



**INFORME INCERTESES EQUIPS AUTOMÀTICS DE MESURA
ESTACIÓ HOSPITAL JOAN MARCH (LAT-41/14)**

TAULA RESUM

Paràmetre	Còdi FIINN	h_{lv}^1 ($\mu\text{g}/\text{m}^3$)	c_t^2 ($\mu\text{g}/\text{m}^3$)	Incertesa (%) (valor màxim acceptat) ³	Incertesa (%) (valor assolit)	Resultat
SO ₂	07010001_1_38	350	399	15	12	● CORRECTE
NO	07010001_7_8	200	249	15	11	● CORRECTE
NO ₂	07010001_8_8	200	383	15	7	● CORRECTE
O ₃	07010001_14_6	180	200	15	11	● CORRECTE

¹ Valor límit horari (Real Decret 102/2011, Annex I)

² Concentració del gas d'assaig

³ Real Decret 102/2011, Annex V

Contaminant: SO₂

[1] Càlcul de $U_{r,z}$ [$U_{r,z} = \frac{S_{r,z}}{\sqrt{n}}$]

Concentració màxima recta de calibratge ($\mu\text{g}/\text{m}^3$)	Error absolut ($\mu\text{g}/\text{m}^3$)	Incertesa (%)	$S_{r,z}$ ($\mu\text{g}/\text{m}^3$)	n	$U_{r,z}$ ($\mu\text{g}/\text{m}^3$)	
399	-0,2660	0,10	0,1995	10	0,0631	
399	-0,9840	0,09	0,1795		0,0568	
399	-0,9840	0,17	0,3991		0,1072	
399	-0,3457	0,08	0,1596		0,0505	
399	0,0000	0,12	0,2394		0,0757	
532	-0,2626	0,18	0,4787		0,1514	
532	-0,8511	0,11	0,2926		0,0925	

$U_{r,z}$ màxim = 0,1514

[2] Càlcul de $U_{r,f}$ [$U_{r,f} = \frac{h_{lv}s}{c_t\sqrt{n}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	s ($\mu\text{g}/\text{m}^3$)	$U_{r,f}$ ($\mu\text{g}/\text{m}^3$)
399	350	1,5356	0,4412

[4] Càlcul de $U_{l,lv}$ [$U_{l,lv} = \frac{X_{l,lv} h_{lv}}{100\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	$X_{l,lv}$ (%)	$U_{l,lv}$ ($\mu\text{g}/\text{m}^3$)
399	350	0,0133	0,0268

[5] Càlcul de U_{gp} [$U_{gp} = \frac{h_{lv}b_{gp}\Delta gp}{c_t\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_{gp} ($\frac{\mu\text{g}}{\text{m}^3\text{kPa}}$)	Δgp (kPa)	U_{gp} ($\mu\text{g}/\text{m}^3$)
399	350	0,133	30	2,0207

[3] Càlcul de $X_{l,lv}$ [$X_{l,lv} = \frac{|\bar{y} - y_{\text{calc.}}| \cdot 100}{c_t}$]

c_t ($\mu\text{g}/\text{m}^3$)	Y ($\mu\text{g}/\text{m}^3$)	$Y_{\text{calc.}}$ ($\mu\text{g}/\text{m}^3$)	$X_{l,lv}$ (%)
399	401	401	0,0133
399	403	403	
399	403	403	
399	400	400	
319	319	319	
399	389	389	
399	397	397	

[6] Càlcul de U_{gt} [$U_{gt} = \frac{h_{lv} b_{gt} \Delta g t}{c_t \sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_{gt} ($\frac{\mu\text{g}}{\text{m}^3\text{K}}$)	$\Delta g t$ (K)	U_{gt} ($\mu\text{g}/\text{m}^3$)
399	350	1,090	30	16,5699

[7] Càlcul de U_{st} [$U_{st} = \frac{h_{lv} b_{gt} \Delta T}{c_t \sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_{gt} ($\frac{\mu\text{g}}{\text{m}^3\text{K}}$)	ΔT (K)	U_{st} ($\mu\text{g}/\text{m}^3$)
399	350	1,090	10	5,5233

[8] Càlcul de U_v [$U_v = \frac{h_{lv} b_v \Delta V}{c_t \sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_v ($\frac{\mu\text{g}}{\text{m}^3\text{V}}$)	ΔV (V)	U_v
399	350	0,0266	8	0,1078

[9] Càlcul de b_{H_2O} [$b_{H_2O} = \frac{1}{c_{H_2O}} [X_{H_2O,Z} + (X_{H_2O,ct} - X_{H_2O,Z}) \frac{h_{lv}}{c_t}]$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	c_{H_2O} ($\frac{\text{mmol}}{\text{mol}}$)	$X_{H_2O,Z}$ ($\frac{\text{nmol}}{\text{mol}}$)	$X_{H_2O,ct}$ ($\frac{\text{nmol}}{\text{mol}}$)	b_{H_2O} ($\frac{\text{nmol}}{\text{mmol}}$)
399	350	19	0,1	-2,33	-0,1069

[10] Càlcul de U_{H_2O} [$U_{H_2O} = b_{H_2O} \sqrt{\frac{c_{H_2O,max}^2 + c_{H_2O,max} c_{H_2O,min} + c_{H_2O,min}^2}{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	$c_{H_2O,max}$ ($\frac{\text{mmol}}{\text{mol}}$)	$c_{H_2O,min}$ ($\frac{\text{mmol}}{\text{mol}}$)	b_{H_2O} ($\frac{\text{nmol}}{\text{mmol}}$)	U_{H_2O} ($\mu\text{g}/\text{m}^3$)
399	21	6	-0,1069	-4,0324

[14] Càlcul $U_{D_{sc}}$ [$U_{D_{sc}} = \frac{h_{lv} D_{sc}}{100 \sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	D_{sc} (%)	$U_{D_{sc}}$ ($\mu\text{g}/\text{m}^3$)
399	350	1	2,0207

[16] Càlcul $U_{D_{1,lv}}$ [$U_{D_{1,lv}} = \frac{h_{lv} D_{1,lv}}{100 \sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	$D_{1,lv}$ (%)	$U_{D_{1,lv}}$ ($\mu\text{g}/\text{m}^3$)
399	350	5	10,1037

[11] Altres interferents (dades importants)

Interf.	$X_{i,z}$	$X_{i,ct}$	$c_{i,max}$	$c_{i,min}$	c_i
NH ₃	0,1	-0,33	28,3	0	200
H ₂ S	-0,07	-0,67	3,53	0	200
NO	2,8	4,0	160,2	0	500
NO ₂	0,23	0,67	104,5	0	200
m-xilè ¹	0,07	1,0	0,009	0	1

¹ En $\mu\text{mol}/\text{mols}$

[12] Altres interferents (resultats obtinguts)

Interf.	c_t	b_i	U_i
NH ₃	399	-0,0014	-0,0602
H ₂ S	399	-0,0030	-0,0162
NO	399	0,0077	1,8952
NO ₂	399	0,0031	0,4940
m-xilè ¹	399	0,8859	0,0123

¹ En $\mu\text{mol}/\text{mols}$

[13] Interferents (resultats globals)

c_t ($\mu\text{g}/\text{m}^3$)	$U_{\text{interf.,negatiu}}$ ($\mu\text{g}/\text{m}^3$)	$U_{\text{interf.,positiu}}$ ($\mu\text{g}/\text{m}^3$)
399	0,0623	1,9585

[15] Càlcul $U_{D_{1,z}}$ [$U_{D_{1,z}} = \frac{D_{1,z}}{\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	$D_{1,z}$ ($\mu\text{g}/\text{m}^3$)	$U_{D_{1,z}}$ ($\mu\text{g}/\text{m}^3$)
399	1,3298	0,7678

[17] Càlcul U_{res} [$U_{res} = \frac{\text{Resolució}}{2\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	Resolució ($\mu\text{g}/\text{m}^3$)	U_{res} ($\mu\text{g}/\text{m}^3$)
399	0,2659	0,0768

[18] Càlcul $U_{patró}$ [$U_{patró} = \sqrt{(\frac{\partial C_{patró}}{\partial MR})^2 U_{MR}^2 + (\frac{\partial C_{patró}}{\partial A})^2 U_A^2 + (\frac{\partial C_{patró}}{\partial G})^2 U_G^2}$]

c_t ($\mu\text{g}/\text{m}^3$)	C_{MR} ($\mu\text{g}/\text{m}^3$)	U_{MR} ($\mu\text{g}/\text{m}^3$)	Fact. Diluc.	Cabal aire (lpm)	Cabal gas (lpm)	U_A ($\mu\text{g}/\text{m}^3$)	U_G ($\mu\text{g}/\text{m}^3$)	$U_{patró}$ ($\mu\text{g}/\text{m}^3$)
399	27.021	266,0	67,73	6	0,0899	0,1077	0,000492	4,8073
	1.457	29,3	3,65		2,2613			8,2432
	27.021	266,0	67,73		0,0899			4,8073
	27.021	266,0	67,73		0,0899			4,8073
	26.702	267,0	83,67		0,0726			3,9195
	26.755	267,6	67,07		0,0908			4,8572
	26.755	267,6	67,07		0,0908			4,8572

[19] Resultats finals

c_t ($\mu\text{g}/\text{m}^3$)	U_z ($\mu\text{g}/\text{m}^3$)	$U_{\text{combinada}}$ ($\mu\text{g}/\text{m}^3$)	K	I ($\mu\text{g}/\text{m}^3$)	I (%)	Resultat calibratge
399	1,5355	22,1753	2	44,3506	11,5696	CORRECTE

Contaminant: NO

[1] Càlcul de $U_{r,z}$ [$U_{r,z} = \frac{S_{r,z}}{\sqrt{n}}$]

Concentració màxima recta de calibratge ($\mu\text{g}/\text{m}^3$)	Error absolut ($\mu\text{g}/\text{m}^3$)	Incertesa (%)	$S_{r,z}$ ($\mu\text{g}/\text{m}^3$)	n	$U_{r,z}$ ($\mu\text{g}/\text{m}^3$)
499	0,0000	0,00	0,0000	10	0,0000
499	-0,2619	-0,21	0,0998		0,0316
499	-0,2495	-0,20	0,0998		0,0316
499	-0,1996	-0,16	0,0998		0,0316
499	-0,1247	-0,10	0,0998		0,0316
499	-0,1871	-0,15	0,1247		0,0394
374	-0,3243	-0,26	0,3742		0,1183
374	0,0000	0,00	0,3742		0,1183
499	0,0624	0,05	0,0998		0,0316

$U_{r,z}$ màxim = 0,1183

[2] Càlcul de $U_{r,f}$ [$U_{r,f} = \frac{h_{lv}s}{c_t\sqrt{n}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	s ($\mu\text{g}/\text{m}^3$)	$U_{r,f}$ ($\mu\text{g}/\text{m}^3$)
249	200	0,5684	0,1441

[4] Càlcul de $U_{i,lv}$ [$U_{i,lv} = \frac{X_{i,lv} h_{lv}}{100\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	$X_{i,lv}$ (%)	$U_{i,lv}$ ($\mu\text{g}/\text{m}^3$)
249	200	0,3987	0,4604

[5] Càlcul de U_{gp} [$U_{gp} = \frac{h_{lv}b_{gp}\Delta gp}{c_t\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_{gp} ($\frac{\mu\text{g}}{\text{m}^3 \text{ kPa}}$)	Δgp (kPa)	U_{gp} ($\mu\text{g}/\text{m}^3$)
249	200	-	30	-

[3] Càlcul de $X_{i,lv}$ [$X_{i,lv} = \frac{|\bar{y} - y_{\text{calc}}| \cdot 100}{c_t}$]

c_t ($\mu\text{g}/\text{m}^3$)	Y ($\mu\text{g}/\text{m}^3$)	Y_{calc} ($\mu\text{g}/\text{m}^3$)	$X_{i,lv}$ (%)
249	252	251	0,3987
249	252	251	
249	252	251	
249	250	249	
249	249	248	
249	248	247	
249	232	230	

[6] Càlcul de U_{gt} [$U_{gt} = \frac{h_{lv}b_{gt}\Delta gt}{c_t\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_{gt} ($\frac{\mu\text{g}}{\text{m}^3 \text{ K}}$)	Δgt (K)	U_{gt} ($\mu\text{g}/\text{m}^3$)
249	200	-	30	-

[7] Càlcul de U_{st} [$U_{st} = \frac{h_{lv}b_{st}\Delta T}{c_t\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_{st} ($\frac{\mu\text{g}}{\text{m}^3 \text{ K}}$)	ΔT (K)	U_{st} ($\mu\text{g}/\text{m}^3$)
249	200	-	10	-

[8] Càlcul de U_v [$U_v = \frac{h_{lv}b_v\Delta V}{c_t\sqrt{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	b_v ($\frac{\mu\text{g}}{\text{m}^3 \text{ V}}$)	ΔV (V)	U_v ($\mu\text{g}/\text{m}^3$)
249	200	0,2994	8	1,1085

[11] Altres interferents (dades importants)

Interf.	$X_{i,z}$	$X_{i,ct}$	$C_{i,m\grave{a}x.}$	$C_{i,min.}$	C_i
NH ₃	0,0	-0,09	28,3	0	200
CO ₂	-0,17	0,025	700	393	500
O ₃	-0,003	-25,7	90	0	200

[9] Càlcul de b_{H_2O} [$b_{H_2O} = \frac{1}{c_{H_2O}} [X_{H_2O,Z} + (X_{H_2O,ct} - X_{H_2O,Z}) \frac{h_{lv}}{c_t}]$]

c_t ($\mu\text{g}/\text{m}^3$)	h_{lv} ($\mu\text{g}/\text{m}^3$)	c_{H_2O} ($\frac{\text{mmol}}{\text{mol}}$)	$X_{H_2O,Z}$ ($\frac{\text{nmol}}{\text{mol}}$)	$X_{H_2O,ct}$ ($\frac{\text{nmol}}{\text{mol}}$)	b_{H_2O} ($\frac{\text{nmol}}{\text{mmol}}$)
249	200	19	0,0	-12,9	-0,5443

[12] Altres interferents (resultats obtinguts)

Interf.	c_t	b_i	U_i
NH ₃	249	-3,608e-4	-0,0073
CO ₂	249	-2,734e-5	-0,0189
O ₃	249	-0,1030	-6,6772

[10] Càlcul de U_{H_2O} [$U_{H_2O} = b_{H_2O} \sqrt{\frac{c_{H_2O,m\grave{a}x.}^2 + c_{H_2O,m\grave{a}x.} c_{H_2O,min.} + c_{H_2O,min.}^2}{3}}$]

c_t ($\mu\text{g}/\text{m}^3$)	$c_{H_2O,m\grave{a}x.}$ ($\frac{\text{mmol}}{\text{mol}}$)	$c_{H_2O,min.}$ ($\frac{\text{mmol}}{\text{mol}}$)	b_{H_2O} ($\frac{\text{nmol}}{\text{mmol}}$)	U_{H_2O} ($\mu\text{g}/\text{m}^3$)
249	21	6	-0,5443	-9,6257

[13] Interferents (resultats globals)

c_t ($\mu\text{g}/\text{m}^3$)	$U_{\text{interf.,negatiu}}$ ($\mu\text{g}/\text{m}^3$)	$U_{\text{interf.,positiu}}$ ($\mu\text{g}/\text{m}^3$)
249	6,6773	0

[14] Càlcul $U_{D_{SC}} [U_{D_{SC}} = \frac{h_{iv} D_{SC}}{100\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	h_{iv} ($\mu\text{g}/\text{m}^3$)	D_{SC} (%)	$U_{D_{SC}}$ ($\mu\text{g}/\text{m}^3$)
249	200	1	1,1547

[15] Càlcul $U_{D_{i,z}} [U_{D_{i,z}} = \frac{D_{i,z}}{\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	$D_{i,z}$ ($\mu\text{g}/\text{m}^3$)	$U_{D_{i,z}}$ ($\mu\text{g}/\text{m}^3$)
249	0,6237	0,3601

[16] Càlcul $U_{D_{i,lv}} [U_{D_{i,lv}} = \frac{h_{iv} D_{i,lv}}{100\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	h_{iv} ($\mu\text{g}/\text{m}^3$)	$D_{i,lv}$ (%)	$U_{D_{i,lv}}$ ($\mu\text{g}/\text{m}^3$)
249	200	5	5,7735

[17] Càlcul $U_{res} [U_{res} = \frac{\text{Resolució}}{2\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	Resolució ($\mu\text{g}/\text{m}^3$)	U_{res} ($\mu\text{g}/\text{m}^3$)
249	0,1247	0,0360

[18] Càlcul $U_{patró} [U_{patró} = \sqrt{(\frac{\partial C_{patró}}{\partial MR})^2 U_{MR}^2 + (\frac{\partial C_{patró}}{\partial A})^2 U_A^2 + (\frac{\partial C_{patró}}{\partial G})^2 U_G^2}]$

c_t ($\mu\text{g}/\text{m}^3$)	C_{MR} ($\mu\text{g}/\text{m}^3$)	U_{MR} ($\mu\text{g}/\text{m}^3$)	Fact. Diluc.	Cabal aire (lpm)	Cabal gas (lpm)	U_A ($\mu\text{g}/\text{m}^3$)	U_G ($\mu\text{g}/\text{m}^3$)	$U_{patró}$ ($\mu\text{g}/\text{m}^3$)
249	24.648	124,7	98,8		0,0613			2,2860
249	24.510	122,6	98,25		0,0617			2,2760
249	24.510	122,6	98,25		0,0617			2,2760
249	24.510	122,6	98,25		0,0617			2,2760
249	24.510	122,6	98,25		0,0617			2,2760
249	24.510	122,6	98,25	6	0,0617	0,0526	0,000244	2,2760
249	24.510	122,6	98,25		0,0617			2,2760
249	25.159	125,8	100,85		0,0601			2,2838
249	25.159	125,8	100,85		0,0601			2,2838
249	25.159	125,8	100,85		0,0601			2,2838
249	24.648	124,7	98,8		0,0613			2,2860

[19] Resultats finals

c_t ($\mu\text{g}/\text{m}^3$)	U_z ($\mu\text{g}/\text{m}^3$)	$U_{combinada}$ ($\mu\text{g}/\text{m}^3$)	K	I ($\mu\text{g}/\text{m}^3$)	I (%)	Resultat calibratge
249	0,7202	13,3877	2	26,7753	10,7329	CORRECTE

Contaminant: NO₂

[1] Càlcul de U_{r,z} [$U_{r,z} = \frac{S_{r,z}}{\sqrt{n}}$]

Concentració màxima recta de calibratge (µg/m ³)	Error absolut (µg/m ³)	Incertesa (%)	S _{r,z} (µg/m ³)	n	U _{r,z} (µg/m ³)
772	0,3829	0,20	0,7724	10	0,2442
772	-0,2298	0,04	0,1544		0,0488
766	1,1488	0,24	0,9190		0,2906
766	1,5700	0,14	0,5361		0,1695
766	1,3211	0,20	0,7658		0,2422
766	0,6510	0,38	1,4551		0,4601
193	-0,6510	0,67	0,6465		0,2044
193	-0,4595	0,47	0,4536		0,1434
383	0,0191	0,06	0,1149		0,0363

U_{r,z} màxim = 0,4601

[2] Càlcul de U_{r,f} [$U_{r,f} = \frac{h_{lv} s}{c_t \sqrt{n}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	s (µg/m ³)	U _{r,f} (µg/m ³)
383	200	2,5991	1,1053

[4] Càlcul de U_{i,lv} [$U_{i,lv} = \frac{X_{i,lv} h_{lv}}{100 \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	X _{i,lv} (%)	U _{i,lv} (µg/m ³)
383	200	0,5685	0,6564

[5] Càlcul de U_{gp} [$U_{gp} = \frac{h_{lv} b_{gp} \Delta gp}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _{gp} ($\frac{\mu g}{m^3 \text{ kPa}}$)	Δgp (kPa)	U _{gp} (µg/m ³)
383	200	-	30	-

[3] Càlcul de X_{i,lv} [$X_{i,lv} = \frac{|\bar{y} - y_{calc}| \cdot 100}{c_t}$]

c _t (µg/m ³)	Y (µg/m ³)	Y _{calc.} (µg/m ³)	X _{i,lv} (%)
386	385	387	0,5685
386	394	396	
383	389	392	
383	385	387	
383	385	387	
383	385	387	
383	385	387	
383	381	384	

[6] Càlcul de U_{gt} [$U_{gt} = \frac{h_{lv} b_{gt} \Delta gt}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _{gt} ($\frac{\mu g}{m^3 \text{ K}}$)	Δgt (K)	U _{gt} (µg/m ³)
383	200	-	30	-

[7] Càlcul de U_{st} [$U_{st} = \frac{h_{lv} b_{st} \Delta T}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _{st} ($\frac{\mu g}{m^3 \text{ K}}$)	ΔT (K)	U _{st} (µg/m ³)
383	200	-	10	-

[8] Càlcul de U_v [$U_v = \frac{h_{lv} b_v \Delta V}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _v ($\frac{\mu g}{m^3 \text{ V}}$)	ΔV (V)	U _v (µg/m ³)
383	200	0,4595	8	1,0992

[11] Altres interferents (dades importants)

Interf.	X _{i,z}	X _{i,ct}	C _{i,màx.}	C _{i,min.}	C _i
NH ₃	0,0	-0,09	28,3	0	200
CO ₂	-0,17	0,025	700	393	500
O ₃	-0,003	-25,7	90	0	200

[9] Càlcul de b_{H₂O} [$b_{H_2O} = \frac{1}{c_{H_2O}} [X_{H_2O,Z} + (X_{H_2O,ct} - X_{H_2O,Z}) \frac{h_{lv}}{c_t}]$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	c _{H₂O} ($\frac{mmol}{mol}$)	X _{H₂O,Z} ($\frac{nmol}{mol}$)	X _{H₂O,ct} ($\frac{nmol}{mol}$)	b _{H₂O} ($\frac{nmol}{mmol}$)
383	200	19	0,83	-1,33	-0,0157

[12] Altres interferents (resultats obtinguts)

Interf.	c _t	b _i	U _i
NH ₃	383	-2,350e-4	-0,0073
CO ₂	383	-1,363e-4	-0,1445
O ₃	383	-0,0671	-6,6778

[10] Càlcul de U_{H₂O} [$U_{H_2O} = b_{H_2O} \sqrt{\frac{c_{H_2O,màx.}^2 + c_{H_2O,màx.} c_{H_2O,min.} + c_{H_2O,min.}^2}{3}}$]

c _t (µg/m ³)	c _{H₂O,màx.} ($\frac{mmol}{mol}$)	c _{H₂O,min.} ($\frac{mmol}{mol}$)	b _{H₂O} ($\frac{nmol}{mmol}$)	U _{H₂O} (µg/m ³)
193	21	6	-0,0157	-0,4260

[13] Interferents (resultats globals)

c _t (µg/m ³)	U _{interf., negatiu} (µg/m ³)	U _{interf., positiu} (µg/m ³)
383	6,6793	0

[14] Càlcul $U_{D_{SC}} [U_{D_{SC}} = \frac{h_{iv} D_{SC}}{100\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	h_{iv} ($\mu\text{g}/\text{m}^3$)	D_{SC} (%)	$U_{D_{SC}}$ ($\mu\text{g}/\text{m}^3$)
383	200	1	1,1547

[15] Càlcul $U_{D_{I,Z}} [U_{D_{I,Z}} = \frac{D_{I,Z}}{\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	$D_{I,Z}$ ($\mu\text{g}/\text{m}^3$)	$U_{D_{I,Z}}$ ($\mu\text{g}/\text{m}^3$)
383	0,9573	0,5527

[16] Càlcul $U_{D_{I,IV}} [U_{D_{I,IV}} = \frac{h_{iv} D_{I,IV}}{100\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	h_{iv} ($\mu\text{g}/\text{m}^3$)	$D_{I,IV}$ (%)	$U_{D_{I,IV}}$ ($\mu\text{g}/\text{m}^3$)
383	200	5	5,7735

[17] Càlcul $U_{res} [U_{res} = \frac{\text{Resolució}}{2\sqrt{3}}]$

c_t ($\mu\text{g}/\text{m}^3$)	Resolució ($\mu\text{g}/\text{m}^3$)	U_{res} ($\mu\text{g}/\text{m}^3$)
383	0,1914	0,0553

[18] Càlcul $U_{patró} [U_{patró} = \sqrt{(\frac{\partial C_{patró}}{\partial MR})^2 U_{MR}^2 + (\frac{\partial C_{patró}}{\partial A})^2 U_A^2 + (\frac{\partial C_{patró}}{\partial G})^2 U_G^2}]$

c_t ($\mu\text{g}/\text{m}^3$)	C_{MR} ($\mu\text{g}/\text{m}^3$)	U_{MR} ($\mu\text{g}/\text{m}^3$)	Fact. Diluc.	Cabal aire (lpm)	Cabal gas (lpm)	U_A ($\mu\text{g}/\text{m}^3$)	U_G ($\mu\text{g}/\text{m}^3$)	$U_{patró}$ ($\mu\text{g}/\text{m}^3$)
386	37.833	191,5	97,97		0,0619			3,5349
386	37.622	188,1	97,42		0,0622			3,5195
383	37.622	188,1	98,25		0,0617			3,4936
383	37.622	188,1	98,25		0,0617			3,4936
383	37.622	188,1	98,25	6	0,0617	0,0807	0,000375	3,4936
383	37.622	188,1	98,25		0,0617			3,4936
383	38.618	193,1	100,0		0,0606			3,5313
386	38.618	193,1	100,0		0,0606			3,5313
386	38.618	191,5	100,8		0,0601			3,5349

[19] Resultats finals

c_t ($\mu\text{g}/\text{m}^3$)	U_z ($\mu\text{g}/\text{m}^3$)	$U_{combinada}$ ($\mu\text{g}/\text{m}^3$)	K	I ($\mu\text{g}/\text{m}^3$)	I (%)	Resultat calibratge
383	1,1054	14,2368	2	28,4736	7,4046	CORRECTE

Contaminant: O₃

[1] Càlcul de U_{r,z} [$U_{r,z} = \frac{S_{r,z}}{\sqrt{n}}$]

Concentració màxima recta de calibratge (µg/m ³)	Error absolut (µg/m ³)	Incertesa (%)	S _{r,z} (µg/m ³)	n	U _{r,z} (µg/m ³)
300	-0,1399	-0,07	0,2098	10	0,0663
200	-0,8192	-0,31	0,3097		0,0979
200	-0,8591	-0,35	0,3497		0,1106
400	0,2198	0,07	0,1399		0,0442
400	0,2797	0,07	0,1399		0,0442

U_{r,z} màxim = 0,1106

[2] Càlcul de U_{r,f} [$U_{r,f} = \frac{h_{lv,s}}{c_t \sqrt{n}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	s (µg/m ³)	U _{r,f} (µg/m ³)
200	180	1,0067	0,2868

[4] Càlcul de U_{i,lv} [$U_{i,lv} = \frac{X_{i,lv} h_{lv}}{100 \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	X _{i,lv} (%)	U _{i,lv} (µg/m ³)
200	180	0,2703	0,3218

[5] Càlcul de U_{gp} [$U_{gp} = \frac{h_{lv} b_{gp} \Delta gp}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _{gp} ($\frac{\mu g}{m^3 \text{ kPa}}$)	Δgp (kPa)	U _{gp} (µg/m ³)
200	180	-	30	-

[6] Càlcul de U_{gt} [$U_{gt} = \frac{h_{lv} b_{gt} \Delta gt}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _{gt} ($\frac{\mu g}{m^3 \text{ K}}$)	Δgt (K)	U _{gt} (µg/m ³)
200	180	-0,1998	30	-3,1179

[3] Càlcul de X_{i,lv} [$X_{i,lv} = \frac{|\bar{y} - y_{calc}| \cdot 100}{c_t}$]

c _t (µg/m ³)	Y (µg/m ³)	Y _{calc.} (µg/m ³)	X _{i,lv} (%)
185	185	186	0,2703
200	196	197	
200	200	200	
200	203	204	
200	203	204	

[8] Càlcul de U_v [$U_v = \frac{h_{lv} b_v \Delta V}{c_t \sqrt{3}}$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	b _v ($\frac{\mu g}{m^3 \text{ V}}$)	ΔV (V)	U _v (µg/m ³)
200	180	0,0999	8	0,4157

[11] Altres interferents (dades importants)

Interf.	X _{i,z}	X _{i,ct}	c _{i,màx.}	c _{i,min.}	c _i
toluè	-	-	0,018	0	0,5
m-xilè	-	-	0,009	0	0,5

[9] Càlcul de b_{H₂O} [$b_{H_2O} = \frac{1}{c_{H_2O}} [X_{H_2O,Z} + (X_{H_2O,ct} - X_{H_2O,Z}) \frac{h_{lv}}{c_t}]$]

c _t (µg/m ³)	h _{lv} (µg/m ³)	c _{H₂O} ($\frac{mmol}{mol}$)	X _{H₂O,Z} ($\frac{nmol}{mol}$)	X _{H₂O,ct} ($\frac{nmol}{mol}$)	b _{H₂O} ($\frac{nmol}{mmol}$)
200	180	19	-4	6,1	0,2684

[12] Altres interferents (resultats obtinguts)

Interf.	c _i	b _i	U _i
toluè	200	-	-
m-xilè	200	-	-

[10] Càlcul de U_{H₂O} [$U_{H_2O} = b_{H_2O} \sqrt{\frac{c_{H_2O,màx.}^2 + c_{H_2O,màx.} c_{H_2O,min.} + c_{H_2O,min.}^2}{3}}$]

c _t (µg/m ³)	c _{H₂O,màx.} ($\frac{mmol}{mol}$)	c _{H₂O,min.} ($\frac{mmol}{mol}$)	b _{H₂O} ($\frac{nmol}{mmol}$)	U _{H₂O} (µg/m ³)
200	21	6	0,2684	7,6032

[13] Interferents (resultats globals)

c _t (µg/m ³)	U _{interf.,negatiu} (µg/m ³)	U _{interf.,positiu} (µg/m ³)
200	-	-

[14] Càlcul $U_{D_{SC}}$ [$U_{D_{SC}} = \frac{h_{iv} D_{SC}}{100\sqrt{3}}$]			
c_t ($\mu\text{g}/\text{m}^3$)	h_{iv} ($\mu\text{g}/\text{m}^3$)	D_{SC} (%)	$U_{D_{SC}}$ ($\mu\text{g}/\text{m}^3$)
200	180	1	1,0393

[15] Càlcul $U_{D_{1,z}}$ [$U_{D_{1,z}} = \frac{D_{1,z}}{\sqrt{3}}$]		
c_t ($\mu\text{g}/\text{m}^3$)	$D_{1,z}$ ($\mu\text{g}/\text{m}^3$)	$U_{D_{1,z}}$ ($\mu\text{g}/\text{m}^3$)
200	5,9940	3,4606

[16] Càlcul $U_{D_{1,lv}}$ [$U_{D_{1,lv}} = \frac{h_{iv} D_{1,lv}}{100\sqrt{3}}$]			
c_t ($\mu\text{g}/\text{m}^3$)	h_{iv} ($\mu\text{g}/\text{m}^3$)	$D_{1,lv}$ (%)	$U_{D_{1,lv}}$ ($\mu\text{g}/\text{m}^3$)
200	180	5	5,1966

[17] Càlcul U_{res} [$U_{res} = \frac{\text{Resolució}}{2\sqrt{3}}$]		
c_t ($\mu\text{g}/\text{m}^3$)	Resolució ($\mu\text{g}/\text{m}^3$)	U_{res} ($\mu\text{g}/\text{m}^3$)
200	0,1998	0,0577

[18] Càlcul $U_{patró}$ [$U_{patró} = \frac{I}{K}$]			
c_t ($\mu\text{g}/\text{m}^3$)	I	K	$U_{patró}$ ($\mu\text{g}/\text{m}^3$)
200	7,1928	2	3,5964

[19] Resultats finals						
c_t ($\mu\text{g}/\text{m}^3$)	U_z ($\mu\text{g}/\text{m}^3$)	$U_{combinada}$ ($\mu\text{g}/\text{m}^3$)	K	I ($\mu\text{g}/\text{m}^3$)	I (%)	Resultat calibratge
200	1,1535	11,2636	2	22,5272	11,2849	CORRECTE

Palma, 22 de juliol de 2014

Elaborat per: Secció de Contaminació Atmosfèrica, DIRECCIÓ GENERAL DE MEDI NATURAL, EDUCACIÓ AMBIENTAL I CANVI CLIMÀTIC, CONSELLERIA D'AGRICULTURA, MEDI AMBIENT I TERRITORI, GOVERN BALEAR.