



Liquid Reagents – ready to use

## BILIRUBIN DIRECT/TOTAL

Jendrassik Grof  
3 Reagents

Diagnostic reagent for quantitative in vitro determination of direct and total bilirubin in human serum or plasma on photometric systems

REF	Cont.		
103200	4 x 100 mL (416 mL)	2 x 100 mL 2 x 100 mL 2 x 8 mL	BD Reagent 1 BT Reagent 1 Reagent 2
103210	4 x 50 mL (208 mL)	2 x 50 mL 2 x 50 mL 2 x 4 mL	BD Reagent 1 BT Reagent 1 Reagent 2
116320	4 x 25 mL (104 mL)	2 x 25 mL 2 x 25 mL 2 x 2 mL	BD Reagent 1 BT Reagent 1 Reagent 2

Additionally offered:

D98485SV	1 x 3 mL	Calibrator	Diacal Auto
D98485	5 x 3 mL	Calibrator	Diacal Auto
D98481	12 x 5 mL	Control normal	Diacon N
D98482	12 x 5 mL	Control abnormal	Diacon P

### TEST PARAMETERS

Method: Colorimetric, Increasing Reaction, Endpoint, Jendrassik Grof,  
Wavelength: 555 nm  
Temperature: 20 – 25°C, 37°C  
Sample: serum or plasma,  
Linearity: up to 20 mg/dL Total Bilirubin

### REAGENT COMPOSITION

COMPONENTS	CONCENTRATION
<b>Bilirubin Direct, Reagent 1:</b>	
Sulfanilic Acid	32.2 mmol/L
<b>Bilirubin Total, Reagent 1:</b>	
Sulfanilic Acid	32.2 mmol/L
Ethylene Glycol	
Dimethylsulfoxide (DMSO)	
<b>Reagent 2:</b>	
Sodium Nitrite	109 mmol/L

### REAGENT PREPARATION

#### Substrate Start:

Reagents are ready for use

#### Sample Start (Working Reagent):

Mix 150 parts of Reagent 1 with 1 part of Reagent 2.

### REAGENT STABILITY AND STORAGE

Conditions: protect from light  
close immediately after use  
Storage: at 2 – 8°C  
Stability: up to the expiration date

#### Working Reagent:

Stability: at 20 – 25°C 8 hours\*  
\* in amber bottles.

### SAMPLE STABILITY AND STORAGE

It is very important to store the sample protected from light!  
Use only clear unhemolyzed serum.

Stability: at 15 – 25°C 2 hours  
at 2 - 8°C 5 hours  
at - 20°C \* 2 months

\*in case of immediate freezing after work.  
Discard contaminated specimens.

### INTERFERING SUBSTANCES

no interference up to:  
hemoglobin 1000 mg/dL

### MANUAL TEST PROCEDURE

Bring reagents and samples to room temperature.

#### Sample Start:

Pipette into test tubes	Sample blank	Sample	Calibr. blank	Calibr.
Reagent 1	1000 µL	-	1000 µL	-
Working R.	-	1000 µL	-	1000 µL
Sample	100 µL	100 µL	-	-
Calibrator	-	-	100 µL	100 µL

Mix without delay.

Incubate 3 min at 30°C or 2 min at 37°C.

Read absorbance of each test against the respective blank.

#### Substrate Start:

Pipette into test tubes	Sample blank	Sample	Calibr. blank	Calibr.
Reagent 1	1000 µL	1000 µL	1000 µL	1000 µL
Sample	100 µL	100 µL	-	-
Calibrator	-	-	100 µL	100 µL
Reagent 2	-	10 µL	-	10 µL

Mix without delay.

Incubate 3 min at 30°C or 2 min at 37°C.

Read absorbance of each test against the respective blank.

### CALCULATION (light path 1 cm)

#### With Calibrator:

$$\text{Bilirubin (mg/dL)} = \frac{\Delta A \text{ Sample}}{\Delta A \text{ Cal}} \times \text{Conc. of Cal (mg/dL)}$$

#### With Factor:

$$\text{Bilirubin (mg/dl)} = \Delta A \text{ Sample} \times \text{Factor}$$

Factor = 12.9

**The factor has to be checked by a calibration serum and adapted if necessary!**

## UNIT CONVERSION

mg/dl x 17.1 = µmol/L

## REFERENCE RANGE \*(mg/dL)

Conjugated (direct) bilirubin:	0.0 - 0.2
Unconjugated bilirubin:	0.2 - 0.8
Total bilirubin:	0.2 - 1.0

\*It is recommended that each laboratory should establish its own reference range.

## TEST PRINCIPLE

Bilirubin is formed from the heme portion of hemoglobin released by aged or damaged red blood cells.

It is then converted in the liver to bilirubin monoglucuronide and bilirubin diglucuronide.

Free bilirubin is not soluble in aqueous solution and requires solubilization by alcohols or other solvents to react. Reactions carried out in these solvents provide measurements of total bilirubin.

Mono and diglucuronides of bilirubin are water soluble and measurements performed in aqueous solution measure what in this form is called direct bilirubin.

In our reagents we use dimethylsulfoxide (DMSO) and ethylene glycol as solvents for the total bilirubin assay. Bilirubin in these solvents readily reacts with diazotized sulfanilic acid to produce an intensely colored diazo dye.

The intensity of color of this dye in solution is proportional to the concentration of direct or total bilirubin, resp.

## PERFORMANCE CHARACTERISTICS

### LINEARITY

The assay is linear to 20 mg/dl. Samples with bilirubin concentrations higher than 20 mg/dl should be diluted with distilled or deionized water and the assay should be repeated; multiply results by dilution factor.

### PRECISION (at 37°C), Bilirubin Total, n = 10

Intra-assay	Mean [mg/dL]	SD [mg/dL]	CV [%]
Sample 1	5.59	0.006	0.116
Sample 2	0.385	0.015	3.97

Inter-assay	Mean [mg/dL]	SD [mg/dL]	CV [%]
Sample 1	5.14	0.096	1.87
Sample 2	0.57	0.032	5.6

### PRECISION (at 37°C), Bilirubin Direct n = 10

Intra-assay	Mean [mg/dL]	SD [mg/dL]	CV [%]
Sample 1	5.44	0.004	0.078
Sample 2	0.306	0.011	3.75

### METHOD COMPARISON

A comparison between Dialab Bilirubin Direct (y) and a commercially available test (x) using 39 samples gave the following results:  $y = 0.989x + 0.001$  mg/dL;  $r = 0.998$ .

A comparison between Dialab Bilirubin Total (y) and a commercially available test (x) using 41 samples gave following results:  $y = 0.991x + 0.005$  mg/dL;  $r = 0.998$ .

### QUALITY CONTROL

All control sera with Bilirubin values determined by this method can be used.

We recommend:

REF	Cont.		
D98481	12 x 5 mL	DIACON N	Assayed Control Serum Normal
D98482	12 x 5 mL	DIACON P	Assayed Control Serum Abnormal

### CALIBRATION

The assay requires the use of a Bilirubin Standard or Calibrator. We recommend:

REF	Cont.		
D98485SV	1 x 3 mL	DIACAL AUTO	Assayed Multi Calibration Serum
D98485	5 x 3 mL	DIACAL AUTO	Assayed Multi Calibration Serum

### AUTOMATION

Special adaptations for automated analyzers can be made on request.

### WASTE MANAGEMENT

Please refer to local legal requirements.

## WARNINGS AND PRECAUTIONS

- Reagent 1: Danger  
H314: Causes severe skin burns and eye damage.  
P260: Do not breathe dust/fume/gas/mist/vapours/spray.  
P280: Wear protective gloves/protective clothing/eye protection/face protection.  
P303+P361+P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.  
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
EUH208: Contains sulphanilic acid. May produce an allergic reaction.
- Take the necessary precautions for the use of laboratory reagents.

## REFERENCES

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2°C 8°C

IVD



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