

	OFICINA DE CENTROS DE DIAGNÓSTICO Y PRODUCCIÓN				UNIDAD DEL CENTRO DE CONTROL DE INSUMOS Y RESIDUOS TÓXICOS						
	REGISTRO: HOJA DE TRABAJO DE ENSAYOS				REG-UCCIRT/Lab- 61						
					Revisión: 02		Pag ____				
LABORATORIO DE ANÁLISIS DE RESIDUOS TÓXICOS											
DETERMINACION DE METALES EN GRANOS SECOS Y CEREALES POR PLASMA INDUCTIVAMENTE ACOPLADO A ESPECTROMETRO DE MASA											
NOMBRE DE ENSAYO:						N° LOTE /CODIGO:					
HOJA DE TRABAJO N°		EMS/RES-06-75									
MUESTRA O PRODUCTO :		PRODUCTO-CEREALES-SECOS									
NOMBRE DEL METODO :		DETERMINACION DE METALES PESADOS EN FRUTOS Y VEGETALES POR PLASMA INDUCTIVAMENTE ACOPLADO A ESPECTROMETRIA DE MASA (ICP-MS)				CODIGO DE MUESTRA:		1029.001 1030.001 1037.001 1063.001 1064.001 1065.001 1066.001 1068.001 1316.001 1048.001 1049.001 1174.001 1182.001 1195.001 1235.001 1281.001 1288.001 1288.001 1289.001 1292.001 1386.001 1400.001 1401.001 1356.001 1357.001 1359.001 1360.001 1361.001 1362.001 1363.001 987.001			
CODIGO DE METODO UCCIRT:		MET-UCCIRT/Res-01									
REFERENCIA DEL METODO UCCIRT :		AOAC official Method 2015.01 (2016)				FECHA DE ANÁLISIS:		15/03/2023			
EQUIPO:		ICP- MS		MODELO:		ICAP RQ					
MARCA:		THERMO		SERIE:		ICAPRQ01712					
N° IDENT:		EMS/RES-06									
ESTANDAR											
		Tuning Solution		Internal Standard mix		Calibration Standard					
Concentracion inicial (ppb)		1 ug/L		MIX (10 ug/mL), Ge (1000 ug/mL), Rh (100 ug/mL)		10ug/ml					
Lote		2120808-100		MIX (221045125-01), Ge (S2-GE707432), Rh (220025110)		219025113-01					
Volumen (uL)		Directo		MIX (2 mL), Ge (20 uL), Rh (200 uL)		0,5,25, 50,250,500 uL					
Concentración final (ppb)		1 ug/L		100 ppb		0ppb,1ppb,5ppb,10ppb,50ppb y 100ppb					
Fecha		31/05/2023		MIX (04/06/2024), Ge (14/08/2026), Rh (27/02/2025)		19/08/2023 (MIX)					
CONDICIONES DE EQUIPO											
EQUIPO		SENSITIVITY		KED		OXIDE		CONSTANTE DE CORRELACION			
		59Co ≥ 30,000 CPS									
		238U ≥ 85,000 CPS									
		209Bi ≥ 42,500 CPS		59Co / 35Cl.16O > 18		140Ce.16O / 140Ce < 0,02		R² > 0.990			
		115In ≥ 35,000 CPS									
Valor detectado		96,554						As = 0.9997			
		792,003		21.2		0.0057		Cd = 0.9998			
		468,055						Pb = 0.9986			
		130,322									
MUESTRA											
n° Vaso	Muestras	Lote	Peso o Vol. (gr)	Factor de Dilución	Densidad	peso en gramos	Observación				
1	1029.001	-----	0.5340	1	-----	-----	QUINUA				
2	1030.001	-----	0.5331	1	-----	-----	QUINUA				
3	1037.001	-----	0.5330	1	-----	-----	QUINUA				
4	1063.001	-----	0.5500	1	-----	-----	QUINUA				
5	1064.001	-----	0.5485	1	-----	-----	QUINUA				
6	1065.001	-----	0.5458	1	-----	-----	QUINUA				
7	1066.001	-----	0.5835	1	-----	-----	QUINUA				
8	1068.001	-----	0.5344	1	-----	-----	QUINUA				
9	1316.001	-----	0.5300	1	-----	-----	QUINUA				
10	1048.001	-----	0.5350	1	-----	-----	TORTA DE SOYA				
13	1049.001	-----	0.5380	1	-----	-----	TORTA DE SOYA				
14	1174.001	-----	0.5330	1	-----	-----	TORTA DE SOYA				
15	1182.001	-----	0.5326	1	-----	-----	TORTA DE SOYA				
16	1195.001	-----	0.5250	1	-----	-----	TORTA DE SOYA				
17	1235.001	-----	0.5200	1	-----	-----	TORTA DE SOYA				
18	1281.001	-----	0.5450	1	-----	-----	TORTA DE SOYA				
19	1288.001	-----	0.5440	1	-----	-----	TORTA DE SOYA				
20	1289.001	-----	0.5374	1	-----	-----	TORTA DE SOYA				
21	1292.001	-----	0.5171	1	-----	-----	TORTA DE SOYA				
22	1386.001	-----	0.5410	1	-----	-----	TORTA DE SOYA				
25	1400.001	-----	0.5200	1	-----	-----	TORTA DE SOYA				
26	1401.001	-----	0.5300	1	-----	-----	TORTA DE SOYA				
27	1356.001	-----	0.5635	1	-----	-----	ARVEJA				
28	1357.001	-----	0.5200	1	-----	-----	ARVEJA				
29	1359.001	-----	0.5408	1	-----	-----	ARVEJA				
30	1360.001	-----	0.5365	1	-----	-----	ARVEJA				
31	1361.001	-----	0.5147	1	-----	-----	ARVEJA				
32	1362.001	-----	0.5106	1	-----	-----	ARVEJA				
33	1363.001	-----	0.5093	1	-----	-----	ARVEJA				
34	987.001	-----	0.5385	1	-----	-----	FREJOL				
CALCULOS PRELIMINARES											
		DATA CRUDO (ug/L)			RESTA DE BLANCOS ppb (ug/L)			(gr)		mg/Kg	
n° Vaso	Muestras	As	Cd	Pb	As	Cd	Pb	PESO	As	Cd	Pb
1	1029.001	0.091	0.859	0.119	0.072	0.855	0.000	0.5340	0.007	0.080	0.000
2	1030.001	0.094	0.846	0.104	0.074	0.843	0.000	0.5331	0.007	0.079	0.000
3	1037.001	0.078	0.806	0.118	0.059	0.803	0.000	0.5330	0.006	0.075	0.000
4	1063.001	0.101	0.850	0.106	0.082	0.847	0.000	0.5500	0.007	0.077	0.000
5	1064.001	0.092	0.828	0.108	0.073	0.825	0.000	0.5485	0.007	0.075	0.000
6	1065.001	0.077	0.860	0.106	0.058	0.857	0.000	0.5458	0.005	0.078	0.000
7	1066.001	0.092	0.866	0.108	0.073	0.863	0.000	0.5835	0.006	0.074	0.000
8	1068.001	0.073	0.833	0.146	0.054	0.830	0.000	0.5344	0.005	0.078	0.000
9	1316.001	0.068	0.249	0.152	0.048	0.246	0.000	0.5300	0.005	0.023	0.000
10	1048.001	0.293	0.335	0.606	0.274	0.331	0.048	0.5350	0.026	0.031	0.004
13	1049.001	0.283	0.331	0.547	0.264	0.328	0.000	0.5380	0.024	0.030	0.000
14	1174.001	0.240	0.331	0.386	0.220	0.327	0.000	0.5330	0.021	0.031	0.000
15	1182.001	0.360	0.341	0.706	0.340	0.338	0.147	0.5326	0.032	0.032	0.014
16	1195.001	0.257	0.353	0.617	0.238	0.350	0.058	0.5250	0.023	0.033	0.006
17	1235.001	0.404	0.335	0.685	0.385	0.332	0.127	0.5200	0.037	0.032	0.012
18	1281.001	0.412	0.344	0.937	0.393	0.341	0.379	0.5450	0.036	0.031	0.035
19	1288.001	0.661	0.394	1.933	0.641	0.391	1.375	0.5440	0.059	0.036	0.126
20	1289.001	0.546	0.379	1.599	0.527	0.376	1.040	0.5374	0.049	0.035	0.097
21	1292.001	0.734	0.370	2.241	0.714	0.366	1.683	0.5171	0.069	0.035	0.163

22	1386.001	0.248	0.299	0.388	0.228	0.296	0.000	0.5410	0.021	0.027	0.000
25	1400.001	0.410	0.320	0.178	0.391	0.317	0.000	0.5200	0.038	0.031	0.000
26	1401.001	0.354	0.376	0.713	0.335	0.372	0.155	0.5300	0.032	0.035	0.015
27	1356.001	0.031	0.144	0.046	0.012	0.140	0.000	0.5635	0.001	0.012	0.000
28	1357.001	0.061	0.198	0.060	0.042	0.194	0.000	0.5200	0.004	0.019	0.000
29	1359.001	0.025	0.209	1.139	0.006	0.206	0.580	0.5408	0.001	0.019	0.054
30	1360.001	0.032	0.129	0.040	0.012	0.126	0.000	0.5365	0.001	0.012	0.000
31	1361.001	0.026	0.103	0.060	0.007	0.100	0.000	0.5147	0.001	0.010	0.000
32	1362.001	0.038	0.326	0.042	0.019	0.322	0.000	0.5106	0.002	0.032	0.000
33	1363.001	0.026	0.095	0.067	0.007	0.092	0.000	0.5093	0.001	0.009	0.000
34	987.001	0.165	0.155	0.151	0.146	0.152	0.000	0.5385	0.014	0.014	0.000

CONTROL DE CALIDAD												
		DATA CRUDO (ug/L)				RESTA DE BLANCOS ppb (ug/L)			(gr)	mg/Kg		
n° Vaso	Muestras	As	Cd	Pb		As	Cd	Pb	PESO	As	Cd	Pb
11	1048.001MD	0.272	0.331	0.648		0.25	0.33	0.09	0.5165	0.025	0.032	0.009
12	1048.001MF	59.027	45.802	52.579		59.01	45.80	52.02	0.5116	0.880	-0.411	0.197
23	1386.001MD	0.264	0.300	0.374		0.24	0.30	0.00	0.5352	0.023	0.028	0.000
24	1386.001MF	57.645	43.784	52.155		57.63	43.78	51.60	0.5433	0.702	-0.572	0.147
35	987.001MD	0.160	0.145	0.136		0.14	0.14	0.00	0.5229	0.013	0.014	0.000
36	987.001MF	54.820	43.150	50.911		54.80	43.15	50.35	0.5249	0.457	-0.653	0.034
58	bkdig1	0.029	0.004	0.916		0.01	0.00	0.36		Blancos digerados		
59	bkdig2	0.009	0.003	0.201		0.00	0.00	0.00		0.019	0.003	0.558
60	ctrol digest1	43.778	41.020	47.036		43.76	41.02	46.48				
	Bk1	0.004	0.001	0.002						Blancos de lectura		
	Bk2	0.010	0.001	0.000						0.013	0.007	0.007
	Bk3	0.012	0.004	0.002								
	Bk4	0.025	0.023	0.025								
50ppb	ctrl1(A)	26.586	25.668	26.386								
50ppb	ctrl2(A)	26.191	24.019	25.814								
50ppb	ctrl3(A)	26.659	24.825	25.907								
50ppb	ctrl4(A)	27.056	25.011	26.276								

RESULTADOS FINALES											
n° Vaso	Muestras	mg/Kg				INCERTIDUMBRE (mg/kg)					
		As	Cd	Pb		As	Cd	Pb			
1	1029.001	<0.011	0.080	ND		N/A	0.007	N/A			
2	1030.001	<0.011	0.079	ND		N/A	0.007	N/A			
3	1037.001	<0.011	0.075	ND		N/A	0.007	N/A			
4	1063.001	<0.011	0.077	ND		N/A	0.007	N/A			
5	1064.001	<0.011	0.075	ND		N/A	0.007	N/A			
6	1065.001	<0.011	0.078	ND		N/A	0.007	N/A			
7	1066.001	<0.011	0.074	ND		N/A	0.007	N/A			
8	1068.001	<0.011	0.078	ND		N/A	0.007	N/A			
9	1316.001	<0.011	<0.029	ND		N/A	N/A	N/A			
10	1048.001	0.026	0.031	ND		0.006	0.006	N/A			
13	1049.001	0.024	0.030	ND		0.006	0.006	N/A			
14	1174.001	0.021	0.031	ND		0.006	0.006	N/A			
15	1182.001	0.032	0.032	<0.022		0.006	0.006	N/A			
16	1195.001	0.023	0.033	ND		0.006	0.006	N/A			
17	1235.001	0.037	0.032	<0.022		0.006	0.006	N/A			
18	1281.001	0.036	0.031	0.035		0.006	0.006	0.007			
19	1288.001	0.059	0.036	0.126		0.006	0.006	0.011			
20	1289.001	0.049	0.035	0.097		0.006	0.006	0.010			
21	1292.001	0.069	0.035	0.163		0.007	0.006	0.014			
22	1386.001	0.021	<0.029	ND		0.006	N/A	N/A			
25	1400.001	0.038	0.031	ND		0.006	0.006	N/A			
26	1401.001	0.032	0.035	<0.022		0.006	0.006	N/A			
27	1356.001	ND	<0.029	ND		N/A	N/A	N/A			
28	1357.001	<0.011	<0.029	ND		N/A	N/A	N/A			
29	1359.001	ND	<0.029	0.054		N/A	N/A	0.007			
30	1360.001	ND	<0.029	ND		N/A	N/A	N/A			
31	1361.001	ND	<0.029	ND		N/A	N/A	N/A			
32	1362.001	ND	0.032	ND		N/A	0.006	N/A			
33	1363.001	ND	<0.029	ND		N/A	N/A	N/A			
34	987.001	0.014	<0.029	ND		0.006	N/A	N/A			

CONTROL DE CALIDAD											
n° Vaso	Muestras	% Recuperación				% RPD					
		As	Cd	Pb		As	Cd	Pb			
11	1048.001MD					4.425	2.426	0.000			
12	1048.001MF	117.118	91.153	103.775							
23	1386.001MD					7.884	0.000	0.000			
24	1386.001MF	113.579	87.999	102.938							
35	987.001MD					0.604	0.000	0.000			
36	987.001MF	108.876	86.672	100.672							
60	ctrol digest1	87.518	82.033	92.954							
50ppb	ctrl1(A)	106.344	102.671	105.543							
50ppb	ctrl2(A)	104.764	96.077	103.257							
50ppb	ctrl3(A)	106.634	99.300	103.629							
50ppb	ctrl4(A)	108.224	100.045	105.104							

Concentracron inicial (ppb) Lote Volumen (uL) Concentracron final (ppb) Fecha		Control									
		100 mg/L 219125064-02 25 uL 50 ppb 13/05/2024									
OBSERVACIONES:						Limite de Cuantificacron (LOQ) : As= 0.011 , Cd = 0.029 , Pb = 0.022					