

اولین قدم برای استفاده صحیح از تجهیزات آزمایشگاهی، مطالعه کامل کاتالوگها و عمل به دستورالعملهای نگهداری و کنترل کیفیت مندرج در آن می باشد. مطالبی که در ذیل آمده است، جنبه عام داشته و جایگزین دستورالعمل سازنده نمی باشد.

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(Control button/Push /
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button)

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Unwetted Tip

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(Resolution)

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Paranitrohenol (C6H5NO3), indicator PH(5.4-7.5) MERCK Art. 6798

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(Tietz 1999 ())
Paranitrophenol High purity- NIST SRM 938
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Sodium hydroxide(NaOH) , Pure ... MERCK Art. 6462.

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(stock)

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(OD)

(CV%)

$$mean = \frac{\sum x_i}{n}$$

$$SD = \sqrt{\frac{\sum (xi - mean)^2}{n - 1}}$$

$$CV\% = \frac{SD * 100}{mean}$$

(Coefficient of variation)

: CV

:SD

: mean

: n

: xi

(CV%)

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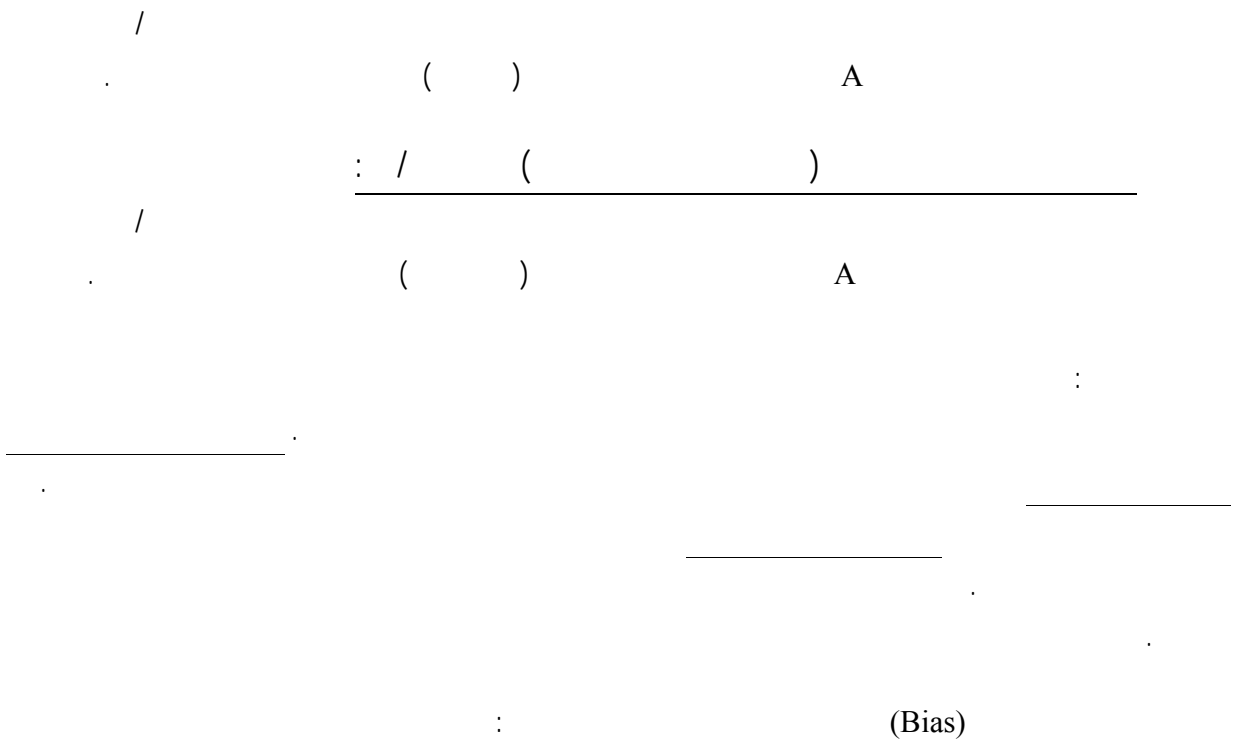
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$$Bias\% = \frac{\text{expected} - \text{observed}}{\text{expected}} \times 100$$

: *expected*
: *observed*

Inaccuracy

Imprecision (CV%) (Bias)

CV% = %

Bias% = %

(Fixed Volume)

Bias

(%)

(%)

%

) "Tip holder"

(

Silicone grease

(O-ring)

(Tip-holder)

Linearity

pH

solid glass filter

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:

HiCN

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(Stock)

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g/l

(/ / / /)

(Observed)

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(OD)

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$$\text{Bias} = \frac{\text{observed} - \text{expected}}{\text{expected}} \times 100$$

$$\text{Bias} = \frac{\text{expected} - \text{observed}}{\text{expected}} * 100$$

(OD expected)	(OD observed)	%Bias
2.075	2.094	0.91
1.66	1.663	0.18
1.245	1.259	1.12
1.037	1.017	1.97
0.83	0.826	0.48
-	0.415	-
0.207	0.212	2.1

$$0.13911 \times 0.08 = 0.0111288 = 11.11288 \sim 11.1$$

/ (Na OH)

2 0.1

Bias

0.005 0.01 0.02 0.04 0.06

0.4

0.02 0.463
0.04 x

$\mu\text{mol/L}$			Bias %
0.08	1.852	1.908	3
0.06	1.389	1.418	2
0.04	0.926	0.937	1.2
0.02		0.463	
0.01	0.231	0.225	2.6
0.005	0.116	0.113	2.6

oven

/

200

2 0.1

/

10 25 50 100 150 200

Bias

50
25

0.493
x

0.4

mg/L			Bias %
200	1.972	2.007	1.8
150	1.479	1.486	0.5
100	0.986	0.991	0.5
50		0.493	-
25	0.247	0.245	0.8
10	0.099	0.095	4

%

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/ ± /

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SRM

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IRMM

www.nist.gov (/ bcwww.irmm.jrc .

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)

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(

(Drift)

(

)

± 0.005

1.259± 0.005

1.259

(Stray light)

(

)

) % 0

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T=0

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Relative

(× g)

Centrifugal Force(RCF)
(gravity) g

$$RCF = 1.118 \times 10^{-5} \times r \times (\text{rpm})^2$$

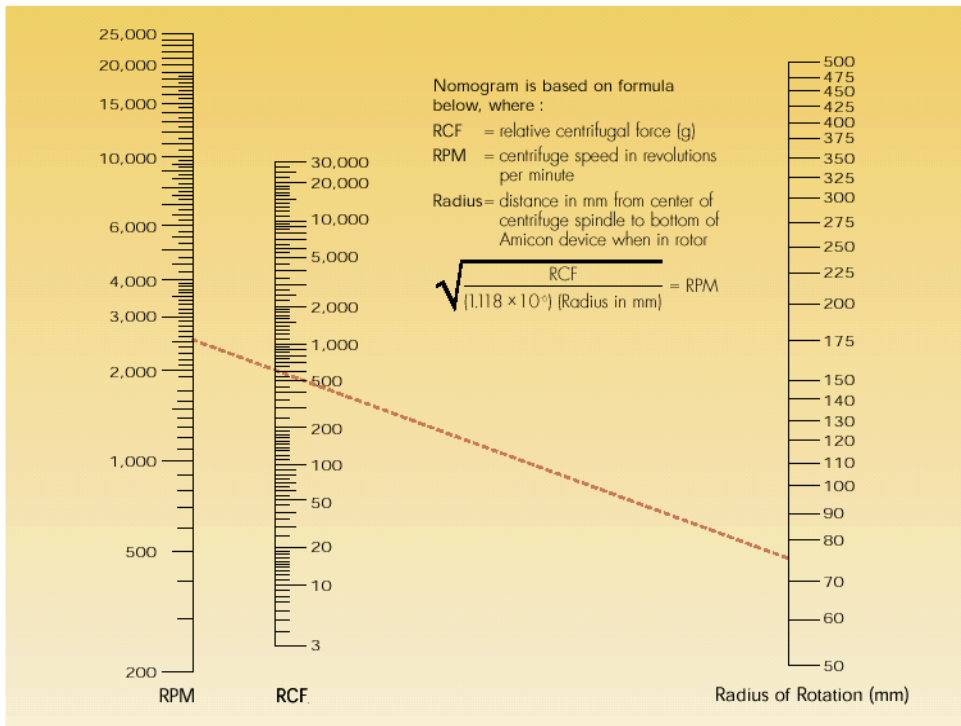
$$1.118 \times 10^{-5}$$

r =

()

rpm =

RCF



g
500g

(Horizontal- head /Swinging- bucket)

)

(...

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%

•

:

:

:

)

%

(

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%

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±0.5 (end point)

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CLSI

(
) NCCLS

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NCCLS

Purification Process	Major Classes of Contaminants					
	Dissolved Ionized Solids	Dissolved Ionized Gases	Dissolved Organics	Particulate Matter	Micro organisms	Pyrogens/ Endotoxins
Distillation	E	G/P	G	E	E	E
Deionization	E	E	P	P	P	P
Reverse osmosis	G	P	G	E	E	E
Carbon adsorption/absorption	P	P	E/G	P	P	P

Filtration (0.22 mm)	P	P	P	E	E	P
Ultrafiltration	P	P	P	E	E	P

E : Excelent G : Good P : Poor

: III

I

: II

: I

TABLE I-9 NCCLS Specifications for Reagent Grade Water

	Type I	Type II	Type III
<i>Microbiological content,*</i> colony forming units per mL, cfu/mL (maximum)	10	10 ³	N.A.
<i>pH</i>	N.A.	N.A.	5.0-8.0
<i>Resistivity,†</i> MΩ per centimeter (MΩ-cm), 25 °C	10 (in line)	2.0	0.1
<i>Silicate,</i> mg SiO ₂ /L (maximum)	0.05	0.1	1.0
<i>Particulate matter‡</i>	Water passed through 0.2-µm filter	N.A.	N.A.
<i>Organics</i>	Water passed through activated carbon	N.A.	N.A.

From National Committee for Clinical Laboratory Standards: Preparation and Testing of Reagent Water in the Clinical Laboratory, 3rd ed. Approved Standard. NCCLS Document C03-A3. Wayne, PA, National Committee for Clinical Laboratory Standards, 1997.

**Microbiological content.* The microbiological content of viable organisms, as determined by total colony count after incubation at 36 ± 1 °C for 14 hr, followed by 48 hr at 25 ± 1 °C, and reported as colony forming units per mL (cfu/mL).

†*Specific resistance or resistivity.* The electrical resistance in ohms measured between opposite faces of a 1-cm cube of an aqueous solution at a specified temperature. For these specifications, the resistivity will be corrected for 25 °C and reported in MΩ/cm. The higher the amount of ionizable materials, the lower the resistivity and the higher the conductivity.

‡*Particulate matter.* When water is passed through a membrane filter with a mean pore size of 0.2 µm, it is considered to be free of particulate matter. *Organic material.* When water is passed through a bed of activated carbon, it is considered to contain minimum organic material.

II

I

III

PH III

III II I . (Conductivity = 1/ resistance)

/ / µS/cm

/ MΩ/cm

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()
()
TSA BHI
23±3
cfu/mL
36±1
pH meter
pH meter
pH

(Lense paper)