



Version 4.0

## Analyte Maintenance

The routine provides the necessary means to create new, edit existing and delete any unwanted Analyte. In PROLIS, an Analyte is defined as a very basic unit of service, the laboratory performs for her clients. An analyte can refer to a test (for example Pregnancy test, Sodium or Alkaline Phosphatase) or other service like phlebotomy. In the context of analyte, one could even define the distance, a phlebotomist would travel, to perform the venipuncture service.

This routine is used to change various characteristics of the analyte, which in turn affect the PROLIS performance. There is always a need and one should consider thoroughly the settings of characteristics while creating the analytes, right from the beginning. Well thought setting of the characteristics of analytes, yield in a better and cleaner output.

Within PROLIS, this routine is found inside the Dictionary Menu which is generally controlled by the Dictionary permission in the user record. But this routine unlike other dictionary routines, is controlled by a separate permission called 'Test Management'. In order to access this routine, the user has to have the 'Test Management' permission granted.

The screenshot shows the 'Analyte Maintenance' window with the following details:

- Analyte ID:** 301
- Analyte Name:** Pregnancy Serum
- Analyte Abbr:** hCG
- Active:** YES
- Markable:** YES
- Billable:** YES
- Result:** YES
- Reportable:** YES
- In House:** YES
- Material:** Serum
- Marking Tab:**

Modifiers (System restricts marking if the following conditions are not met)			
No.	Gender	Age (Lower Limit)	Age (Upper Limit)
1	F - Female	12	50
- Buttons:** Edit, Save, Delete, Cancel, Help, Remove, Remove All, Add to List

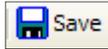
Above snapshot represents this routine in which the 'Pregnancy Serum' analyte has been displayed. We will discuss each and every part of this routine in detail.

### Mode Selector



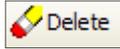
The first button on the toolbar is a mode selector button which is used to select either 'Edit' mode or 'Add' mode by clicking the button it self.

**Save command**



The command is available both in 'Edit' (default) mode and the 'New' mode but is activated only when the required fields (Labeled with maroon color) have the data. Otherwise the command is disabled.

**Delete command**



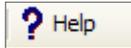
The command is only available in 'Edit' mode and is activated only when a record is being displayed.

**Cancel command**



The command is always available and is used to exit from the routine. It does not prompt you to save the data.

**Help command**



The command is always available and is used to access the help files.

**Analyte Characteristic fields**

The screenshot shows a software interface for managing analyte characteristics. It includes several input fields and status buttons. The fields are: Analyte ID (301), Analyte Name (Pregnancy Serum), Analyte Abbr (hCG), Analyte Description, and Result Note. There are also three columns of status buttons: Active, Markable, and Billable, each with a 'YES' button. Below these are buttons for Result, Reportable, and In House, also with 'YES' buttons. At the bottom, there is a 'Material' dropdown menu set to 'Serum' and a row of tabs for Marking, Result, Billing, and Service Location.

All fields on the left side of the section, are labeled with a self explanatory purpose. For example, the **analyte ID**, the value of which is 301 in the displayed record, represents a numerical value assigned to the analyte as an identification of it. Although the system allows the user to custom assign this value to the analyte, yet system verifies the uniqueness.

**Analyte Name** is the full 60 character long name of the analyte and the **Analyte Abbr** is an abbreviated 10 character long name of the analyte.

**Analyte Description** and the **Result Note**, both are 250 character long fields. The description is used to enter the descriptive text of the field and the Result Note is used to go in to the result report when this analyte is ordered on the patient.

The 'Yes' value of the **active** button is used to tell the system that the analyte is active in the system. The 'No' value of this button, disables the analyte and can not be used in the system any more.

The '**Markable**' button is used to inform the system that this analyte can be ordered if the value is 'Yes' and can't be ordered otherwise. Analytes with markable value of 'No' can be ordered if in Groups and Profiles only.

The **billable** switch, is used to stop the analyte from being billed individually. Analytes with the 'No' value, can be billed only when those are a part of Group or a Profile.

The 'Yes' value of the **Result** switch, informs the system that the analyte is a test performed either on any Instrument or manually and has the specific result value. For example, Pregnancy Serum, should have the value of 'Yes'. The 'No' value indicates the analyte to be a result less service, like venipuncture or the distance traveled to draw the patient's blood.

### Analyte Characteristic fields

The **reportable** field is used to make the result reportable or not reportable. Usually this field should have the same value as that of the **Result** field. **In House** field is used to inform PROLIS that if the test is performed in the laboratory or it is outsourced.

The **material** field is used to specify the source material, the test is performed on. For example, the Pregnancy Serum, would have 'Serum' as the source material of the analyte and the Pregnancy Urine would have 'Urine' as the source material.

Active	Markable	Billable
YES	YES	YES
Result	Reportable	In House
YES	YES	YES
Material		
Serum		

### Extended Characteristic fields Marking Tab

The bottom section of the routine, is used to specify the extended characteristics. For example, if the analyte is tagged as 'markable', the user can specify the conditions under which the analyte is markable and if those conditions are not met, PROLIS would treat the analyte as non markable. The displayed example is the 'Pregnancy Serum' analyte. Upon marking the 'Pregnancy Serum' analyte as markable, would enable the user to specify the condition that if the patient is a female between the age of 12 and 50, the analyte is markable otherwise it is not.

No.	Gender	Age (Lower Limit)	Age (Upper Limit)
1	F - Female	12	50

Gender:  Age Lower Limit:  Age Upper Limit:

Add to List

This version of PROLIS, only supports one condition but future versions will support multiple conditions.

### Result Tab

The Result Tab is enabled only if the Analyte is marked to have the result. The result tab functions to configure the specifics of the result, its type, its range type and the range and other characteristics of the result. We will describe each part of the Tab, in detail, next.

No.	Choice	Flag
1	Negative	N - Normal

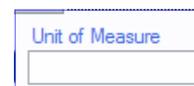
### Result Type Switch

The Result Type Switch is used to specify the result type. An analyte can have either Choice type result or the Numeric type. For example, a choice type result applies to the Pregnancy Serum. Possible choices for this analyte, are Positive, Negative and Undetermined. The Tab provides the necessary means to associate these choices with the analyte. The choice type result in PROLIS, is generally known as qualitative. But if the switch is clicked to show the Numeric type result, the Tab will enable the numeric portion of the result setup. A numeric type result would apply to Alkaline Phosphatase for example. In this case, the Tab would accept only numeric values.



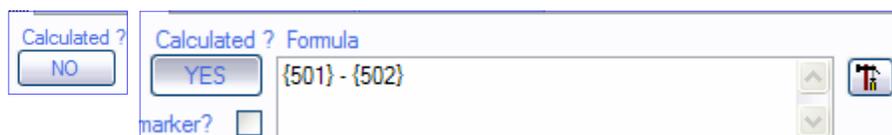
### Unit of Measure

The field is used to specify the unit of measure. For example mg/dL or mmol/L.



### Calculated Switch

The switch is used to inform PROLIS that the analyte being configured, is calculated result which is calculated using



the results of other analytes. If the switch is opted to have a 'Yes' value, it will enable the formula field and the formula building button, shown on the extreme right. For example, these fields would be used to configure the 'Globulin' analyte. The shown formula in the snapshot, is to calculate Globulin result from the results of Total Protein and that of Albumin. The expression '{501}' represents the result of Total Protein of the patient and the expression '{502}' represents the result of Albumin of the patient. The whole formula is subtracting the result of Albumin from that of Total Protein.

The formula can be typed straight in to the field or the formula builder can be used to bring the resulting formula in to the field.

### Formulae

General syntax of the formula is as follows;

<OPERAND1> OPERATOR1 <OPERAND2> OPERATOR2 <OPERAND3> OPERATORn <OPERANDn>

<OPERAND> It is one of the system supported functions or the possible result of another Analyte to be used in the result calculation of the Calculated Analyte.

OPERATOR represents one of the following operations;

No	Operation	Operator	Precedence Level
1	Change Precedence	( )	1
2	Exponentiation (Not supported)	<b>The power of</b>	2
3	Multiplication	*	3
4	Division	/	3
5	Addition	+	4
6	Subtraction	-	4
7	Modulus	\	3

### Precedence

Formulae are evaluated according to the precedence level indicated above in the table.

Lesser the precedence level, prioritize the calculation.

Example1:  $4 + 5 * 2$  will return 14

The evaluation of above expression will start with  $5 * 2$  as the precedence level of '\*' is lower (3) than that of '+' which is 4.

In order to get the result 18, you need to change the precedence level of '+' less than that of '\*' by enclosing the operation in brackets.

Example2:  $(4 + 5) * 2$  will return 18. In the example2, brackets have changed the precedence level to 1, this part of the formula will be calculated first.

## Supported Functions

**MAX**(Value1, Value2, Value3.....,ValueN)

The numeric function provides the maximum value of the provided values, Value1, Value2, Value3 up to any number of (ValueN) values to the function.

Example: MAX(15, 454, 942, 210, 0) will return 942.

**MIN**(Value1, Value2, Value3.....,ValueN)

The numeric function provides the minimum value of the provided values, Value1, Value2, Value3 up to any number of (ValueN) values to the function.

Example: MIN(15, 454, 942, 210, 0) will return 0.

**AVE**(Value1, Value2, Value3.....,ValueN)

The numeric function provides the Average value of the provided values, Value1, Value2, Value3 up to any number of (ValueN) values to the function.

Example: AVE(15, 454, 942, 210, 0) will return 324.20.

**SUM**(Value1, Value2, Value3.....,ValueN)

The numeric function used to add the provided values, Value1, Value2, Value3 up to any number of (ValueN) values to the function.

Example: SUM(15, 454, 942, 210, 0) will return 1621.

**IIF**(Expression, TruePart, FalsePart)

The function evaluates the user provided Expression and if the result is True, it returns Truepart otherwise it returns the Falsepart.

Example: IIF({ResultOf(1146)} = "Reactive", "Positive", "Negative")

The expression **{ResultOf(1146)}** is a custom function internally used in the system that provides the result of the TestID 1146 which in the example data is RPR test, to the IIF function. If the result of RPR is recorded as "Reactive", function IIF will return the value as "Positive" but if the result of the RPR is recorded some thing other than "Reactive" like "Non-Reactive" or "Non Reactive", IIF will return "Negative".

This function is not restricted to be used only in Choice calculations, it can be used in either result type.

**ResultOf(Analyte\_ID)**

A PROLIS custom function that returns the result of the current instance of the Analyte\_ID provided to the function. The data type of the returned value is string.

While manually typing the formula, user needs to type explicitly following the syntax given above exactly if this function is needed in the formula.

In the formula builder, this function is used implicitly making its use easy and error free. We strongly recommend the use the formula builder over manually typing the formula.

## Formula Builder

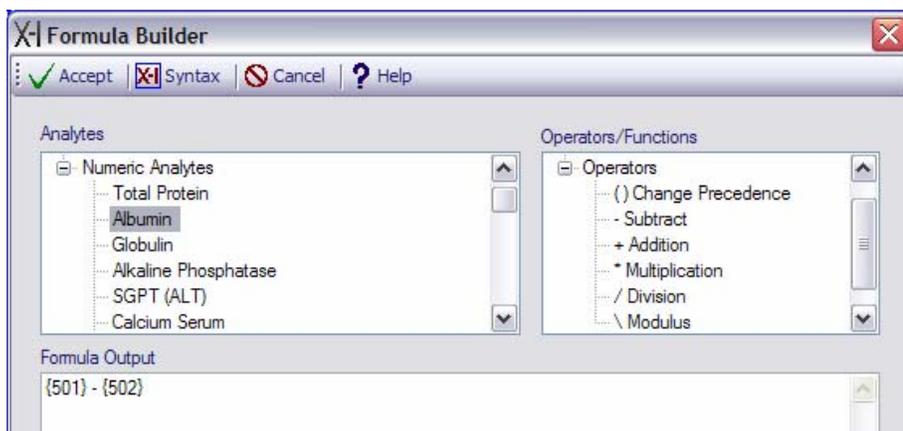
The formula builder provides an easy way to build various formulae.

The top functional bar, has the 'Accept' button, 'Syntax' button, 'Cancel' button and the 'Help' button.

### Accept Button

Upon typing the formula or double clicking the Analyte and/or any operator or

function, to send the clicked element in to the Formula Output pane, the 'Accept' button is enabled and is ready to be used to transfer the resulted formula back to the Formula field on the parent routine.



### Syntax Button

The button functions to check the correctness of the formula syntax.

### Cancel Button

The button is used to dismiss the formula builder routine.

### Help

The help file is accessed using this help button.

### Analytes Pane

This pane lists all the Analytes in the system. To access any specific analyte, expand the tree by clicking the plus (+) sign, on left of the appropriate analyte group heading (Numeric or Choice) and double click the desired analyte, in order to use it in the formula being built in the Formula Output pane.

### Operators/Functions Pane

The top right pane lists the supported functions and operators. To access any specific function or operator, expand the tree by clicking the plus (+) sign, on left of the Operator group heading or Functions group heading and double click the desired element, in order to use it in the formula being built in the Formula Output pane.

### Formula Output Pane

The bottom pane is used to either type the formula directly in it or double clicking the various elements to send them to formula output pane. The pane is the only place where the formula syntax can be checked for the correctness.

### Scripting Language

The scripting language to be used in the formulae in PROLIS, is VB Script.

### AG Ranges?

This field is available only when the result type selected above, is Numeric. The default set of ranges for the numeric result type, is the Numeric Ranges (The left most Tab).

The AG Ranges? Field is clicked to enable the system to enter the set of

ranges relating to the patient's Sex and its age (called AG Ranges in PROLIS world). Marking this field, true, disables the Numeric Ranges, the first Tab shown above and enables the 2nd tab of AG Ranges.

### Automarker ?

This field is marked true, to enable the reflex testing in PROLIS. Based on the result type selected above, either Numeric Reflux Tab or Choice Reflux Tab, is enabled, to accept the required specifics. PROLIS supports the reflex testing resulting from a certain ranges the results of analytes fall in to. Following examples are being provided as a guideline to create your own Analytes, called Automarkers of various types.

### Choice Result Type Automarker

#### Example 1

The first automarker example of this type of analyte is the Syphilis screening (Rapid Plasma Reagin or RPR). The possible result choices for RPR, are Non Reactive, Reactive and Undetermined.

Mark the analyte 'RPR' true for automarking, using the field 'Automarker ?' which will result in enabling the Choice Reflux Tab.

Select the desired result against which you want PROLIS to order the reflex component automatically. In this case, it will be 'Reactive'. You must select the desired triggering result. You may type the desired triggering result if it is not available among choices. Finally select the desired the component (in this case 'FTA-ABS') you want PROLIS to order automatically upon entering the result (in this case 'Reactive') of the automarker (in this case 'RPR') and press the button labeled 'Add to List'. Save the analyte.

**Note:** To create an automarker analyte, the component to be triggered must exist in the system.

#### Example 2

The 2nd automarker example of the analyte is Triglycerides. The possible result range for Triglycerides, could be a really wide one. But we want PROLIS to take an action of ordering the component 'LDL Direct' when the result of Triglycerides is greater than or equal to 400 mg/dL. In such a case, the calculated LDL is considered to be invalid. So before creating a new or modifying an existing Triglycerides analyte with the automarking capability, make sure the analyte 'LDL Direct' exist in the system.

Pull the Analyte 'Triglycerides' and click the Result Tab. Click the field 'Automarker?', to place a checkmark there.

If PROLIS does not select 'Numeric Reflex' Tab automatically, click this tab to select it. Enter 400 in the 'From' field. Enter 800 in the 'To' field and select the component 'LDL Direct' from the list named 'Select Analyte, Group or Profile to mark'. Finally click the button 'Add to List' and save the analyte.

No.	Value From	Value To	Analyte, Group or Profile
1	400	800	LDL Direct

From:  To:  Select Analyte, Group or Profile to mark:

Now after creating this analyte 'Triglycerides', when the entered result of Triglycerides is less than 400, PROLIS will calculate the result of LDL (which is a calculated analyte), upon entering the results of all analytes involved in the calculation of LDL. But if the result of Triglycerides is equal to 400 or higher, PROLIS will order LDL Direct on the patient automatically.

### Sub Tabs in the Result Tab

There are 5 Tabs in the Result Tab.

#### 1. Numeric Ranges Tab

This is the default Tab to input the references ranges of the analytes with the numeric result types. Each line is entered with the value from and that of to, along with the flag (Normal, Abnormal, Low, high or Panic etc).

Number	Value From	Value To	Flag
1	0.5	2.1	L - Low
2	2.2	4.2	N - Normal

Value From:  Value To:  Flag:

#### 2. AG Ranges Tab

This is the Tab to input the extended references ranges relating to the Gender and the Age of the patient, of analytes with the numeric result types. Each line is entered with the Age range, gender, value from and that of to, along with the flag (Normal, Abnormal, Low, high or Panic etc).

No.	Age From	Age To	Gender	Value From	Value To	Flag
1	3	12	M - Male	12.5	15.5	N - Normal

Age From:  Age To:  Gender:  Value From:  Value To:  Flag:

#### 3. Choice Ranges Tab

This is the Tab to input references ranges of analytes with the Choice result types. Each line is entered with a discrete value and a flag (Normal, Abnormal or Panic etc).

No.	Choice	Flag
1	Reactive	A - Abnormal

Select or Type a Choice:  Flag:

### 4. Numeric Reflux Tab

This is the Tab to setup the reflex testing where a numeric analyze is setup in such a way that if its result falls in a specific range, PROLIS will order another analyte, group or profile on the patient automatically.

No.	Value From	Value To	Analyte, Group or Profile
1	400	800	LDL Direct

From: 400 To: 800 Select Analyte, Group or Profile to mark: LDL Direct

### 5. Choice Reflux Tab

This is the Tab to setup the reflex testing where a choice analyte is setup in such a way that if its result is equal to a specific value, PROLIS will order another analyte, group or profile on the patient automatically.

No.	Choice	Analyte, Group or Profile
1	Reactive	FTA-ABS

Select or Type a Choice: Reactive Select Analyte, Group or Profile to mark: FTA-ABS

**Note:**

Microbiology testing like Culture and Sensitivity is perfect candidate to be set up with reflex testing.

### How to set up Culture & Sensitivity

1. Set up all desired Antibiotic Analytes with the result type of 'Choice' with 3 options, named 'Resistant', 'Sensitive' and 'Undetermined'.
2. Group all antibiotic analytes.
3. Set up the Culture analyte with the result type of 'Choice' with the number of obtained result options. For example, usual options would be 'No Growth', 'Growth' or even various count levels can be specified ('5,000', '10,000' etc) . While in the Result Tab, click the field 'Automarker?' to activate the Choice Reflux Tab. In the field 'Select or Type a Choice', enter the Choice which should trigger the ordering of the antibiotic analyte group, created in step 2.
4. In the field 'Select Analyte, Group or Profile to mark', select the antibiotic analyte group, created in step 2.
5. Save the Culture analyte.