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HP 41 PROGRAM SUBMITTAL FORM
PROGRAMMFORMBLATT/DOCUMENTATION DU PROGRAMME/GENERALITÀ SUL PROGRAMMA

Program Title Programmittel Titre du programme Titolo del programma		<u>CALCULATION OF THE TITER OF AN ANTISERUM WITH THE AID OF THE RADIAL IMMUNO DIFFUSION METHOD.</u>	
Category No. Kategorie Nr. Catégorie N° Categoria N°	Name Rubrik Rubrique Nome della categoria	<u>531</u>	<u>Biochemistry</u>
No. of program lines Anzahl Programmzeilen Nombre de lignes de programme N° di linee di programma	No. of data registers Anzahl des benötigten Datenspeicher Nombre de registres de données N° di registri utilizzati	<u>146</u>	<u>17</u>
Recommended HP 41 System configuration Empfohlene System-Konfiguration Configuration recommandée Configurazione raccomandata			
Port # 1	<u>Memory module</u>	Port # 2	
Port # 3		Port # 4	
This program requires the following programs as subroutines: Dieses Programm benutzt folgende Programme als Unterprogramme: ce programme utilise les programmes suivants comme sous-programmes: questo programma usa i seguenti programmi come subroutine:		Program Name: Programm: Nom du programme: Programma:	
HP Applications ROM HP Applications ROM ROM d'application HP ROM di applicazione HP			
Program Abstract Kurzbeschreibung Résumé Breve descrizione del programma	<u>With this program you can calculate the titer of an antiserum in mg/ml when using the radial immuno diffusion method according to Mancini. A possibility to correct erroneous data input is provided.</u>		
		Program Size <u>038</u>	
Name Name/Nom/Nome <u>Ed Nieuwenhuys</u>			
Address Adresse/Indirizzo <u>Langsom 39</u>			
Country Land Pays Paese	Postal Code Postleitzahl Code postal C.A.P.	City Ort Localité Città	<u>Netherlands</u> <u>1066 GC</u> <u>Amsterdam</u>
ACKNOWLEDGMENT AND AGREEMENT Erklärung und Ermächtigung/Déclaration et Autorisation/Dichiarazione e Autorizzazione			
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Date Datum Date	Signature Unterschrift Signature Firma	<u>20-10-82</u> <u>Ed Nieuwenhuys</u>	

HEWLETT-PACKARD SA
Users' Program Library Europe
 7, rue du Bois-du-Lan
 P.O. Box, CH-1217 Meyrin 2
 GENEVE, Switzerland

PROGRAM DESCRIPTION I

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PROGRAMMBESCHREIBUNG I
DESCRIPTION DU PROGRAMME I
DESCRIZIONE DEL PROGRAMMA I

Application, Equations, Variables

Anwendung, Gleichungen, Veränderliche
Application, Equations, Variables
Applicazione, Equazioni, Variabili

The next equations are used:

$$Q_{Ag} = \mu l Ag' \cdot \text{conc } Ag \cdot 10^{-3}$$

$$c = \frac{\delta D^2}{2 Q_{Ag}} = \text{tg} \alpha$$

$$T = \frac{1}{\frac{\pi \cdot k}{4 \cdot k+1} \cdot d \cdot c} = \text{titer in mg/ml}$$

k= ml antiserum

l= ml agar

d= thickness of the agar in cm!

Operating limits and Warnings

Grenzen und Einschränkungen

Limites et restrictions

Limiti operativi e avvertenze

If you want to change a diameter or a % after pressing E, store 1 ST+16.

n is lowered by one in line 045 and 046 and will

be one to low when this is not corrected.

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Dieses Programm wurde lediglich anhand des in der Programmbeschreibung II enthaltenen Zahlenbeispiels überprüft. Der Benutzer erhält und benutzt das Programmmaterial auf eigenes Risiko hin, er hat es deshalb - gleichgültig, ob es bereits anderweitig präsentiert oder beschrieben wurde - selbst zu untersuchen. WEDER HP NOCH DER EINSENDER DES PROGRAMMS ÜBERNEHMEN FÜR DAS PROGRAMMATERIAL EINE IRGENDWIE GEARTETE GEWÄHRLEISTUNG ODER HAFTUNG, INSBESONDERE NICHT FÜR SEINE VERKÄUFLICHKEIT ODER SEINE VERWENDBARKEIT FÜR EINEN BESTIMMTEN ZWECK. HP UND DER EINSENDER HAFTEN AUCH NICHT FÜR INDIREKTE ODER FOLGESCHÄDEN.

Le présent programme n'a été vérifié qu'en ce qui concerne l'exemple numérique indiqué dans la description du programme II. L'utilisateur accepte et utilise le présent programme à SES PROPRES RISQUES et doit se fier uniquement à sa propre inspection dudit programme sans se référer à toute autre déclaration et description.

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Questo programma è stato verificato soltanto per quanto concerne l'esempio numerico indicato nella Descrizione del Programma II. L'utilizzatore accetta e utilizzerà il presente programma A SUO INTERO RISCHIO, fidandosi unicamente della propria verifica del programma e non basandosi su altre dichiarazioni o descrizioni. NE LA SOCIETÀ NÉ L'AUTORE DANNO ALCUNA GARANZIA IMPLICITA O ESPLICITA CONCERNENTE IL PRESENTE PROGRAMMA, IN SPECIALE MODO RIGUARDO ALLA SUA COMMERCIALIZZAZIONE O ADATTABILITÀ AD UN USO PARTICOLARE. NÉ LA SOCIETÀ HP NÉ L'AUTORE ASSUMONO ALCUNA RESPONSABILITÀ PER DANNI IMMEDIATI O MEDIATI CAUSATI DALLA FORNITURA, UTILIZZAZIONE O FUNZIONAMENTO DEL PRESENTE PROGRAMMA.

PROGRAM DESCRIPTION II

PROGRAMMBESCHREIBUNG II
DESCRIPTION DU PROGRAMME II
DESCRIZIONE DEL PROGRAMMA II

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Example / Beispiel / Esempio: The R.I.D. plate is made in 2% agar noble in 0,9% NaCl.
The agar is melted in an boiling waterbath. After dissolving it is cooled till 56°C, the antiserum is added and after mixing it is poured between two glassplates from which one is siliconated.
When the agar is congealed, holes of approx. 2,5 mm are made in the agar and filled with antigen dilution. 100% is 1+0, 50% is 1+1 a.s.o.
After 24-72 hours (the 100% ring should be between 5 and 7 mm) the ring diameter is measured.
Because diameter² vs concentration has a linear relation a straight line can be calculated by linear regression, with $t_{95} = a$ and a correlation R. Then the titer is calculated.

For the example we made a R.I.D. plate with 0,150 ml antiserum in 12 ml agar, with a thickness of 0,15 cm.

We filled the holes with 3 µl antigen (1 mg/ml) and we found the next day the following ring diameters:

sketch
skizze
Croquis
Schizzo

dilution		diameter in mm
1+0	100%	7,0
1+1	50%	5,3
1+3	25%	4,0
1+9	10%	3,0

(Example continued)

(Beispiel Fortsetzung)

(Exemple, suite)

(Esempio)

PROGRAM DESCRIPTION III

 PROGRAMMBESCHREIBUNG III
 DESCRIPTION DU PROGRAMME III
 DESCRIZIONE DEL PROGRAMMA III

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Data Input Dateneingabe Données Dati	Keystrokes Tastendruck Touches Tasti	Result Résultat Résultat Risultato	Comments Kommentare Commentaires Commenti
	XEQ "TI"	UL AG?	3 µl (3.10 ⁻⁶ l) antigen was used
3	R/S	(AG) MG/ML	The antigen concentration of the 100% was 1 mg/ml
1	R/S	DIAM Y1	The diameter of the 100% ring is 7,0 mm
7	R/S	% X1	Display as input control
100	R/S	" 7,0/ 100%"	
		DIAM Y2	
5,3	R/S	% X2	
50	R/S	DIAM Y3	
4	R/S	% X3	
25	R/S	DIAM Y4	
3	R/S	% X4	
10	R/S	DIAM Y5	
			Press E (user mode !) to start the calculation of R, a and b
	E (LN)	R=0,9994	Correlation
	R/S	a=147,99	Tge
		b=4,99	Intercept.SQRT b should be the diameter of an empty hole (this is also a control!)
	R/S	ML AB?	0,150 ml antibody was used
0,15	R/S	ML AGAR?	This was mixed with 12 ml agar
12	R/S	MM AGAR	The agar layer was 0,15 cm thick
1,5	R/S		
		TITER=4,65	The titer is 4,65 mg/ml
			So one ml antiserum can bind 4,65 mg antigen.
			Press C to restart the program at the point R=0,9994
	A (ε+)	DIAM Y?	Press A when something goes wrong during data input
False diameter	R/S	%?	
False %	R/S	" Y/ X"	
		DIAM YA	Correction can also be done after pressing E.
	R/S	% X4	Do not forget to store 1 ST+16 before pressing E again.

PROGRAM LISTING
PROGRAMMAUFLISTUNG
LISTAGE DU PROGRAMME
LISTATO DI PROGRAMMA

Line Zeile Ligne Linea	Keystrokes Tastensequenz Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastensequenz Touches Tasti	Comments Kommentar Commentaires Commenti
01	Δ LBL TT CLΣ		51	RCL 16 /	
	"UL AG?" PROMPT			- STO 00	
05	<AG> MG/ML PROMPT		55	RCL 12 RCL 11 X↑2	
	1E3 /			RCL 16 /	
	* STO 09		60	- STO 03	
	1 STO 16			RCL 14 RCL 13	
	Δ LBL 00 FIX 0			X↑2 RCL 16	
15	"DIAM Y" ARCL 16		65	/	
	PROMPT STO 01			- STO 04	
	"% X"			RCL 00 RCL 03	
20	ARCL 16 PROMPT		70	/	
	CLA FIX 1			1E2 /	
	" "			STO 05 RCL 00	
25	ARCL 01 "1/"		75	RCL 03 RCL 04	
	FIX 0 ARCL X			* SQRT	
	"1%"			/	
30	AVIEW 1E2		80	STO 06 Δ LBL C	
	/			FIX 4 "R="	
	RCL 09 *			ARCL 06 PROMPT	
35	STO 02 RCL 01		85	FIX 2 "a="	
	X↑2 ENTER			ARCL 05 PROMPT	
	RCL 02			RCL 11 RCL 16	
40	* FS?C 07 ← RTN		90	/	
	Σ+			RCL 05 1E2	
	GO TO 00 →			* *	
	Δ LBL E 1		95	CHS RCL 13	
45	ST-16 RCL 15			RCL 16	
	RCL 11 RCL 13				
50	* *		(0)		

PROGRAM LISTING

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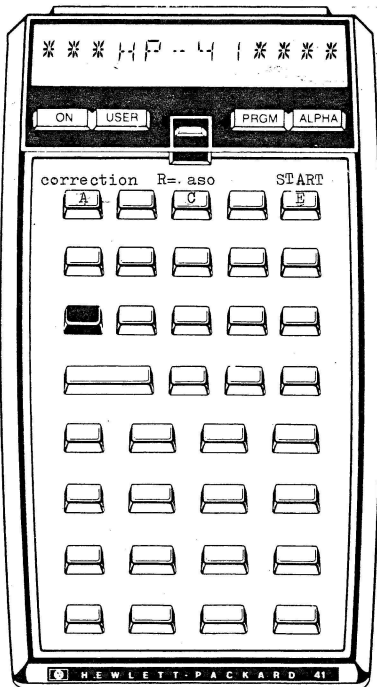
 PROGRAMMAUFLISTUNG
 LISTAGE DU PROGRAMME
 LISTATO DI PROGRAMMA

Line Zeile Ligne Linea	Keystrokes Tastensequenz Touches Tasti	Comments Kommentare Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastensequenz Touches Tasti	Comments Kommentare Commentaires Commenti
01	/		51		
	+				
	"b="				
	ARCL X				
05	PROMPT		55		
	"ML AB?"				
	PROMPT				
	STO 07				
	"ML AGAR?"				
10	PROMPT		60		
	STO 08				
	"MM AGAR?"				
	PROMPT				
	10				
15	/		65		
	STO 09				
	π				
	4				
	/				
20	RCL 07		70		
	ENTER				
	ENTER				
	RCL 08				
	+				
25	/		75		
	≠				
	RCL 09				
	≠				
	RCL 05				
30	≠		80		
	1/X				
	FIX 2				
	"TITER="				
	ARCL X				
35	PROMPT		85		
	△ LBL A				
	• SF 07				
	RCL 16				
	STO 10				
40	"?"		90		
	ASTO 16				
	XEQ 00 ⇒				
	RCL 10				
	STO 16				
45	RDN		95		
	Σ-				
	GO TO 00 →				
	END				
50			00		

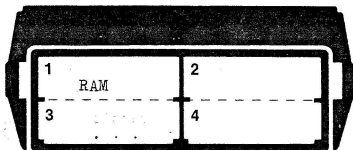
REGISTERS, STATUS, FLAGS
REGISTERBELEGUNG, FLAGS, BETRIEBSARTEN
REGISTRES, INDICATEURS, MODES OPÉRATOIRES
REGISTRI, MODI OPERATIVI, FLAGS

Registers Datenspeicher / Registres de données / Registri			Status Betriebsart / Modes opératoires / Modi operativi					
00	used used	50	Size	017	Total Reg.	038	User Mode	On <input checked="" type="checkbox"/>
	used used used		Eng	<input type="checkbox"/>	Fix	<input checked="" type="checkbox"/>	Sci	<input type="checkbox"/>
			Deg	<input type="checkbox"/>	Rad	<input type="checkbox"/>	Grad	<input type="checkbox"/>
			Purpose Bedeutung Signification Scopo		Flags			
05	a	55					SET	CLEAR
	b		00					
	ml Ab		01					
	ml agar		02					
	Q Ag. mm agar		03					
10	n temp	60	04					
	Σx		05					
	Σx^2		06					
	Σy		07	$\Sigma +$			X	X
	Σy^2		08					$\Sigma -$
15	Σxy	65	09					
	n		10					
			11	Audio execute				
			12					
20		70	13					
			14					
			15					
			16					
			17					
25		75	18					
			19					
			20					
			21	Printer Enable				
			22	Number Input				
		80	23	Alpha Input				
			24	Range Ignore				
			25	Error Ignore				
			26	Audio Enable				
			27	User Mode			X	
35		85	28	Decimal Point			X	
			29	Digit Grouping				
			Assignments Tastenbelegung / Assignations / Assegnamenti					
			Function Funktion Fonction Funzione	Key Taste Touche Tasto	Function Funktion Fonction Funzione	Key Taste Touche Tasto		
			correction input A					
			R= a.s.o.		C			
45		95	START calculation E					
		99						

SYSTEM CONFIGURATION
 CONFIGURAZIONE DEL SISTEMA



Assignments
 Belegungen
 Assignations
 Assegnamenti



Configuration
 Belegung
 Configuration
 Configurazione



Magnetic card
 Magnetkarte
 Carte magnétique
 Scheda magnetica