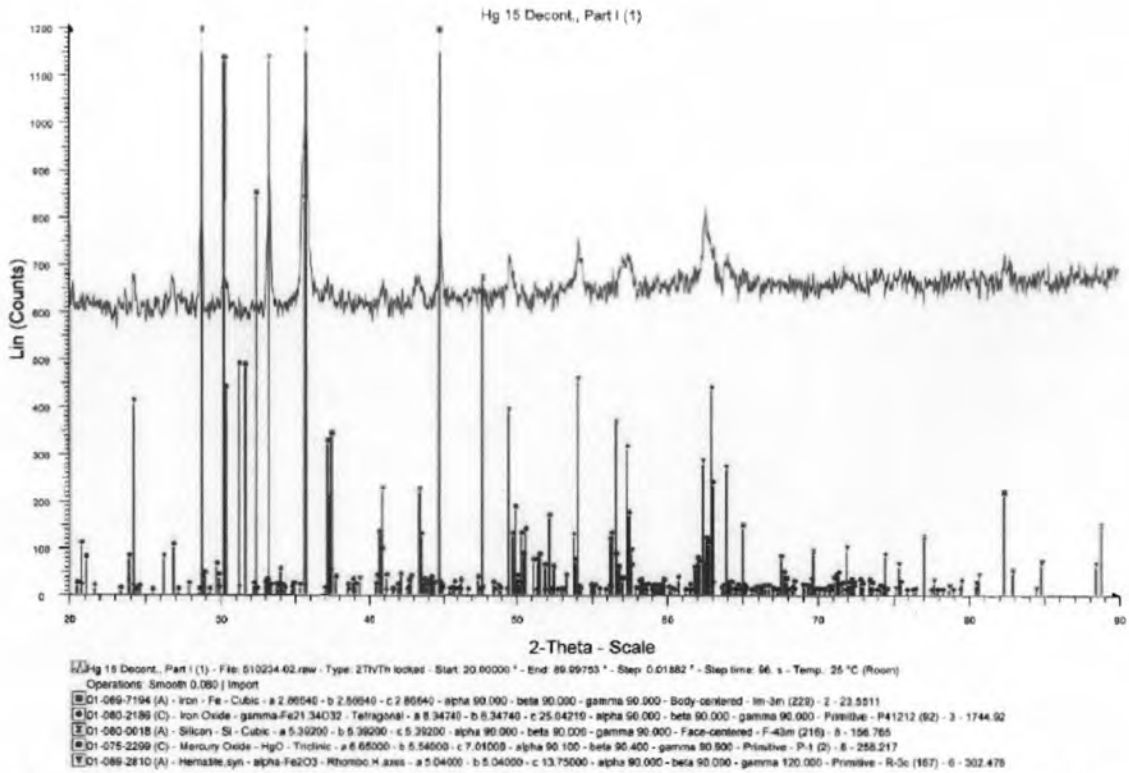


Figure 2-D XRD result of 15 days Hg contaminated sample with 0.2 M Iodine

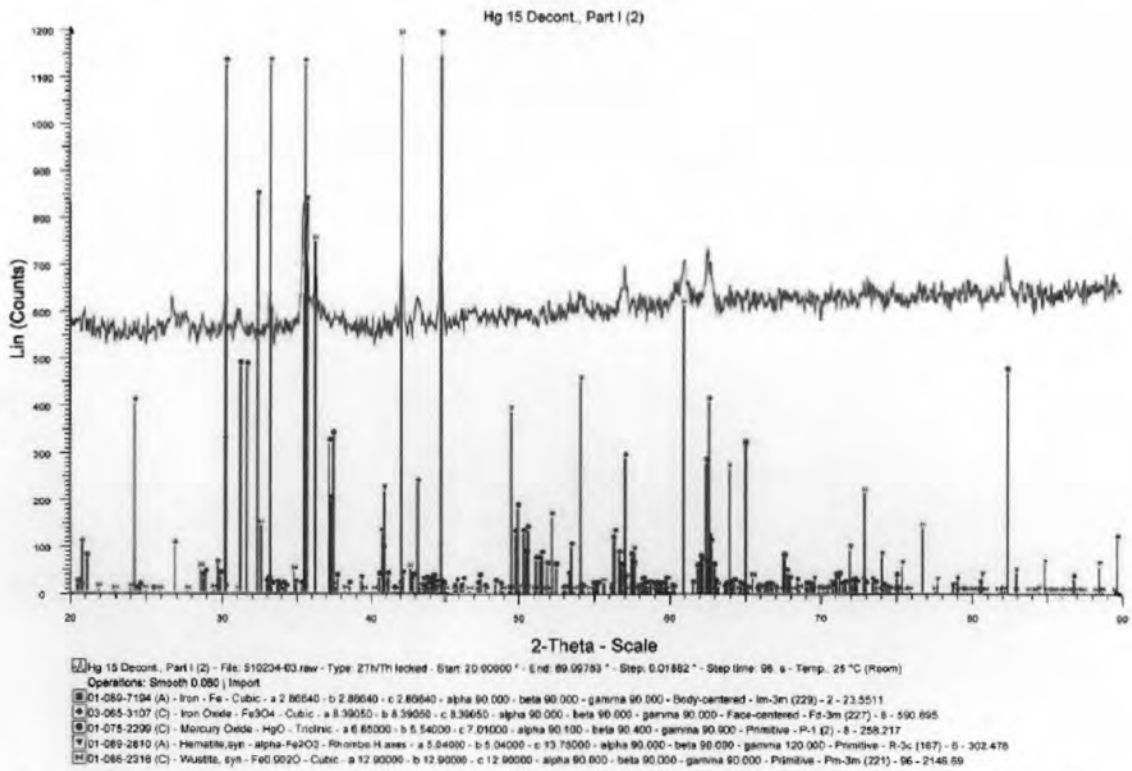


Figure 3-D XRD result of 15 days Hg contaminated sample with 0.4 M Iodine

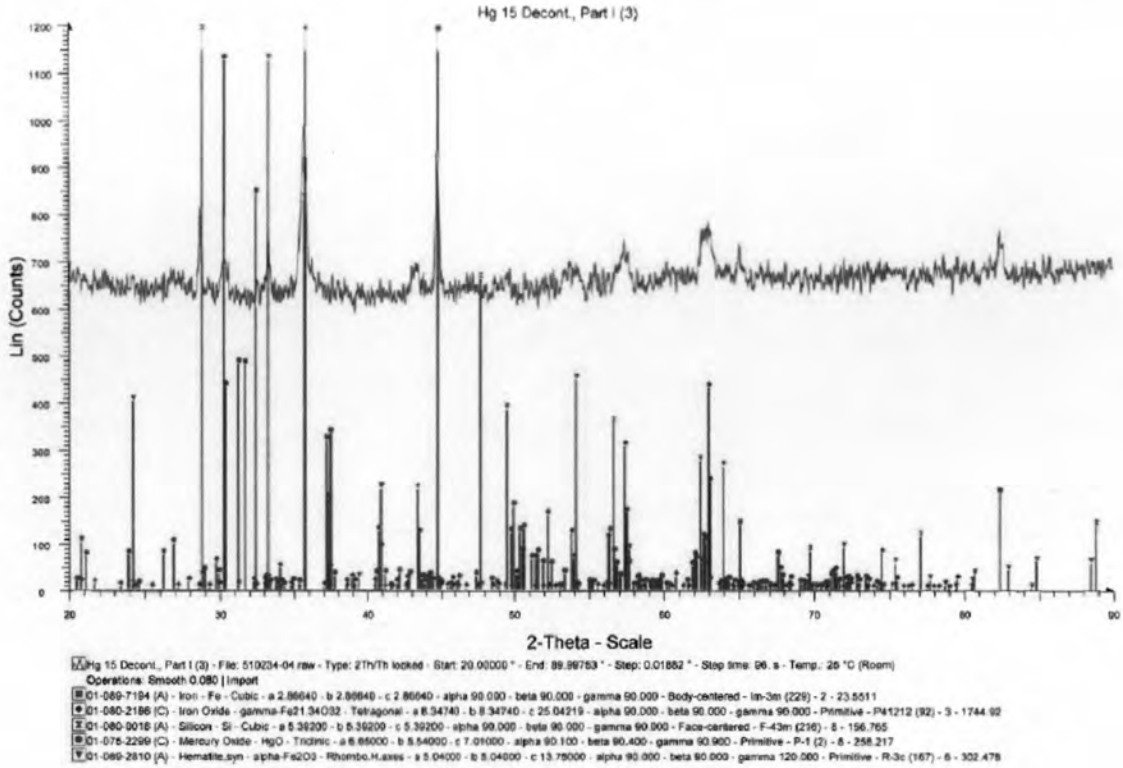


Figure 4-D XRD result of 15 days Hg contaminated sample with 0.6 M Iodine

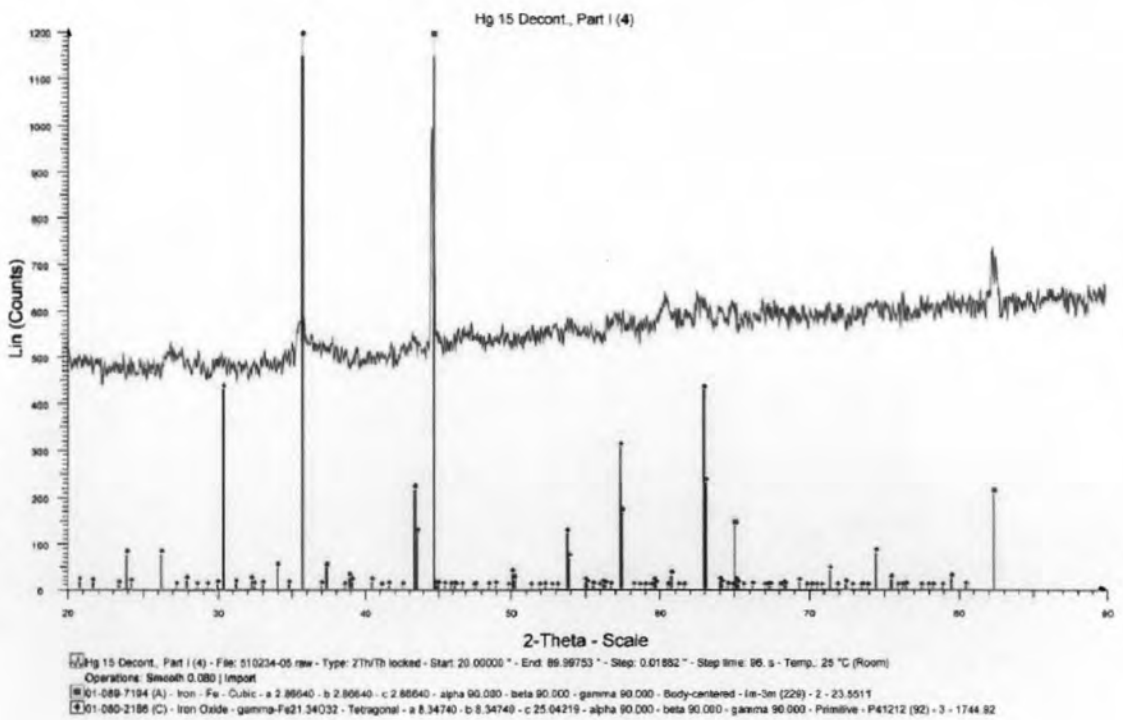


Figure 5-D XRD result of 15 days Hg contaminated sample with 0.8 M Iodine

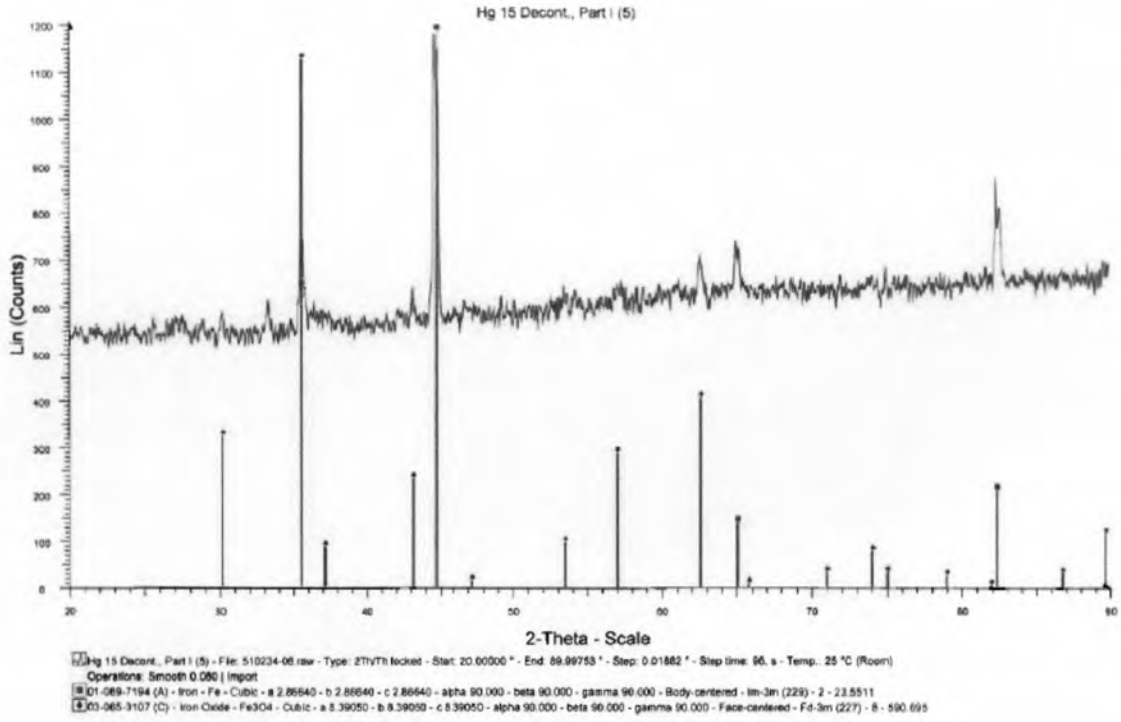


Figure 6-D XRD result of 15 days Hg contaminated sample with 1.0 M Iodine

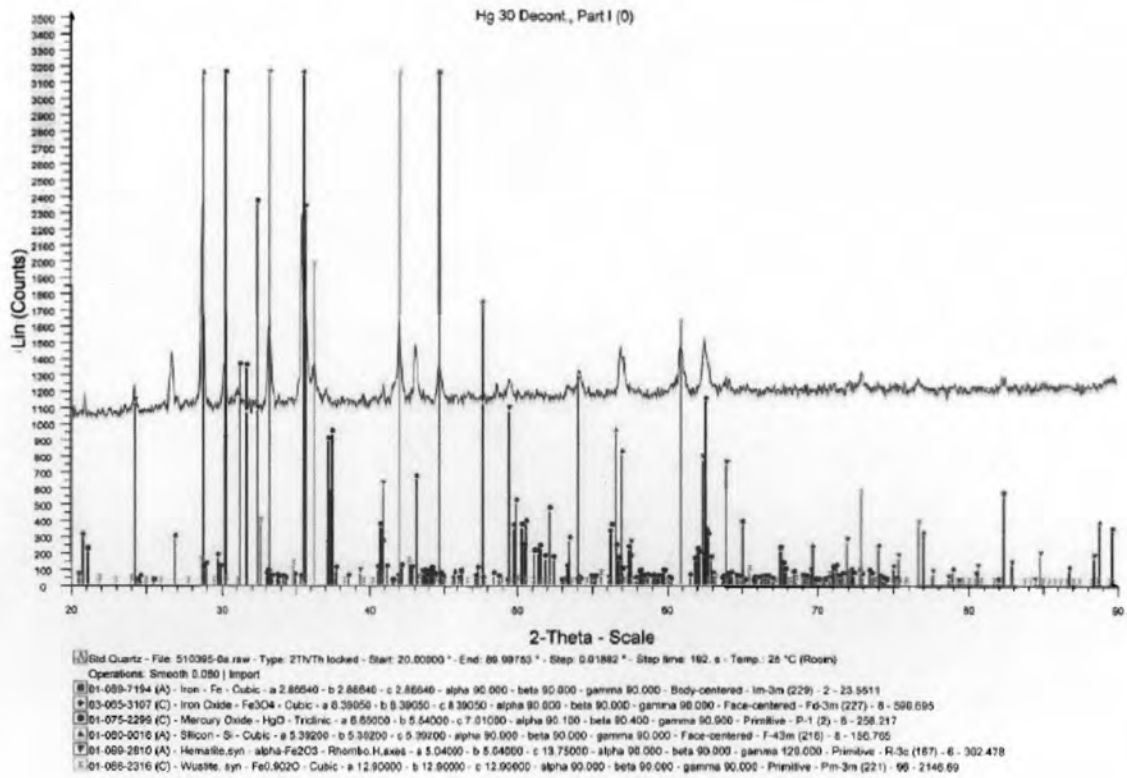


Figure 7-D XRD result of 30 days Hg contaminated sample with 0 M Iodine

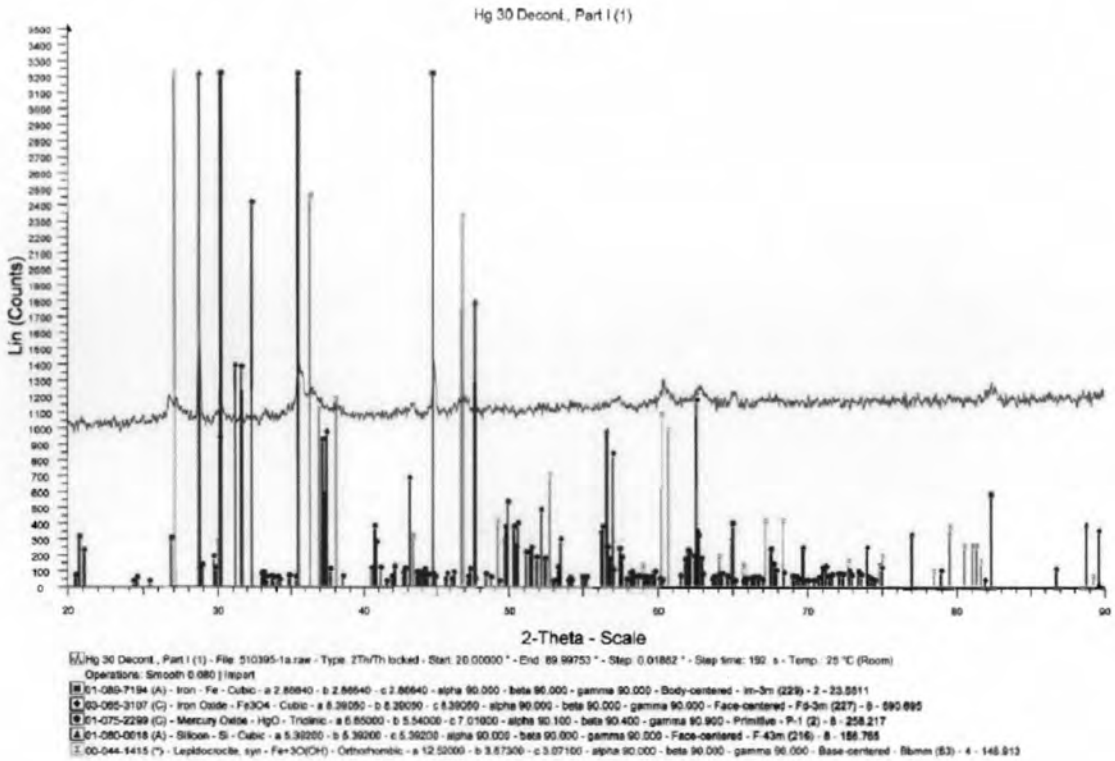


Figure 8-D XRD result of 30 days Hg contaminated sample with 0.2 M Iodine

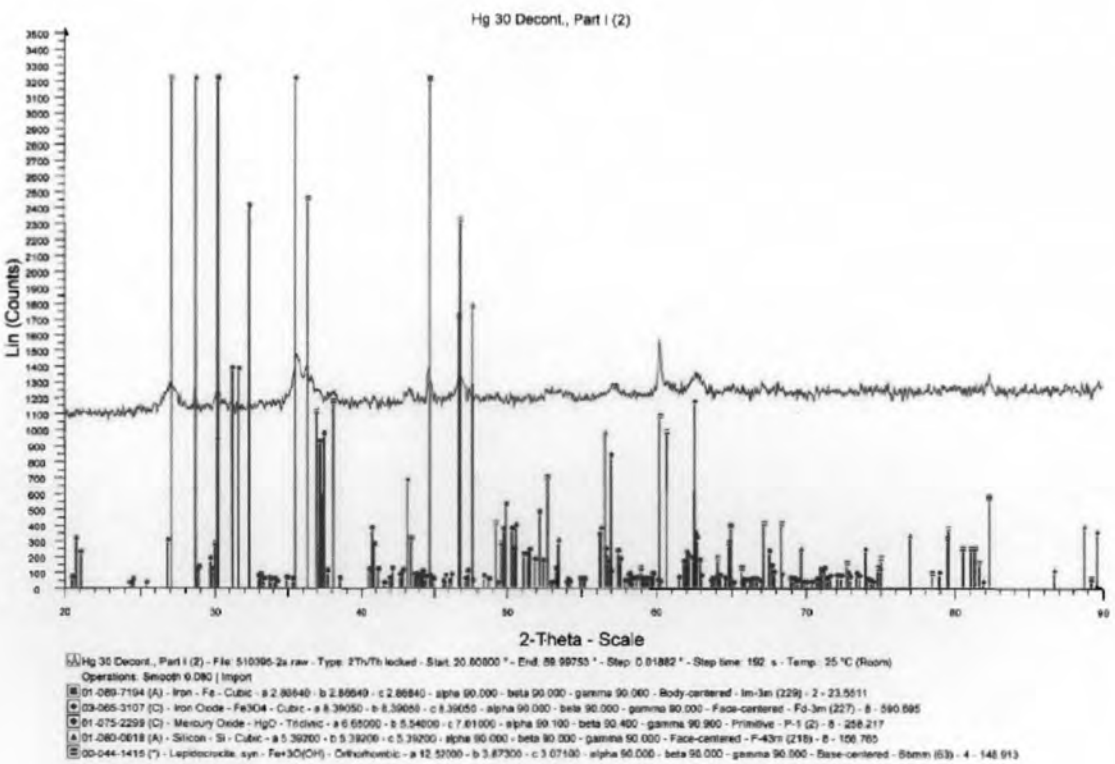


Figure 9-D XRD result of 30 days Hg contaminated sample with 0.4 M Iodine

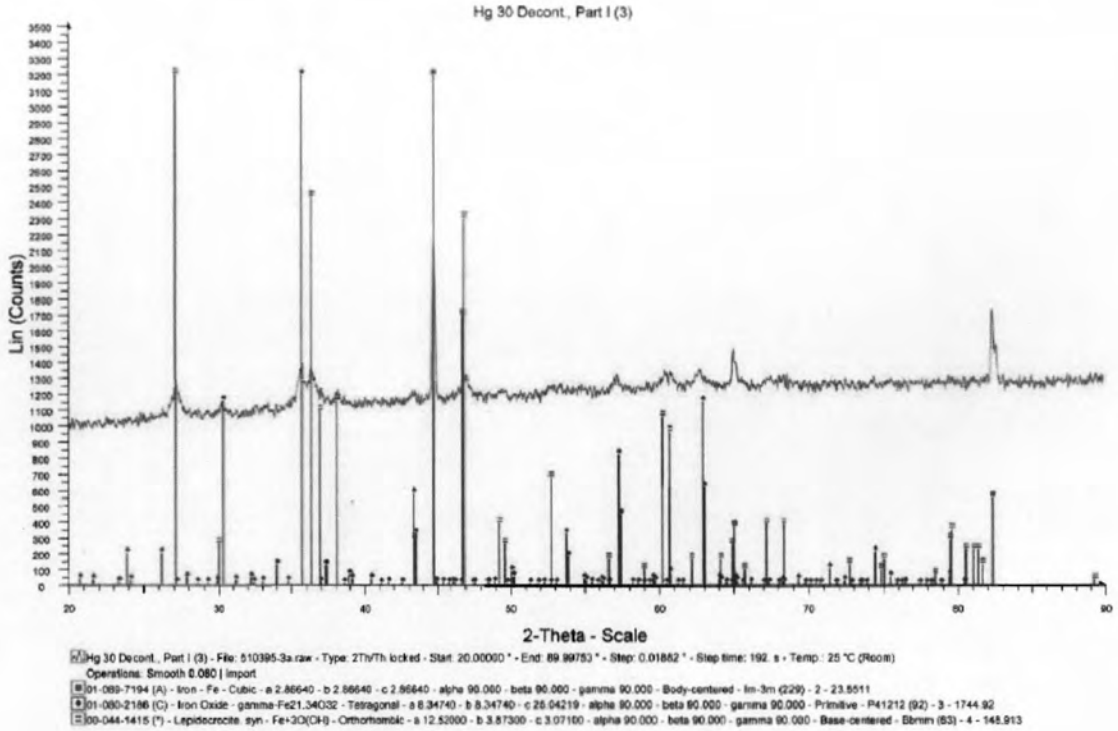


Figure 10-D XRD result of 30 days Hg contaminated sample with 0.6 M Iodine

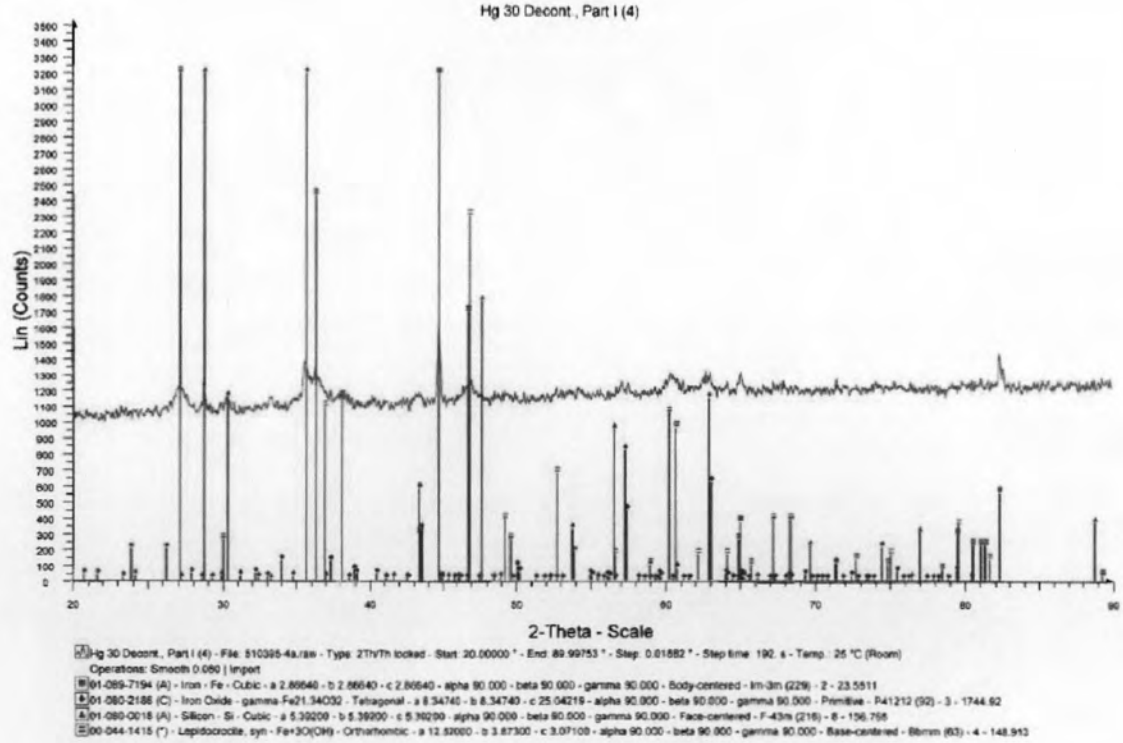


Figure 11-D XRD result of 30 days Hg contaminated sample with 0.8 M Iodine

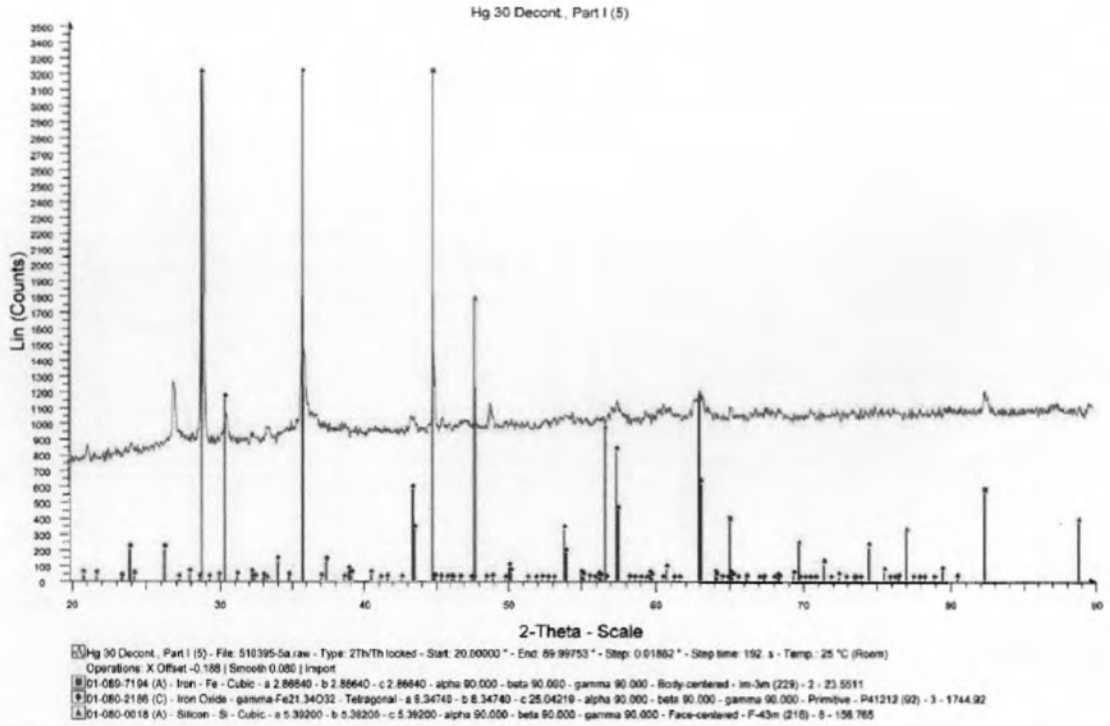


Figure 12-D XRD result of 30 days Hg contaminated sample with 1.0 M Iodine

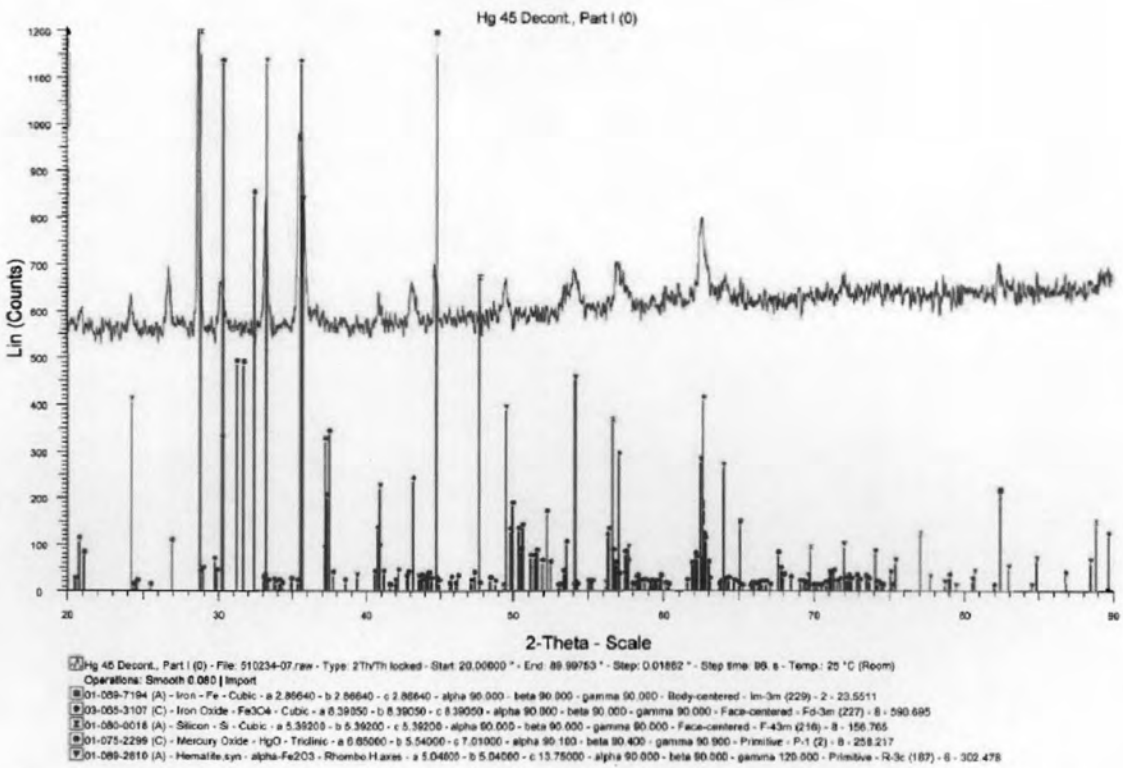


Figure 13-D XRD result of 45 days Hg contaminated sample with 0 M Iodine

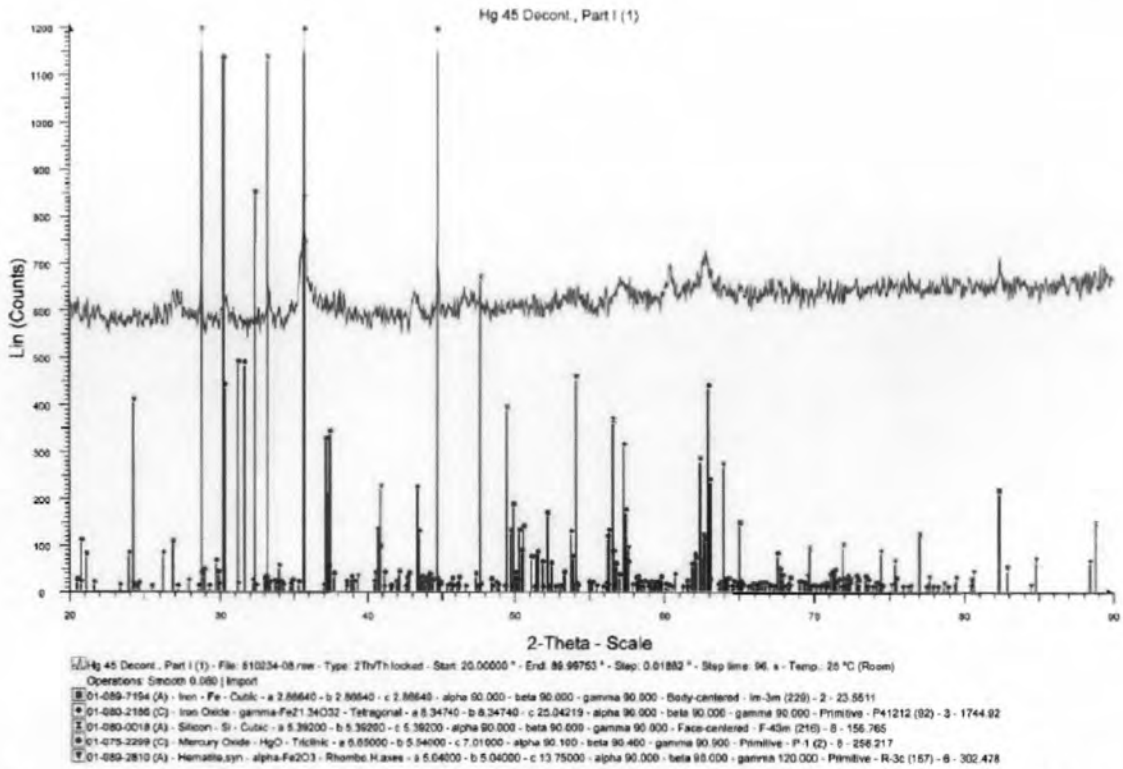


Figure 14-D XRD result of 45 days Hg contaminated sample with 0.2 M Iodine

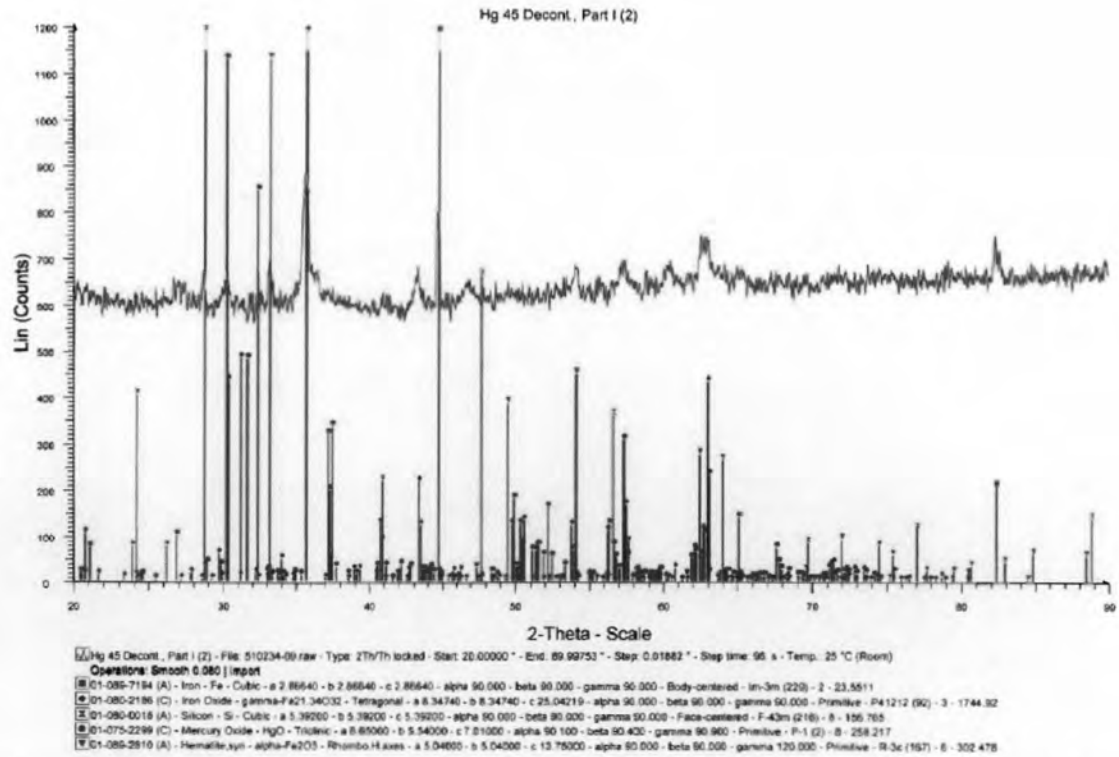


Figure 15-D XRD result of 45 days Hg contaminated sample with 0.4 M Iodine

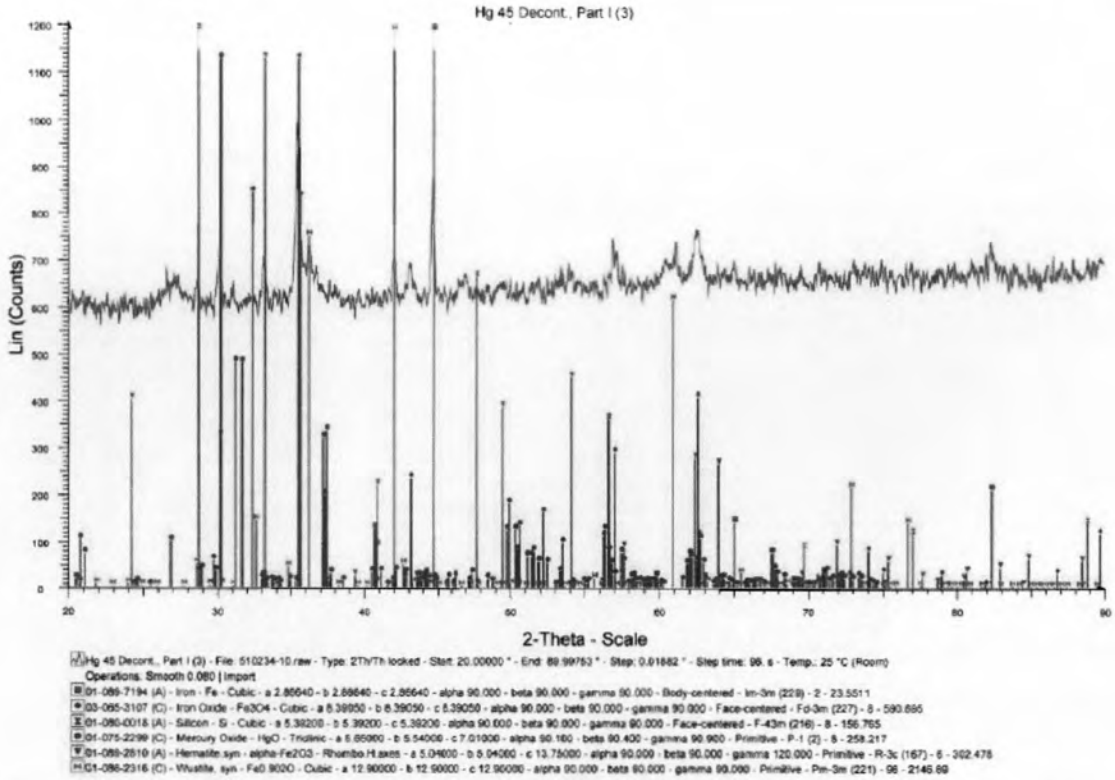


Figure 16-D XRD result of 45 days Hg contaminated sample with 0.6 M Iodine

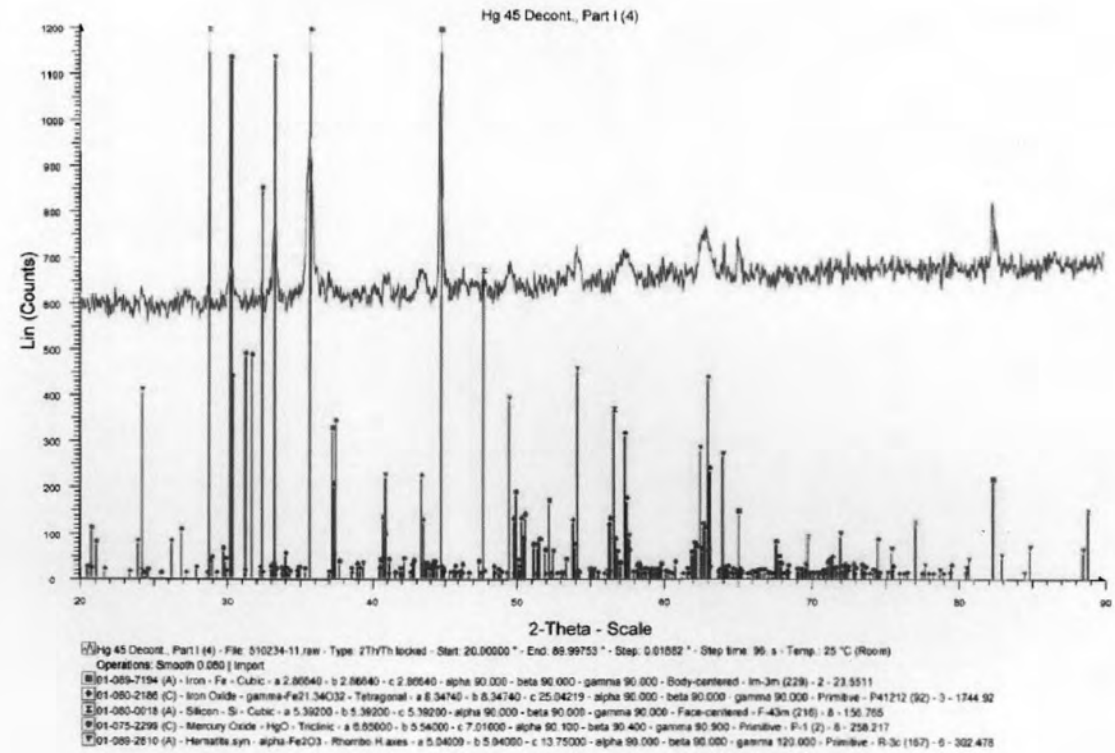


Figure 17-D XRD result of 45 days Hg contaminated sample with 0.8 M Iodine

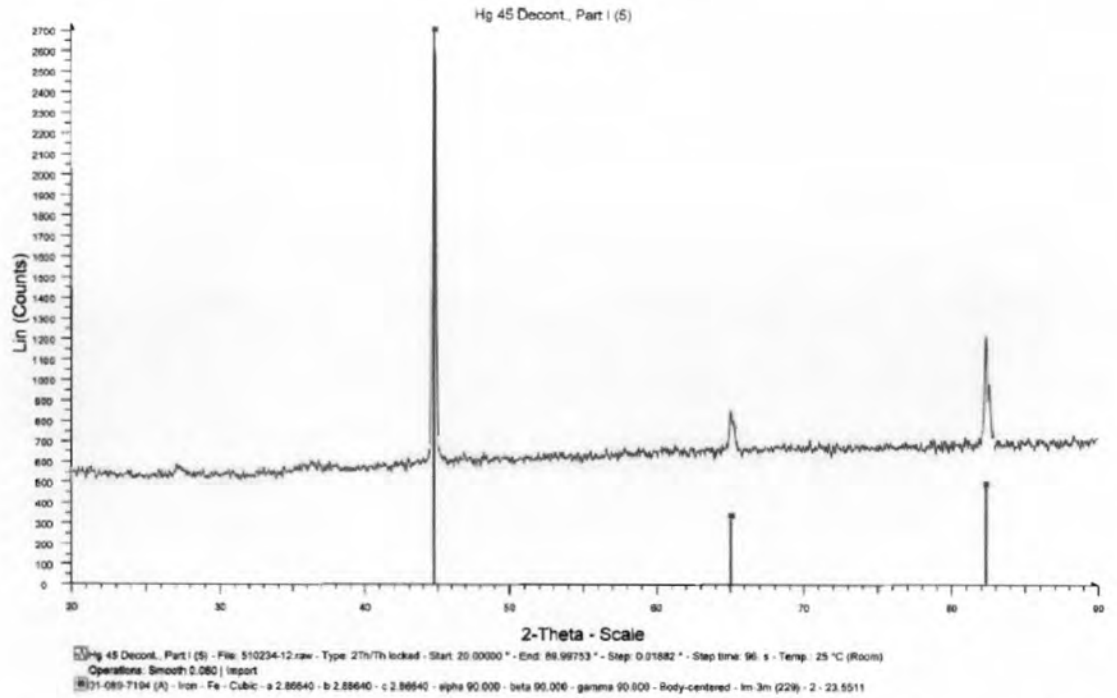


Figure 18-D XRD result of 45 days Hg contaminated sample with 1.0 M Iodine

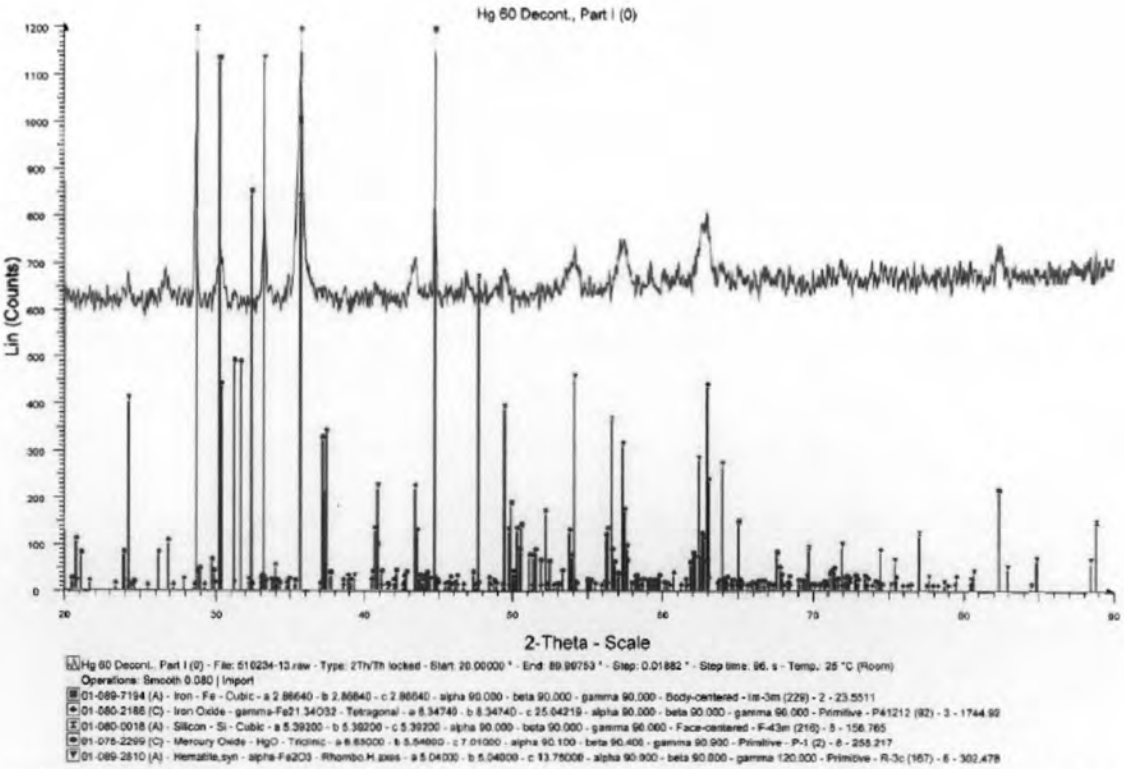


Figure 19-D XRD result of 60 days Hg contaminated sample with 0 M Iodine

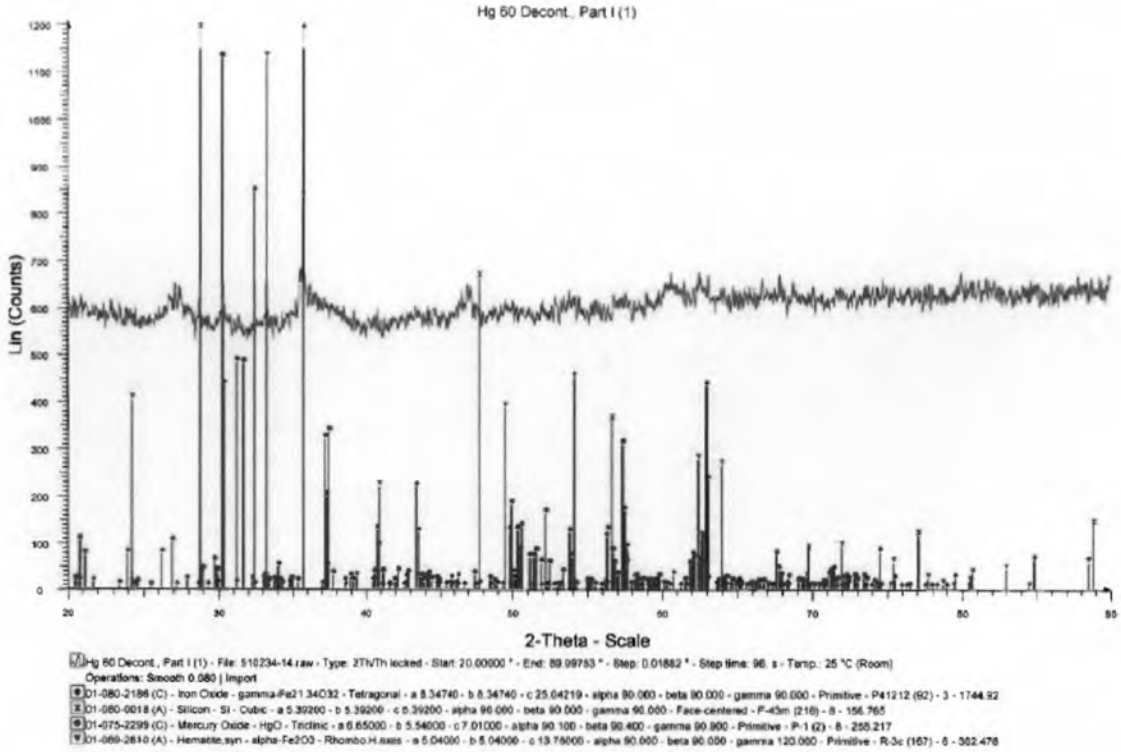


Figure 20-D XRD result of 60 days Hg contaminated sample with 0.2 M Iodine

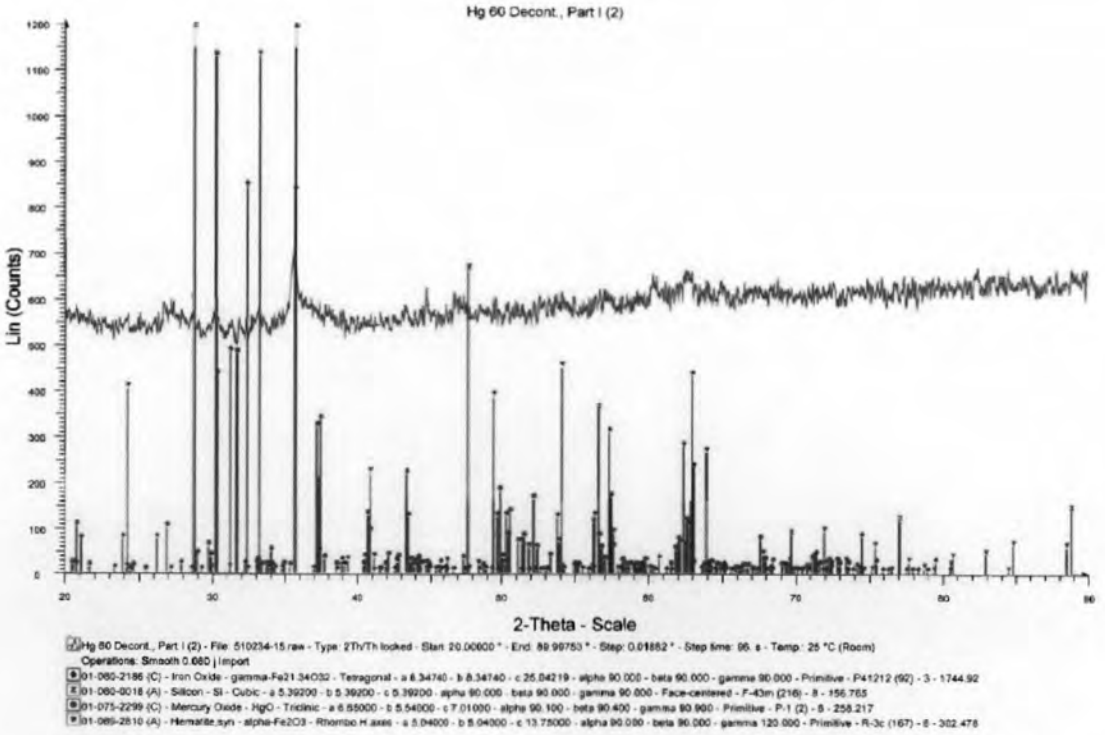


Figure 21-D XRD result of 60 days Hg contaminated sample with 0.4 M Iodine

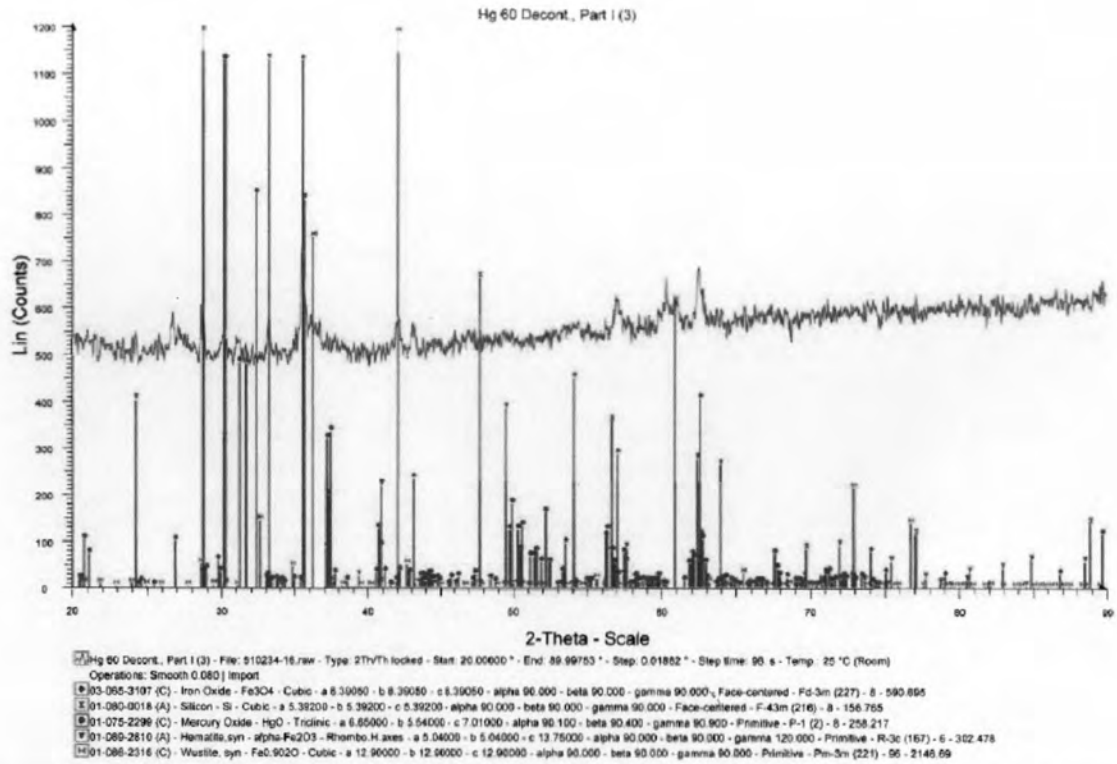


Figure 22-D XRD result of 60 days Hg contaminated sample with 0.6 M Iodine

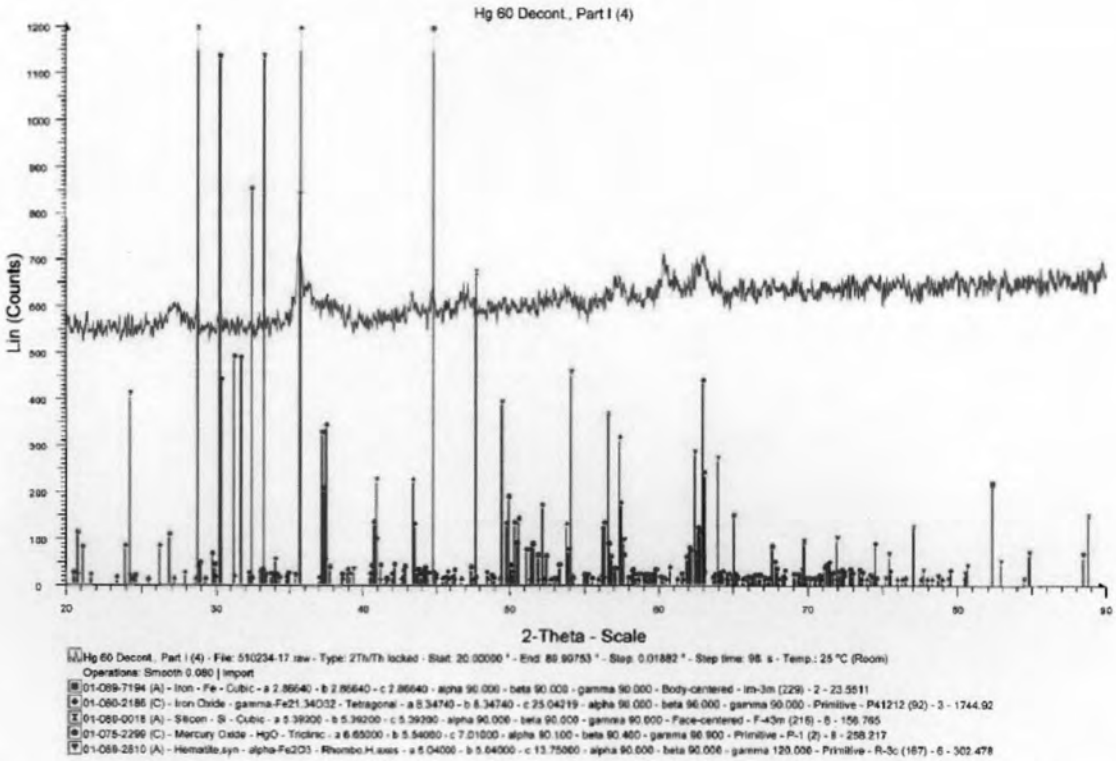


Figure 23-D XRD result of 60 days Hg contaminated sample with 0.8 M Iodine

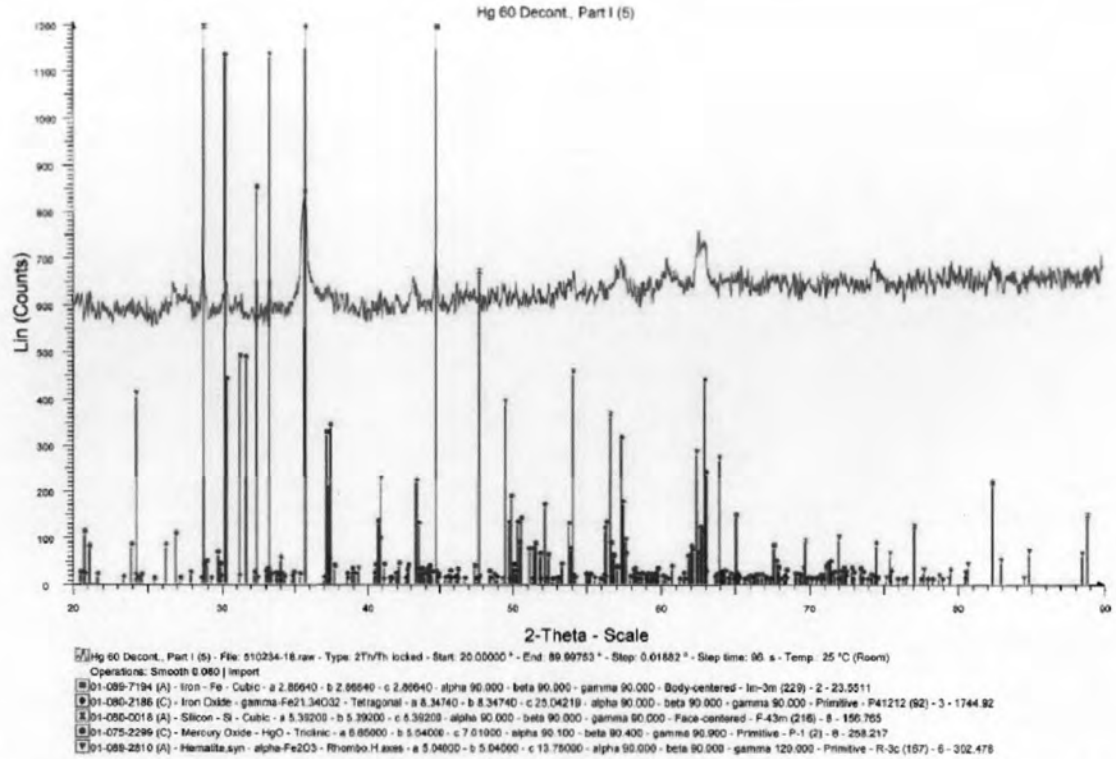


Figure 24-D XRD result of 60 days Hg contaminated sample with 1.0 M Iodine

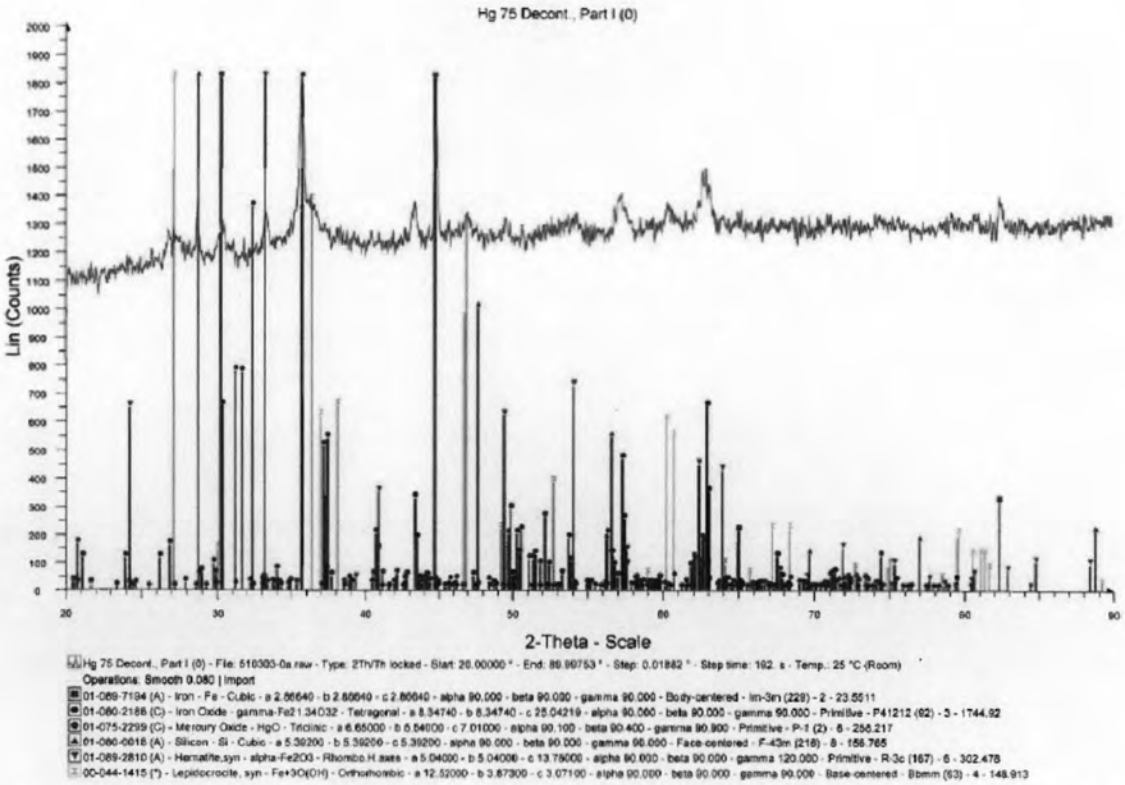


Figure 25-D XRD result of 75 days Hg contaminated sample with 0 M Iodine

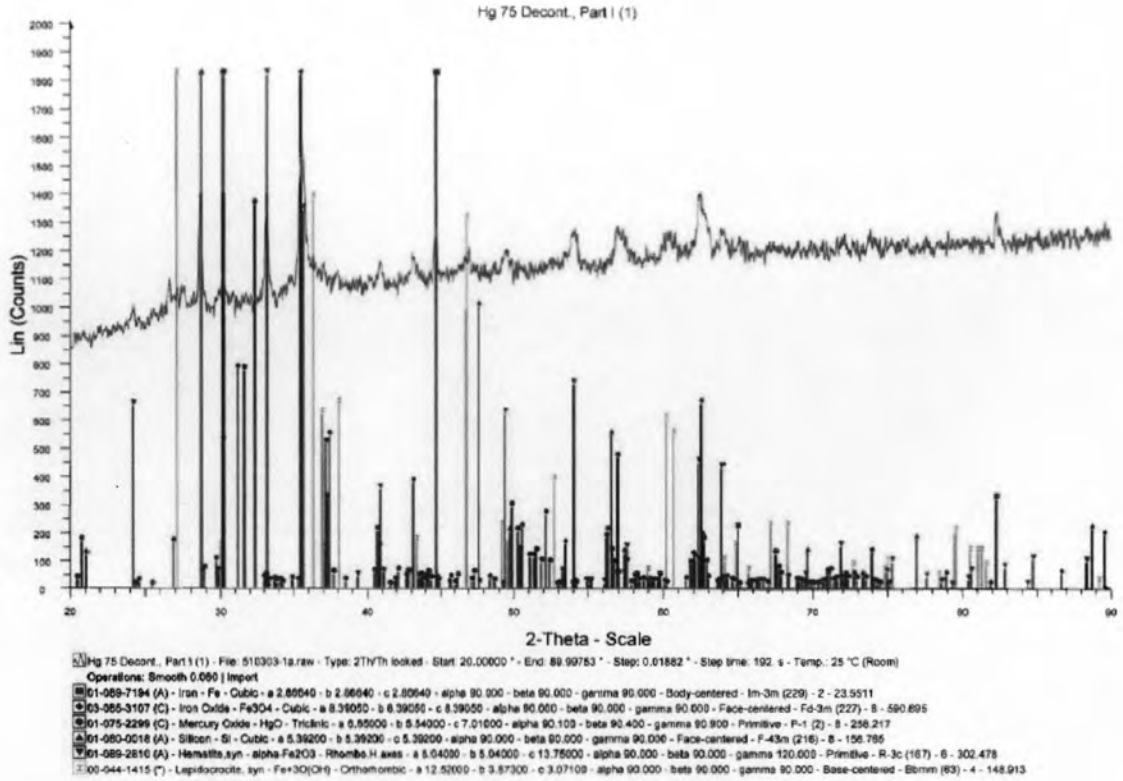


Figure 26-D XRD result of 75 days Hg contaminated sample with 0.2 M Iodine

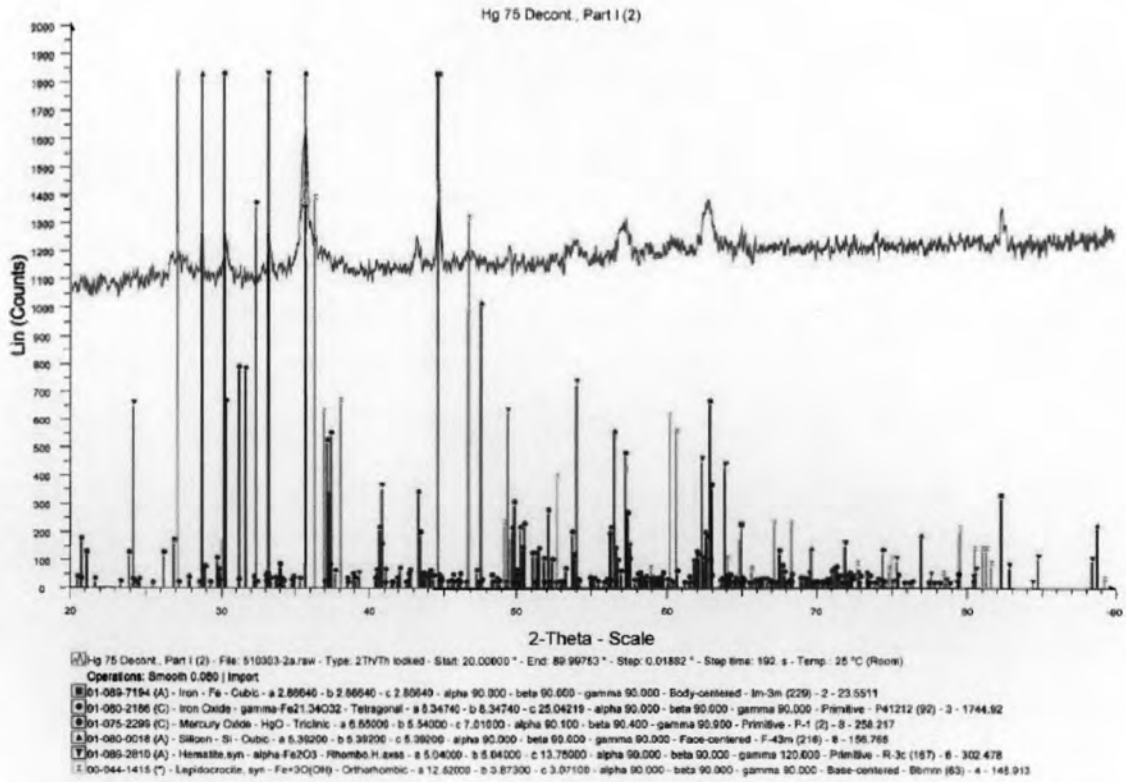


Figure 27-D XRD result of 75 days Hg contaminated sample with 0.4 M Iodine

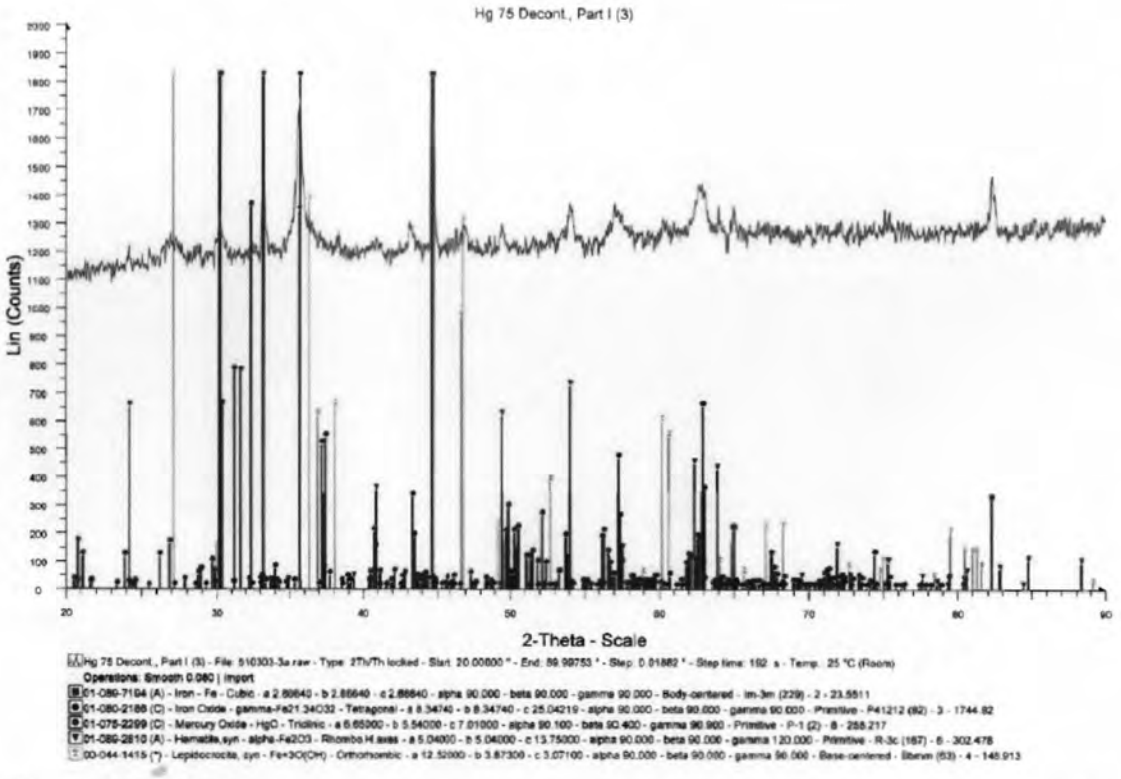


Figure 28-D XRD result of 75 days Hg contaminated sample with 0.6 M Iodine

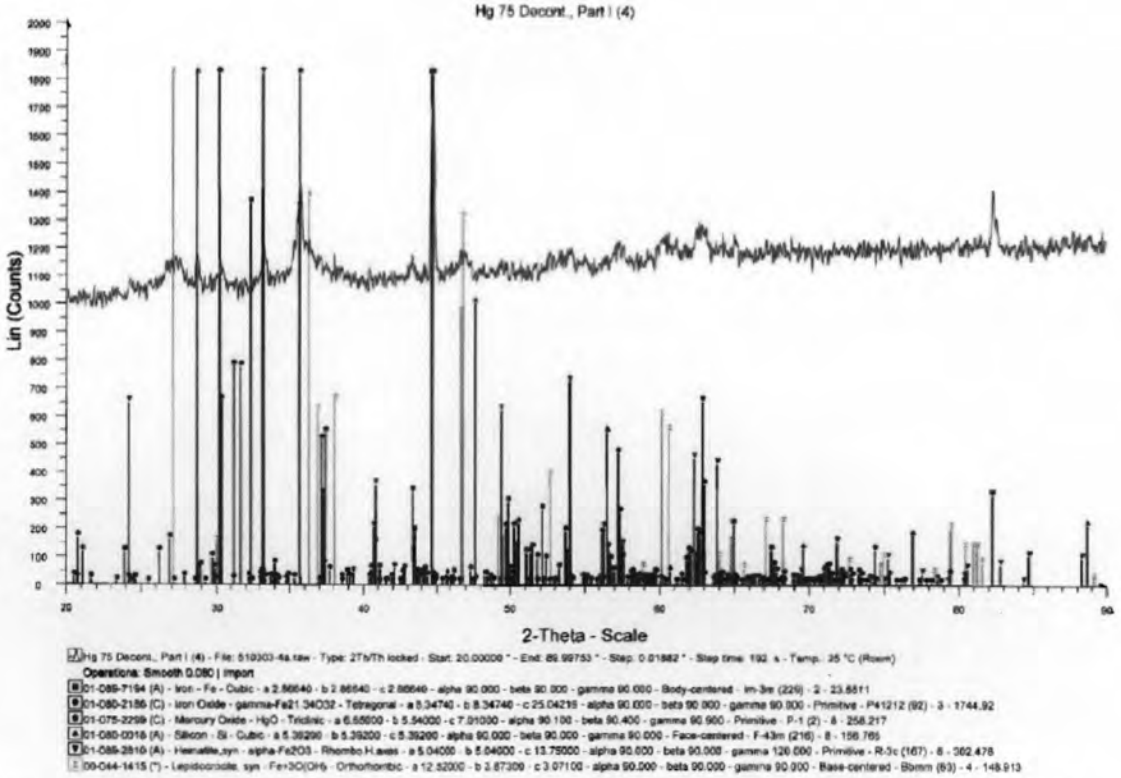


Figure 29-D XRD result of 75 days Hg contaminated sample with 0.8 M Iodine

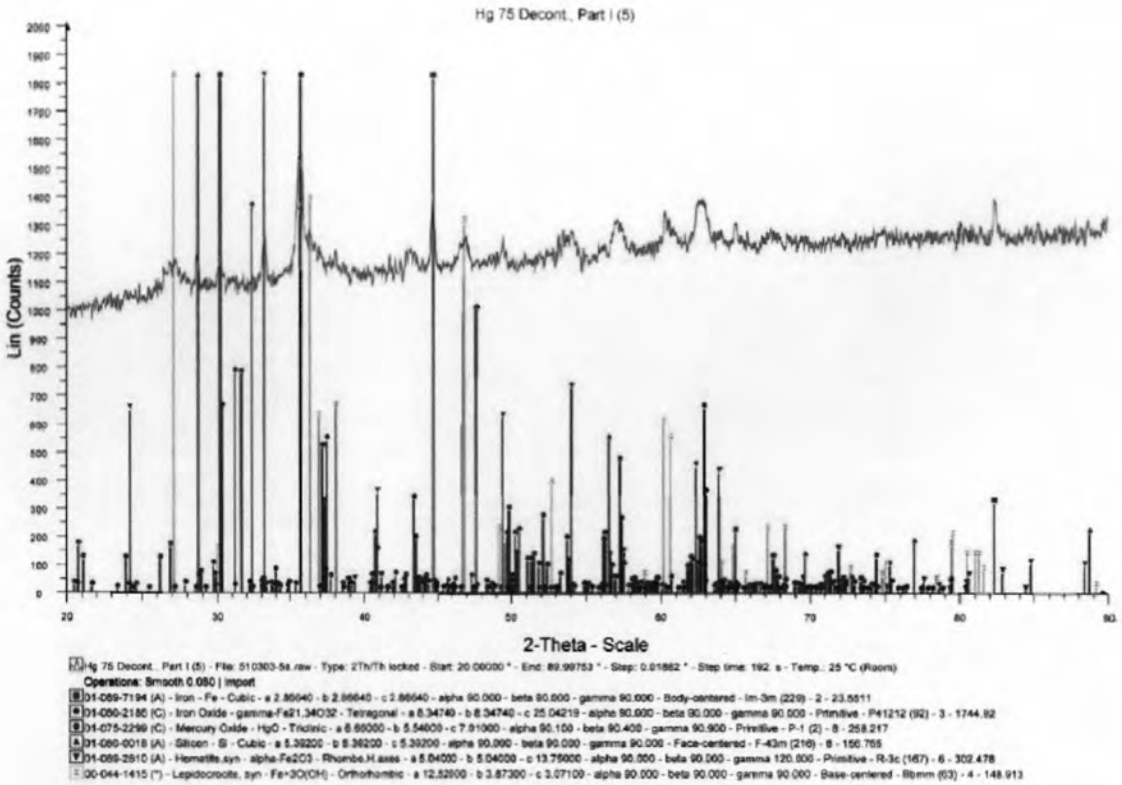


Figure 30-D XRD result of 75 days Hg contaminated sample with 1.0 M Iodine

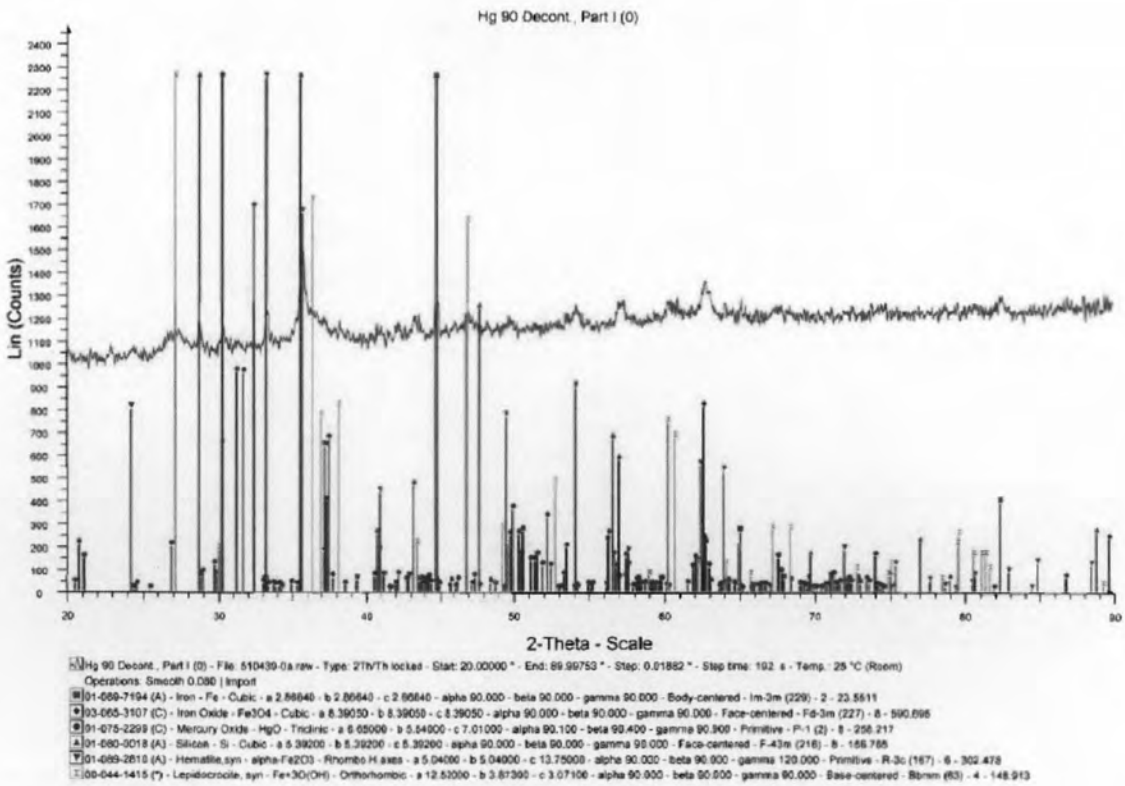


Figure 31-D XRD result of 90 days Hg contaminated sample with 0 M Iodine

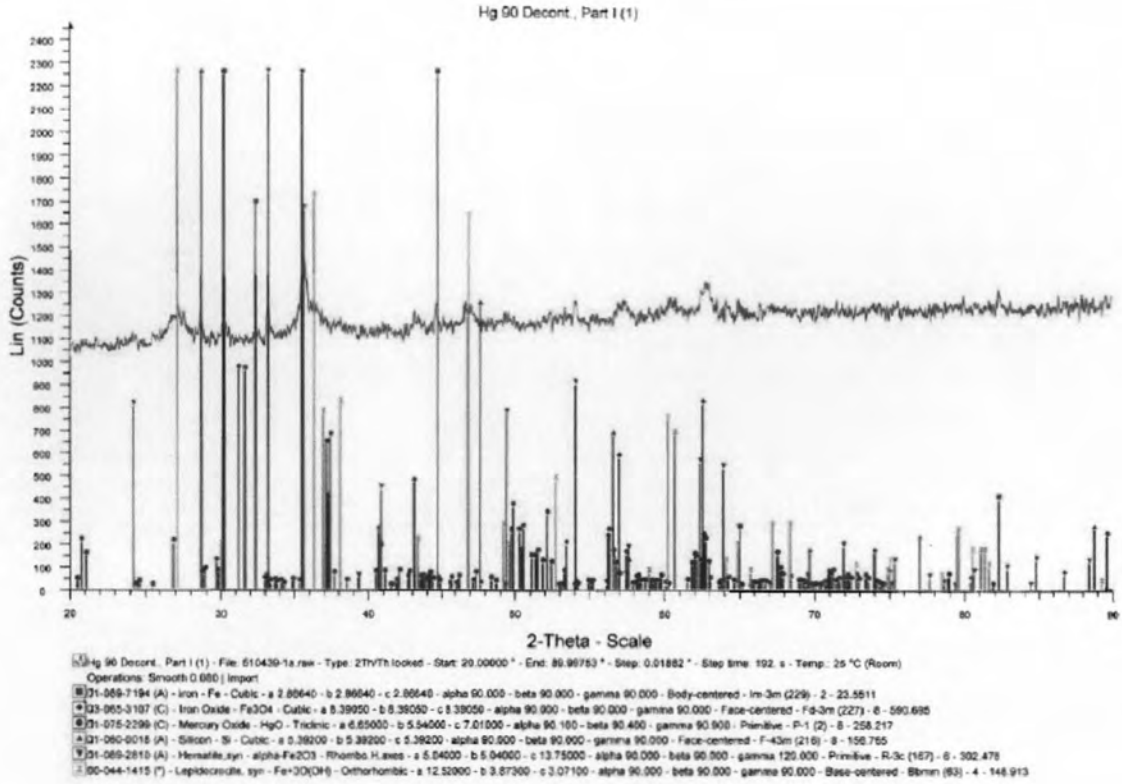


Figure 32-D XRD result of 90 days Hg contaminated sample with 0.2 M Iodine

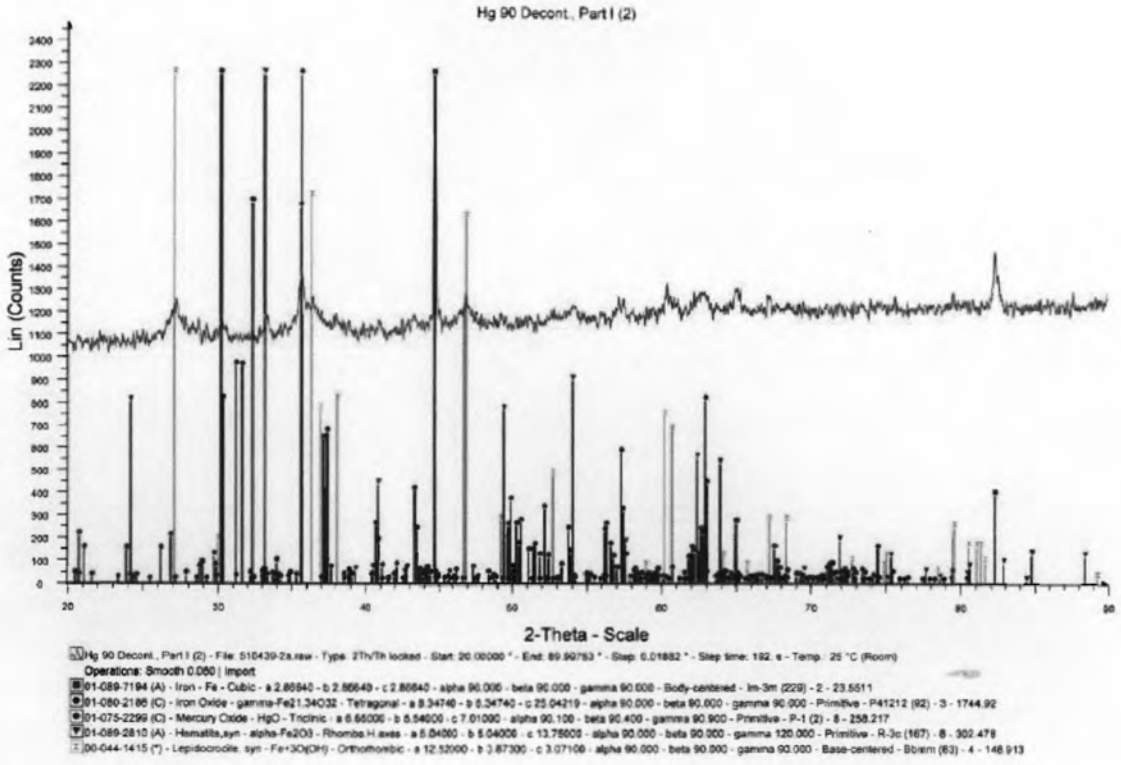


Figure 33-D XRD result of 90 days Hg contaminated sample with 0.4 M Iodine

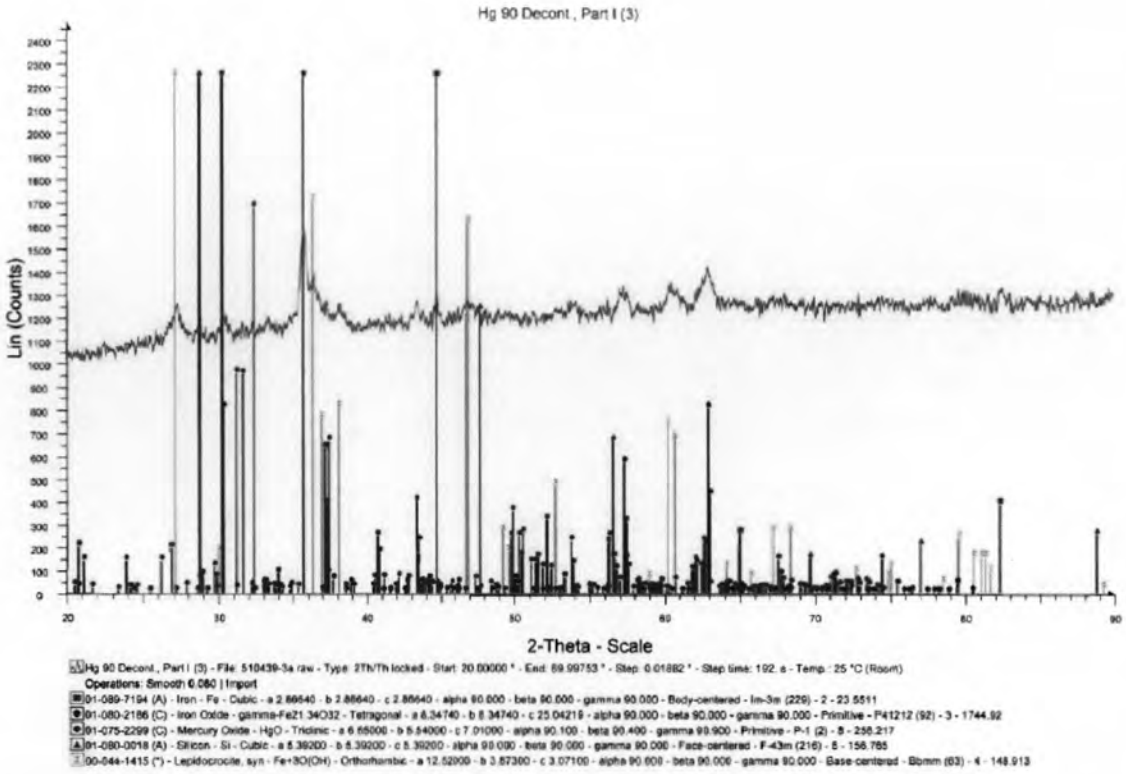


Figure 34-D XRD result of 90 days Hg contaminated sample with 0.6 M Iodine

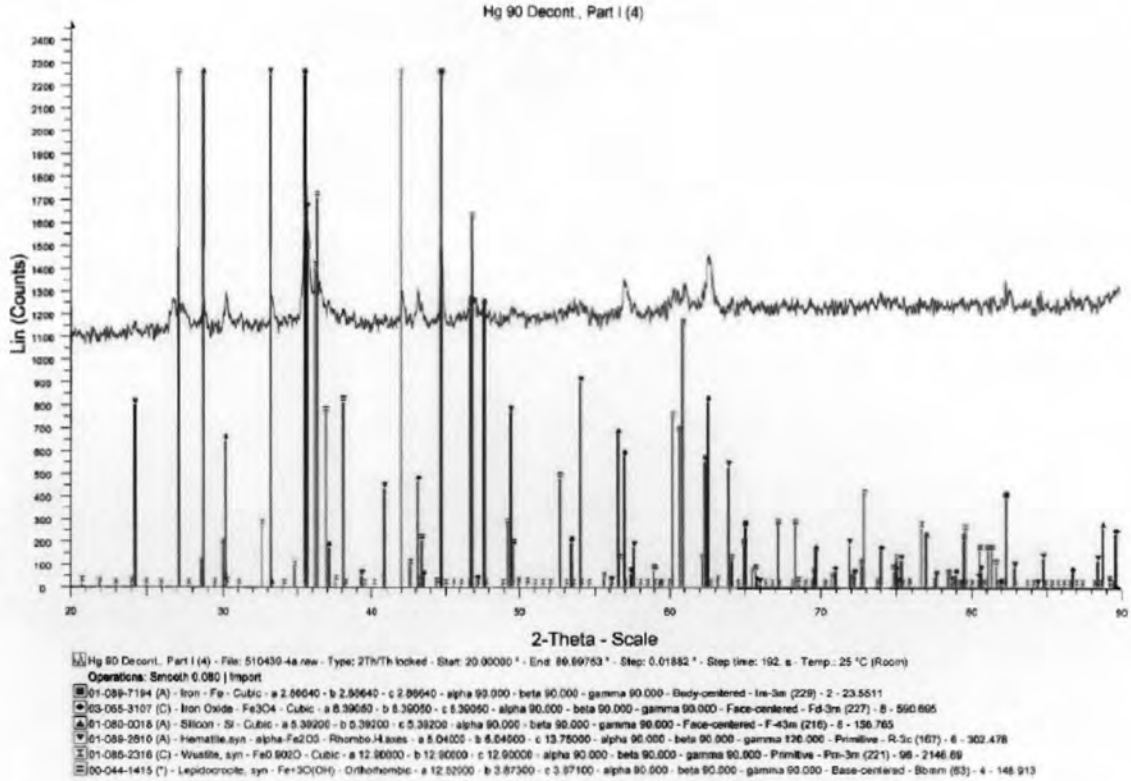


Figure 35-D XRD result of 90 days Hg contaminated sample with 0.8 M Iodine

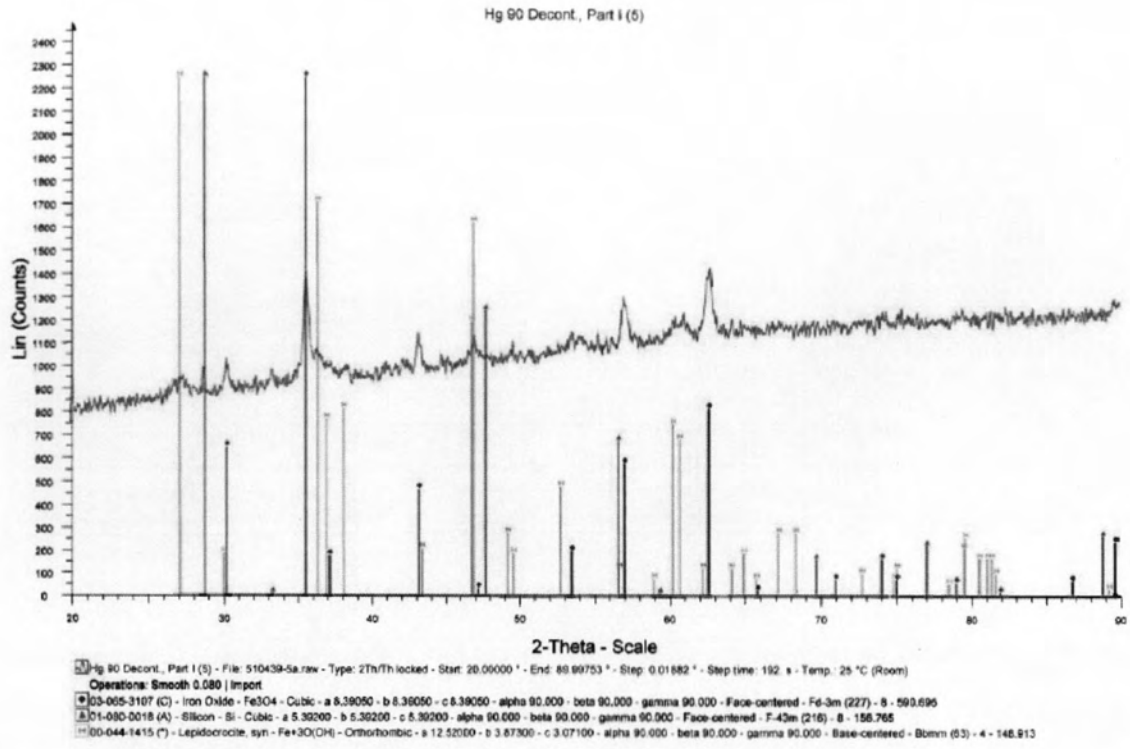


Figure 36-D XRD result of 90 days Hg contaminated sample with 1.0 M Iodine

BIOGRAPHY

Mr. Narongsak Chaiyasit was born on June 21th, 1972, in Bangkok, Thailand. He received a Bachelor of Science degree in Biotechnology (Second Class Honors) from King Mongkut' s Institute of Technology Ladkrabang in 1994 and Master Degree of Science in Water and Wastewater Treatment Engineering from Asian Institute of Technology in 1996. He had worked as senior consultant at Environmental Resource Management – Siam (ERM-Siam) prior to joining Unocal Thailand Ltd as a Health Environment and Safety Specialist. He is currently working at Chevron Thailand Exploration and Production Ltd in a position of Team Leader of Environmental Engineering Department. He received the scholarship for his Ph.D. study since 2003 from Chevron Thailand Exploration and Production Ltd and.