



Chapter 3 Basic Procedures of INTERGLAD Ver. 7

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Users who use INTERGLAD for the first time can perform
the main functions of Search, Analysis and Prediction (Designing)
according to these procedures.

For the details refer “Detailed explanation of windows and operation” of Chapter 4.

System Installation and Initial Setting

Required procedures are different with INTERGLAD types (Internet edition, Standard edition, CD full function edition). In addition, available functions are different with Java version used. Refer the following list.

Application Types of INTERGLAD Ver. 7

1. Internet edition Without system install, full functions except file operation and User Data are available with the latest data.

System Install	Internet Connection	Authentication	Java (32bit)	Available Database ¹	Available Function						PC		
					Search	Analysis	Prediction /Design	Print ²	File Import /Export ³	User Data Conversion /Registration	OS	Rewrite of Batch File	
												Win 32bit	Win 64bit
Required	Required	Server (ID, PW)	Ver. 7	Server DB	Yes	Yes	Yes	Yes	No	-	Windows Linux Mac OS X	-	-
			Ver. 8										

2. Standard edition Full functions are available with the latest data (for Java Ver. 7).
Full functions except User Data are available with the latest data (for Java Ver. 8).

System Install	Internet Connection	Authentication	Java (32bit)	Available Database ¹	Available Function						PC		
					Search	Analysis	Prediction /Design	Print ²	File Import /Export ³	User Data Conversion /Registration	OS	Rewrite of Batch File	
												Win 32bit	Win 64bit
Required	Required	Server (ID, PW)	Ver. 7	Server DB	Yes	Yes	Yes	Yes	Yes	-	Windows Linux* Mac OS X* (* only for Server DB)	Required ⁵	Required ⁶
				Local DB	Yes	Yes	Yes	Yes	Yes	-			
				User DB	Yes	Yes	Yes	Yes	Yes	Yes			
			Ver. 8	Server DB	Yes	Yes	Yes	Yes	Yes	-		Not Required	Not Required
				Local DB	No	No	No	No	No	-			
				User DB	No	No	No	No	No	No			
Temporary System ⁴ Decompress				Server DB	Yes	Yes	Yes	Yes	Yes	-	Windows Linux Mac OS X	Not Required	Not Required
				Local DB	Yes	Yes	Yes	Yes	Yes	-			
				User DB	Yes	Yes	Yes	Yes	Yes	No			

3. CD Full Function edition Without internet connection, full functions are available (for Java Ver. 7).
Without internet connection, full functions except User Data are available (for Java Ver. 8).

System Install	Internet Connection	Authentication	Java (32bit)	Available Database ¹	Available Function						PC		
					Search	Analysis	Prediction /Design	Print ²	File Import /Export ³	User Data Conversion /Registration	OS	Rewrite of Batch File	
												Win 32bit	Win 64bit
Required	Not Required	Access Key	Ver. 7	Local DB	Yes	Yes	Yes	Yes	Yes	-	Windows	Required ⁵	Required ⁶
				User DB	Yes	Yes	Yes	Yes	Yes	Yes			
			Ver. 8	Local DB	No	No	No	No	No	-	Windows	-	-
				User DB	No	No	No	No	No	No			
Temporary System ⁴ Decompress				Local DB	Yes	Yes	Yes	Yes	Yes	-	Windows Linux Mac OS X	Not Required	Not Required
				User DB	Yes	Yes	Yes	Yes	Yes	No			

1 Available Database

Server DB: Database stored in the INTERGLAD server of the NGF, available with the latest data any time.

Local DB: Database installed on the user's PC from the Web page or CD by the NGF, renewed every year.

User DB: Database in which the user registered his/her own data on the user's PC, available for use such as search along with the Server DB or Local DB.

2 Print: Prints of tables and figures as searched results, etc. are available.

3 File Import/Export: Data- and image-save/open are available for search conditions, search results, analysis results, prediction results, etc.

4 Temporary System: INTERGLAD system using JDBC and UcanAccess for Java Ver. 8, which has been made temporarily, because Java Ver.8 does not have the access function to ODBC date source.

5 Rewrite of the batch file for Win 32bit PC: java→ "c:\Program Files\Java\jre7\bin\java.exe" (Not Required only with Java Ver. 7)

6 Rewrite of the batch file for Win 64bit PC: java→ "c:\Program Files (x86)\Java\jre7\bin\java.exe" (Required even only with Java Ver. 7)

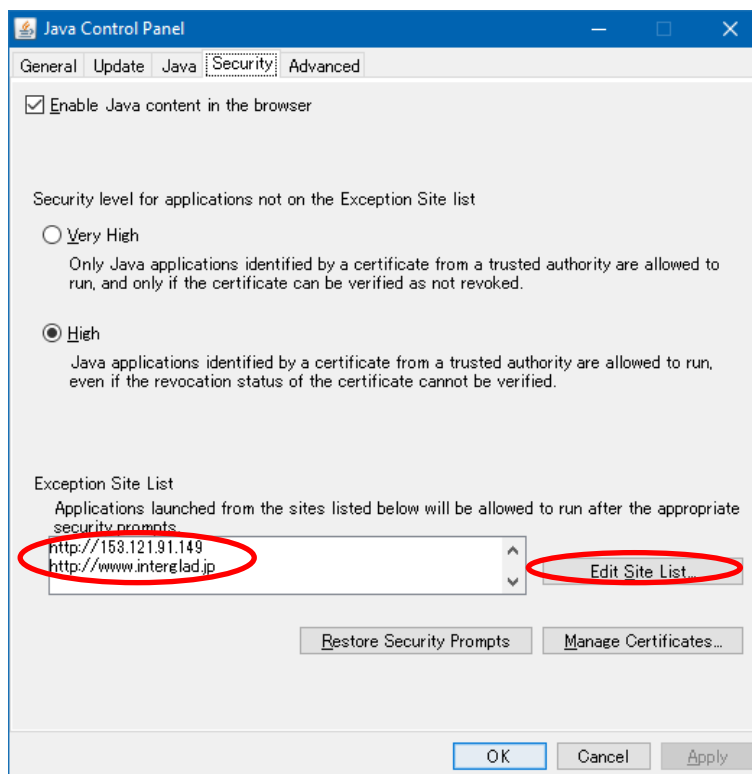
INTERGLAD system is composed of Property Database and Structure Database. The Structure Database does not have functions of prediction/design and user data, and it is only english version.

1. Procedure for Internet Edition
 2. Procedure for Standard Edition
 3. Procedure for CD Full Function Edition
 4. Procedures of Update for Standard and CD Full Function Edition
 5. Procedure for Change of Connection IP Address for New Server
- The procedures are explained for Windows 10 as an example.

1. Procedure for Internet Edition

Internet edition can be used only by installing of Java (Version 6 or newer). Refer to 2. 2). For Windows 10, etc. the following procedure is required. Open the Control Panel and select Java. On the [Security] window of Java Control Panel, check “Enable Java content in the browser,” and add “http://153.121.91.149” and “http://www.interglad.jp” in the Exception Site List by clicking the [Edit Site List] button. For Internet Edition, URL http://153.121.91.149/interglad7 or http://www.interglad.jp/interglad7/ can be used, and the addition in the Exception Site List corresponding to the URL is necessary. Microsoft Edge and Google Chrome are unable to use, because they do not work for Java. Refer to 4. 2) c. of Chapter 2. for the details of the Web browser.

Java Control Panel
[Security] window



For start-up of Internet Edition, open the [INTERGLAD WEB] page by setting,

<http://153.121.91.149/interglad7/> or <http://www.interglad.jp/interglad7/>. This page can be opened also from NEW GLASS FORUM Web site by clicking [Ver. 7 Internet edition] of [Access to INTERGLAD] in the right-hand side menu followed by opening the [INTERGLAD 7] page. Input the User ID and Password in each box at the left side of the window, and click the [LOGIN] button. When some dialogues appear, proceed as follows.

- 1) Java was blocked because it is out of date and needs to be updated. →Run this time
- 2) To display the webpage again, the web browser needs to resend the information you've previously submitted. →Retry
- 3) Your java version is out of date. →Later
- 4) Do you want to run this application? →Run

The [Main] window of INTERGLAD appears under the window of INTERGLAD WEB. Start INTERGLAD by setting the [Main] window upside.

2. Procedure for Standard Edition

- 1) Check Operating System 32 bit or 64 bit

The user can distinguish if the OS of his/her PC is 32-bit or 64-bit in the [System] window from [System and Security] of [Control Panel].

- 2) Install Java

Download and install Java on the user's PC from the following Web page.

http://www.java.com/en/download/ie_manual.jsp

By this procedure usually the newest Java Version 8 of 32-bit is installed. Java Version 7 or former has access function to ODBC data source, but Java Ver. 8 does not have it. Therefore when only Ver. 8 is installed, the user cannot use the Local Database and User Database. For use of full functions of INTERGLAD, install Java Ver. 7 (32-bit) from the following Web page, since the public update by Oracle Corp. has already finished (4.2015).

<http://www.oracle.com/technetwork/java/javase/downloads/java-archive-downloads-javase7-521261.html#jre-7u80-oth-JPR>

Windows x86 Offline: jre-7u80-windows-i586.exe

For this, create a free Oracle Account, and the user can download and install it by inputting the Username and Password.

When Java Ver. 7 is already in the PC, take care not to uninstall it. The user can utilize acquisition support by Oracle for necessity of security. All functions except the functions of User Data are available by installing only Ver. 8.

- 3) Install INTERGLAD system

- ① Open the following INTERGLAD Web page, and click the [LOGIN] button after inputting your User ID and Password. Then the [Downloads] page opens.

<http://www.interglad.jp/interglad7/download/>

This Web page can be opened also from NEW GLASS FORUM Web site by clicking [Ver. 7 Standard edition system download] of [Access to INTERGLAD] in the right-hand side menu followed by opening the [INTERGLAD 7] page.

- ② Choose the Windows Installer “interglad-7.*.*-setup-win.exe” for Windows 10 (the same for 7, 8, Vista) and install it on the user’s PC. Occasionally the user needs to stop or lower the security level of the PC for installing. For instance, when Windows SmartScreen is active on Windows 10, he/she has to cancel the protection once. In some environments, inputting ID and Password of the PC manager are necessary.

For Mac OS X/ Linux, download and decompress “interglad-7.*.*.zip.”

4) Rewrite the batch file [interglad7] for use of Java Ver. 7

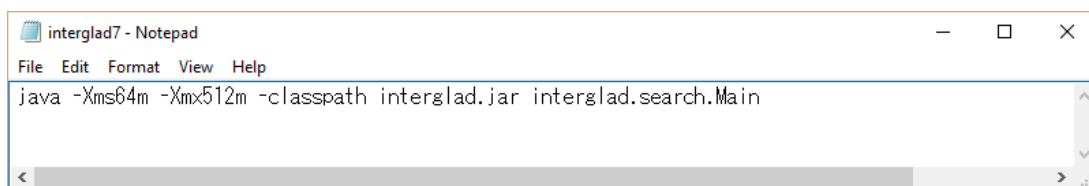
This rewrite is necessary for use of Java Ver. 7 and 8 together on 32-bit PC, and for use of Java Ver. 7 and 8 together, or only Java Ver. 7 on 64-bit PC. It is not necessary for only Java Ver. 8.

- ① By right-clicking the [INTERGLAD7.6] icon on the desktop, select [Edit] of the [interglad7] file.
- ② Rewrite the batch file and save it. The code letters should be ANSI.

Before rewrite:

```
java -Xms64m -Xmx512m -classpath interglad.jar interglad.search.Main
```

(Window below)



For 32-bit PC rewrite as follows.

```
"c:\Program Files\Java\jre7\bin\java.exe" -Xms64m -Xmx512m -classpath  
interglad.jar interglad.search.Main
```

For 64-bit PC rewrite as follows.

```
"c:\Program Files (x86)\Java\jre7\bin\java.exe" -Xms64m -Xmx512m -classpath  
interglad.jar interglad.search.Main
```

Copy and paste of rewrite letters above is convenient.

5) Start-up of INTERGLAD

Double-click the [INTERGLAD 7.6] icon on the desktop of the PC, and the [Main] window of INTERGLAD opens. Input the User ID and Password of INTERGLAD and click the [OK] button, and the user can perform search and all other functions. Inputting the User ID and Password is necessary in each starting of the system. Open the [Preference] window from the [Preference] icon on the top menu bar of the [Main] window, and select the [Server] radio button of the [INTERGLAD Data]. In the use of Java Ver. 8, [Cannot connect local database....] dialog appears 4 times at start-up, then click the [OK] button in each dialog. In the use of Java Ver. 7, such a dialog does not appear.

6) Provisional version applicable for Java Ver. 8

The provisional version applies JDBC and UCanAccess software complementally for access function to ODBC database. In this version the full functions except registration and conversion of User Data are available. Preregistered User Data are available for search and prediction with Server Data.

To apply this version, first open the [Downloads] page by procedure of 3) ①, and click [User Environment of INTERGLAD]. Download and decompress [INTERGLAD 7.*b] “interglad-7.*.*b.zip” in 2 (2) of the opened page. INTERGLAD starts up by double-clicking the [interglad7] on the desktop, shortcut icon of “interglad7.bat” in the [INTERGLAD 7.5b] folder. For the first start-up it takes time, around 10 minutes.

3. Procedure for CD Full Function Edition

1) Check Operating System 32 bit or 64 bit

The user can distinguish if the OS of his/her PC is 32-bit or 64-bit in the [System] window from [System and Security] of [Control Panel].

2) Install Java

Install Java Ver. 7 (32-bit) from the following Web page.

<http://www.oracle.com/technetwork/java/javase/downloads/java-archive-downloads-javase7-521261.html#jre-7u80-oth-JPR>

Windows x86 Offline: jre-7u80-windows-i586.exe

For this, create a free Oracle Account, and the user can download and install it by inputting the Username and Password.

Java Version 7 or former had access function to ODBC data source, but Java Ver. 8 does not have it. Therefore when only Ver. 8 is installed, the user cannot use this

common CD Full Function Edition which needs the Local Database. When the user have to use only Java Ver. 8, refer to 3. 6). Take care not to uninstall Java Ver. 7 at Java update. The user can utilize acquisition support by Oracle for necessity of security.

3) Install INTERGLAD system

Choose the Windows Installer “interglad-7.*.*-sa-setup-win.exe” for Windows 10 (the same for 7, 8, Vista) in the CD from the NGF and install it in the user’s PC. Occasionally the user needs to stop or lower the security level of the PC for installing. For instance, when Windows SmartScreen is active in Windows 10, he/she has to cancel the protection temporarily. In some environments, inputting ID and Password of the PC manager are necessary.

4) Rewrite the batch file [interglad7]

This rewrite is necessary for use of Java Ver. 7 and 8 together on 32-bit PC, and for use of Java Ver. 7 and 8 together, or only Java Ver. 7 on 64-bit PC.

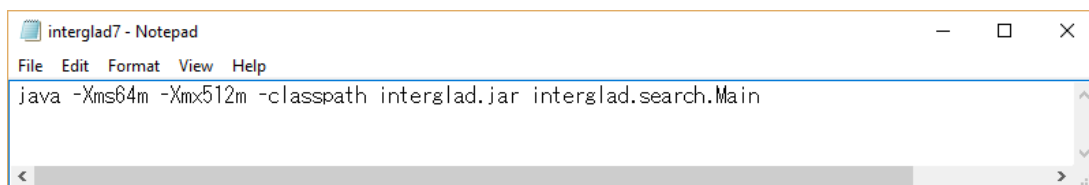
① By right-clicking the [INTERGLAD7.* SA] icon on the desktop, select [Edit] of the [interglad7] file.

② Rewrite the batch file and save. The code letters should be ANSI.

Before rewrite:

```
java -Xms64m -Xmx512m -classpath interglad.jar interglad.search.Main
```

(Window below)



For 32-bit PC rewrite as follows.

```
"c:\Program Files\Java\jre7\bin\java.exe" -Xms64m -Xmx512m -classpath  
interglad.jar interglad.search.Main
```

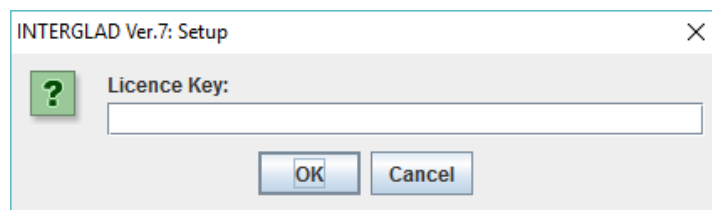
For 64-bit PC rewrite as follows.

```
"c:\Program Files (x86)\Java\jre7\bin\java.exe" -Xms64m -Xmx512m -classpath  
interglad.jar interglad.search.Main
```

5) Start-up of INTERGLAD

Double-click the [INTERGLAD 7.* SA] icon on the desktop of the PC, and the [Main] window of INTERGLAD opens with [INTERGLAD Ver. 7: Setup] dialog box

(below). Input the license key in the dialog box, and click the [OK] button. The user can perform search and all other functions.



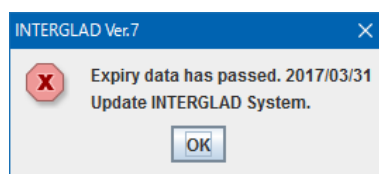
6) Provisional version applicable for Java Ver. 8

The provisional version applies JDBC and UCanAccess software complementally for access function to ODBC database. In this version the full functions except registration and conversion of User Data are available. Preregistered User Data are available for search and prediction. To use this version, download and decompress “interglad-7.*.*-b-sa.zip” in the CD which has been sent by NGF on the user’s PC. By double-clicking the [interglad7] batch file, INTERGLAD starts up. For the first start-up it takes time, around 10 minutes.

4. Procedures of Update for Standard and CD Full Function Edition

For the Standard Edition, click [Check Update] of the [Help] pulldown menu on the menu bar of the [Main] window, and the [INTERGLAD Downloads] webpage opens. When a new version appears on the page, update to the new version of Ver. 7 by the following procedure 2)~9),

When a dialog below appears, update the Standard Edition by the following procedure.



- 1) Open the [INTERGLAD Ver. 7] page in the website of NEW GLASS FORUM. Click [Ver. 7 Standard edition system download] of [Access to INTERGLAD] in the menu on the right side of the page. Input the User ID and Password and click the [LOGIN] button. Next click [Download].
- 2) Choose the Installer of the newest version fit to the OS of the PC on the [INTERGLAD Downloads] page, download and save it in the user’s PC.
For Windows 10 (Vista, 7 or 8), interglad-7.*.*-setup-win.exe
Provisional version applicable for Java Ver. 8 is also available. Refer to 2. 6).
- 3) When the PC has data registered in the User Database, save the user data file with

registered data, MDB File (Glass Property) “GP_user_7*.mdb” before update. The user data file is in the following folder as default, and transfer it to the desktop, etc.

Windows 10 (Vista, 7 or 8), C:\INTERGLAD 7.0\GP_user_7*.mdb

(Windows XP,

C:\Program Files\New Glass Forum\INTERGLAD 7.0\GP_user_7*.mdb)

- 4) Uninstall the [INTERGLAD 7.*] system in the [Programs and Features] window from the [Control Panel]. If the user tries to update without uninstallation of the system, an [Error] message appears on the way.
- 5) To use all functions including functions of User Data, Java Ver. 7 (32 bit) is necessary. When Java Ver. 7 is not in the PC, install it. All functions except the functions of User Data (conversion, registration and use for search) are available, when Java Ver. 8 (32 bit) is installed in the PC. Refer to 2. 2).
- 6) Install INTERGLAD by double-clicking the saved installer by 2) on the PC.
- 7) When Java Ver. 7 is used, open [interglad7 – Notepad] window by right-clicking the [INTERGLAD 7.*] icon and then selecting [Edit], and rewrite the phrase. Refer to 2. 4).
- 8) Place the saved user data file by 2) in the new [INTERGLAD 7.0] folder. When the saved file is “GP_user_76.mdb,” the new file “GP_user_76.mdb is replaced to the saved file.,
- 9) When the user data file is “GP_user_7*.mdb (*: 5 or less), convert it to “GP_user_76.mdb”. Refer to 6.1 (2) (F) in Chapter 4.
- 10) Start-up INTERGLAD by double-clicking the [INTERGLAD 7.6] icon. Open the [Preference] dialog box, and select the newest MDB Files of Local Database and User database and click the [OK] button.

For the CD Full Function Edition, perform the above procedure of 2)-10). Here in 2), the installer of the new version is in the CD sent by NGF, and the Windows Installer is “interglad-7.*.*-sa-setup-win.exe.” In 3), 4) and 8), [INTERGLAD 7.0] is replaced to [INTERGLAD 7.0 SA]. In 7) and 10), the [INTERGLAD 7.6] icon is replaced to the [INTERGLAD 7.* SA] icon.

5. Procedure for Change of Connection IP Address for New Server

The INTERGLAD server has been replaced by new one in May 23, 2017. Therefore the user of the Standard Edition has to change the connection IP address by the following procedure. Without the change the user cannot use the Standard Edition.

- 1) After starting-up the Standard Edition, when a dialog “Cannot Connect INTERGLAD Server. Set up Network Configuration.” appears, click the [OK] button. And the [Preference] dialog box opens.
 - 2) Change the IP address from “61.194.5.20” to “153.121.91.149” or “www.interglad.jp” as shown in figures.
 - 3) Click the [OK] button.
- Only one time IP Address change is required.

[Preference] dialog box
Before renewing

After renewing

OR

For the Internet Edition, add “http://153.121.91.149” or “http://www.interglad.jp” to the Exception Site List in the [Security] window of the Java Control Panel. Refer 1

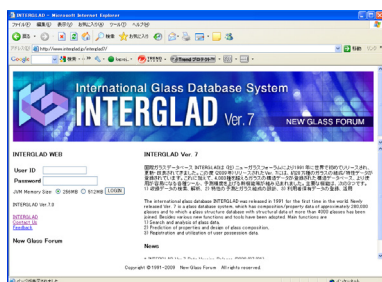
Basic Procedures

A. Start-up

Here the start-up procedures for the Internet Edition are described.

In the Standard Edition and the CD Full Function Edition, for which installing of the application to a user's PC is required, the [Main] window (No.3 in this page) opens by double-clicking of the [INTERGLAD] icon on the desk-top.

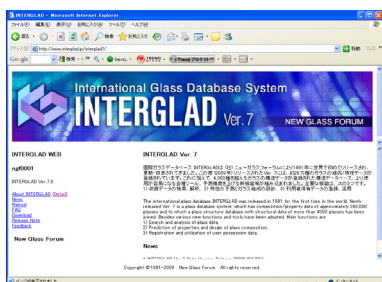
1 [INTERGLAD WEB] page



Open the [INTERGLAD WEB] page from the website, <http://www.interglad.jp/interglad7>. Input your User ID and Password in each column, then click the [LOGIN] button. (Refer p. 2 of this Chapter.)

- As [JVM Memory Size] 256MB is selected commonly. When large capacity processes are required, it is preferable to change to 512MB.
- On the [Security] window of Java Control Panel, check "Enable Java content in the browser," and add "http://www.interglad.jp" in the Exception Site List.

2

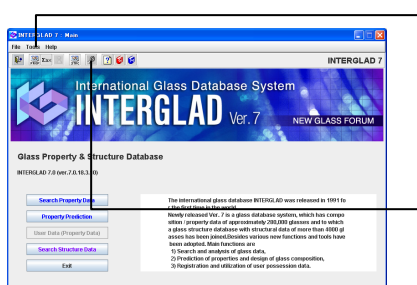


When clicking an item on the left side of the screen, the corresponding page opens.

From [Manual], the User's Manual including ID lists can be browsed and downloaded.

- By selecting [Contents of Property Data], [Contents of Structure Data] from Tools on the menu bar, the number of corresponding glasses can be checked.
- From [Contents of Glass-Forming Region], the number of 2 or 3-component compositions with the data can be checked.

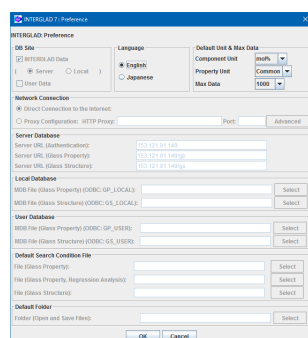
3 [Main] window



By clicking the [LOGIN] button, the [Main] window opens after the No.2 page is displayed. As the [Main] window appears under the No.2 page, set the [Main] window upside by clicking it.

By selecting [Preference] from Tools on the menu bar or clicking the [Preference] icon, the [Preference] dialog box# opens.

4 #[Preference] dialog box



The user environment can be modified on the [Preference] dialog box.

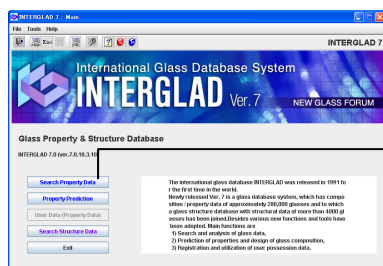
In the [Language] column, check the [English] checkbox. (The default is English.) In the [Default Unit & Max Data] column, the Component Unit, the Property Unit and the Max Data can be selected.

- From Help on the menu bar, [Manual], [Glossary], and [Measurement] are browsed as PDF files.
- In this system main items of the menu bar items have icons on the tool bar.

B. Search for Property Database

Data of glasses are searched in the Property Database under the search conditions specified as for composition, property, etc.

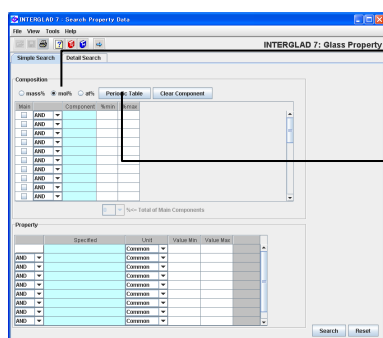
1 [Main] window



Click the [Search Property Data] button.

2 [Search Property Data] window (in case of Simple Search)

Composition condition

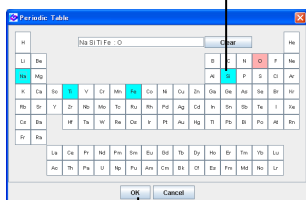


1) Unit

Select a radio button of mass%, mol% or at% in the [Composition] column.

2) Click the [Periodic Table] button.

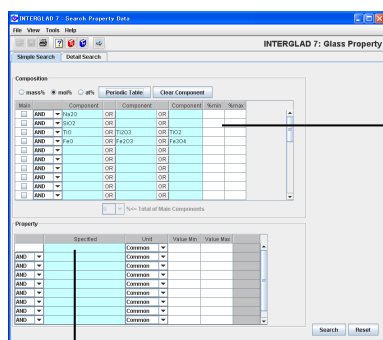
3 [Periodic Table] dialog box



3) Click required cation elements when a search composition is composed of oxides, and the cells of the selected elements become light blue color. In case of non-oxide compositions, firstly click O element (pink-colored to non-colored), secondly click a required anion element (non-colored to pink-colored), and thirdly click cation elements.

4) Click the [OK] button.

4



Components of the selected cations appear in the first longitudinal cells. Components of the same cation with different valence are shown in the horizontal cells.

- 5) Input a minimum value and/or a maximum value for the component in the cells after clicking each white-colored [%min] or [%max] cell. Then push the Enter key. (No values are also OK.)

Property condition

- 1) Double-click a light-blue [Specified] cell in the [Property] column.

- By clicking the [Simple Search] tab key or the [Detail Search] tab key, the search window can be changed. The contents of the both windows are always the same even after any selections.

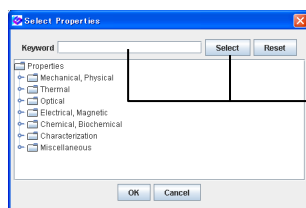
- Selection of components can be done also by double-clicking the light-blue [Component] cells and selecting components in the [Select Component] dialog box. Clicking components with pushing the Ctrl key enables selection of plural components.

- In the [Periodic Table] plural anions can be selected.

- AND, OR and NOT can be selected for each row by the pull-down menu.

- The total percentage of main components can be selected by using the [≤ Total of Main Components] pull-down menu, but this menu is active only when the [Main] checkbox is checked.

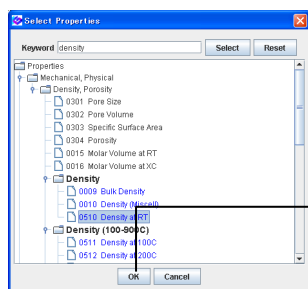
5 [Select Properties] dialog box



- 2) Input a keyword for selection of properties in the [Keyword] cell, and click the [Select] button.

Properties which include the keyword appear in blue-colored letters. Using the slide bar in the right of the window, all the blue-colored properties can be found.

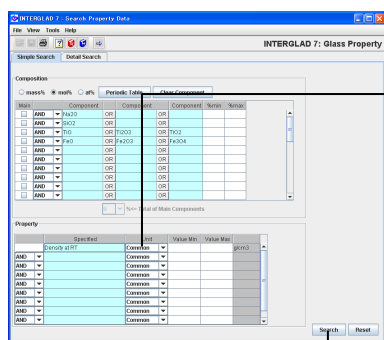
6



- 3) Click a selected property item and then the [OK] button.

The selected property appears in the [Specified] cell.

7



4) Specify a unit for each property in the [Unit] pull-down menu. Input a minimum value and/or a maximum value for the property in the cells after clicking each white-colored [Value Min] or [Value Max] cell, if necessary. Then push the Enter key.

Search

Click the [Search] button, after confirming the search conditions.

8 [Data List of Property] window

Analysis Data 1: Data List of Property

File Data View Help

Database Name: DATA

Total Number: 627

Property Name: SWH

Property Unit: mm/s

Detail

Information

Component

Number of Number: 627

Property Name: SWH

Property Unit: mm/s

Detail

Information

Component

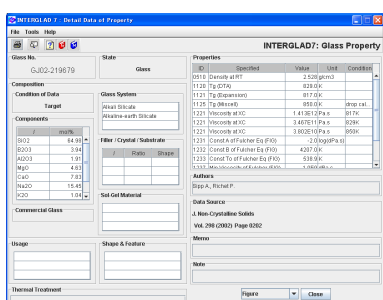
INTERFEROMETER 7: Glass Property

Property	Value	Unit	Property	Value	Unit
177	0.00000000	mm/s	178	0.00000000	mm/s
178	0.00000000	mm/s	179	0.00000000	mm/s
179	0.00000000	mm/s	180	0.00000000	mm/s
180	0.00000000	mm/s	181	0.00000000	mm/s
181	0.00000000	mm/s	182	0.00000000	mm/s
182	0.00000000	mm/s	183	0.00000000	mm/s
183	0.00000000	mm/s	184	0.00000000	mm/s
184	0.00000000	mm/s	185	0.00000000	mm/s
185	0.00000000	mm/s	186	0.00000000	mm/s
186	0.00000000	mm/s	187	0.00000000	mm/s
187	0.00000000	mm/s	188	0.00000000	mm/s
188	0.00000000	mm/s	189	0.00000000	mm/s
189	0.00000000	mm/s	190	0.00000000	mm/s
190	0.00000000	mm/s	191	0.00000000	mm/s
191	0.00000000	mm/s	192	0.00000000	mm/s
192	0.00000000	mm/s	193	0.00000000	mm/s
193	0.00000000	mm/s	194	0.00000000	mm/s
194	0.00000000	mm/s	195	0.00000000	mm/s
195	0.00000000	mm/s	196	0.00000000	mm/s
196	0.00000000	mm/s	197	0.00000000	mm/s
197	0.00000000	mm/s	198	0.00000000	mm/s
198	0.00000000	mm/s	199	0.00000000	mm/s
199	0.00000000	mm/s	200	0.00000000	mm/s
200	0.00000000	mm/s	201	0.00000000	mm/s
201	0.00000000	mm/s	202	0.00000000	mm/s
202	0.00000000	mm/s	203	0.00000000	mm/s
203	0.00000000	mm/s	204	0.00000000	mm/s
204	0.00000000	mm/s	205	0.00000000	mm/s
205	0.00000000	mm/s	206	0.00000000	mm/s
206	0.00000000	mm/s	207	0.00000000	mm/s
207	0.00000000	mm/s	208	0.00000000	mm/s
208	0.00000000	mm/s	209	0.00000000	mm/s
209	0.00000000	mm/s	210	0.00000000	mm/s
210	0.00000000	mm/s	211	0.00000000	mm/s
211	0.00000000	mm/s	212	0.00000000	mm/s
212	0.00000000	mm/s	213	0.00000000	mm/s
213	0.00000000	mm/s	214	0.00000000	mm/s
214	0.00000000	mm/s	215	0.00000000	mm/s
215	0.00000000	mm/s	216	0.00000000	mm/s
216	0.00000000	mm/s	217	0.00000000	mm/s
217	0.00000000	mm/s	218	0.00000000	mm/s
218	0.00000000	mm/s	219	0.00000000	mm/s
219	0.00000000	mm/s	220	0.00000000	mm/s
220	0.00000000	mm/s	221	0.00000000	mm/s
221	0.00000000	mm/s	222	0.00000000	mm/s
222	0.00000000	mm/s	223	0.00000000	mm/s
223	0.00000000	mm/s	224	0.00000000	mm/s
224	0.00000000	mm/s	225	0.00000000	mm/s
225	0.00000000	mm/s	226	0.00000000	mm/s
226	0.00000000	mm/s	227	0.00	

Searched result

Searched glasses are listed in the order of their glass numbers. Each glass data is shown in a row. Total Number means the number of the searched glasses; Number of Sources means the number of sources of the searched glasses

9 [Detail Data of Property] window



Detail of the searched glass

Select a glass by clicking the row in the [Data List of Property] window and click the [Detail] button.

[Detail Data of Property] window appears showing all information for the selected glass.

- Properties can be selected also from the [Select Properties] dialog box opened by double-clicking in a [Specified] cell
- Bold-face items in the dialog box can refer to the [Specified] cells.
- Plural items in the [Select Properties] dialog box can be selected in a lump by 'Ctrl-click' in the items.
- AND or OR can be specified for each row in the [Property] column.
- The default unit is Common, which is usually used.
- In the [Detail Search] window, State, Glass System, Shape, Feature & Manufacturing Processes, Usage, Data Source, Author, and Glass No. can be utilized as search conditions.

- The [Detail Data of Property] window opens also by double-clicking in the row of a selected glass. Note not to check the [Delete] checkbox.

10 [Data Source List] window

2015-2016 AD - Data Source List			INTERGLO 7: Data Source List			
File Types: .xlsx						
		Date Shared	Data Source Number	Author	Notes	Num of Pages
1	Japanese Patent	1987	AD-000107			
2	Non-Crestline Studies	1976	Vol. 017 Page 02-29	Etter, C. L., Wachs, H.		2
3	Non-Crestline Studies	1987	Vol. 005, Part 1, 1-10	Etter, C. L., Wachs, H.		10
4	Medical Science	1976	Vol. 012 Page 01-01	Etter, C. L., Wachs, H.		1
5	PHS CLC	1986	Vol. 047 Page 01-01	Etter, C. L., Wachs, H.		1
6	Science Head Book 10	1987	Vol. 001 Page 01-01	Etter, C. L., Wachs, H.		1
7	Japanese Patent	1985	AD-002322		Nothing in this source is	14
8	U.S. Pat. Class Search	1985	Vol. 016 Page 0016		experimental class.	24
9	U.S. Patent	1986	AD-003035			
10	U.S. Patent	1986	AD-005053			
11	U.S. Pat. Class Search	1985	Vol. 001 Page 0011		experimental class.	24
12	U.S. Pat. Class Search	1985	Vol. 001 Page 0013		experimental class.	24
13	Class Technology	1987	Vol. 005 Page 0005	Physician Group	Nothing in this source is	2
14	Class Technology	1987	Vol. 045 Page 0073	Birgum P. A., Hurd R. B.	nothing in PHD course	2
15	U.S. Patent	1987	Vol. 005 Page 0052	Stewart, J., Ratzlaff, M. J.	nothing in PHD course	5
16	U.S. Patent	1987	Vol. 005 Page 0052	Stewart, J., Ratzlaff, M. J.	nothing in PHD course	5
17	U.S. Patent	1987	AD-005751		Nothing in this source is	12
18	U. Am. Chem. Soc.	1982	Vol. 005 Page 0235	Gordonham, A., Escanti,		12
19	Non-Crestline Studies	1987	Vol. 005 Page 0005	Etter, C. L., Wachs, H.		2
20	U.S. Patent	1987	AD-002839			2
21	Science Class PHD	1986	Vol. 004 Page 0004			2
22	Non-Crestline Studies	1986	Vol. 014 Page 0015	Nakagaki, S., Imai, M.		2
23	U.S. Pat. Class Search	1985	Vol. 001 Page 0010		experimental class.	24

11 [Glasses from a Data Source] window

[illegible]

12 [Data List of Property] window (the same as 8)

[illegible]

13

[illegible]

Data source list

Click the [Data Source List] button or [Data Source List] in Tools on the menu bar, and the [Data Source List] window appears corresponding to the [Data List of Property].

In this list number of glasses in each source is also indicated as [Num of Data].

List of glasses from a single data source

Click the row of a selected glass in the [Data List of Property] window, and click the [Glasses from a Data Source] icon or [Glasses from a Data Source] in Tools on the menu bar.

All the composition and property data of glasses from the same data source are shown in the list.

Search of structure data

Structure data of glasses in the [Data List of Property] can be searched.

Click the [Search Structure DB] icon.

When structure data of the listed glasses exist in the Structure Database, the glass No. in the Structure Database are indicated in the [Data List of Property] window.

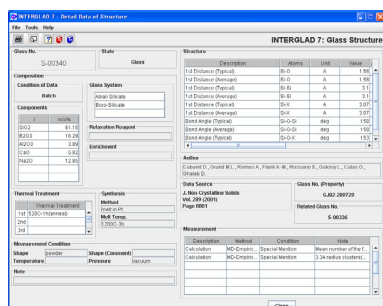
The [Detail Data of Structure] window opens by clicking the row of a selected glass with sturuture glass No. and then clicking the [Detail Data of Structure] icon.

- When a part of the description of [Data Source], [Author] or [Memo] is not shown, drag the mouse-pointer to the right at the right end of the column label to widen the column

- Double-clicking the row of a selected glass in the [Data Source List] window also opens the [Glasses from a Data Source] window.

- Clicking [Search Structure] in Tools on the menu bar results in the same appearance.

14 [Detail Data of Structure] window



For closing the windows, click the x mark in the right upper side of the screen in order. For finishing INTERGLAD, click the [Exit] button in the [Main] window.

C. Analysis for Property Database

Analysis of glasses searched with the Property Database can be performed by Ternary Plot of 3 components, XY Plot of 2 items of components and/or properties, Temperature-Property XY Plot, and Element Analysis of composition. The procedures are as follows.

C.1 Ternary Plot

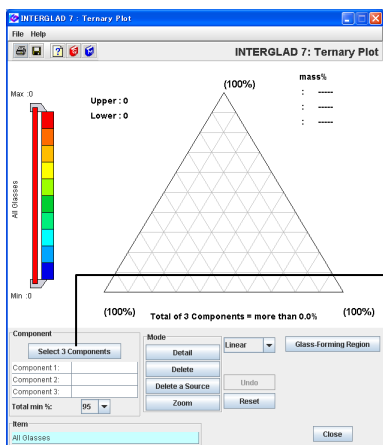
The procedures start from the [Data List of Property] window (8 of [B. Search for Property Database]).

1 [Data List of Property] window

Date	No.	Glass No.	Data Source	Unit	Chemical Composition	Physical Properties	Reference
1	0405-01-0772	J-Non-Crystalline B	1877-024 p.1977	01.00	12.00	2.40	1.50
2	0405-01-0726	J-Non-Crystalline B	1877-026 p.1814	77.51	11.07	2.70	1.47
3	0405-01-0727	J-Non-Crystalline B	1877-026 p.1815	71.50	10.04	2.52	1.40
4	0805-02-0882	Matheson Data	1886-001 p.3166	60.16	12.02	2.30	1.474
5	0805-02-0884	Matheson Data	1886-001 p.3166	67.77	10.92	2.60	1.55
6	0805-02-0886	Matheson Data	1886-001 p.3166	71.60	10.02	2.90	1.491
7	0805-02-0881	Japanese Patent	1885-4181301	58.81	12.07	6.10	1.527
8	0805-02-0881	Japanese Patent	1885-4181301	58.80	12.07	6.10	1.527
9	0805-02-0888	Japanese Patent	1885-4181551	72.20	6.10	6.07	1.508
10	0805-02-0721	Japanese Patent	1883-3474339	30.00	40.00	2.50	1.522
11	0805-02-0722	Japanese Patent	1883-3474339	30.00	40.00	2.50	1.50
12	0805-02-0483	Japanese Patent	1884-4174542	71.82	11.00	6.00	1.48
13	0805-02-0484	Japanese Patent	1884-4174542	70.41	12.01	6.47	1.495
14	0805-02-0748	Japanese Patent	1883-3484640	69.45	14.43	2.30	1.487
15	0805-02-0828	Japanese Patent	1882-3430247	60.00	6.00	6.10	1.514
16	0805-02-0827	Japanese Patent	1882-3430247	60.00	6.00	6.10	1.512
17	0805-02-0828	Japanese Patent	1882-3430247	70.10	6.00	6.10	1.511
18	0805-02-0828	Japanese Patent	1882-3430247	71.00	6.00	6.10	1.512
19	0805-02-0828	Japanese Patent	1882-3430247	70.10	7.00	6.10	1.512
20	0805-02-0828	Japanese Patent	1882-3430247	67.60	10.00	6.10	1.516
21	0805-02-0828	Japanese Patent	1882-3430247	65.60	12.00	6.10	1.517
22	0805-02-0828	Japanese Patent	1882-3430247	63.60	14.00	6.10	1.514

1) Click the [Ternary Plot] icon, and the [Ternary Plot] window opens.

2 [Ternary Plot] window

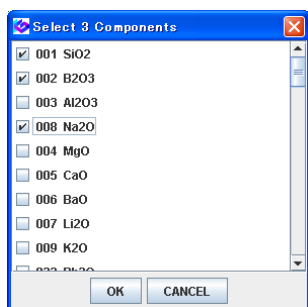


Condition of ternary plots

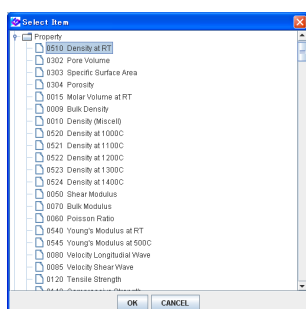
2) Click the [Select 3 Components] button, and the [Select 3 Components] dialog box* opens. In this dialog box check in the checkboxes of 3 components for a ternary plot, and click the [OK] button.

The selected 3 components appear in the [Component 1, 2, 3] cells.

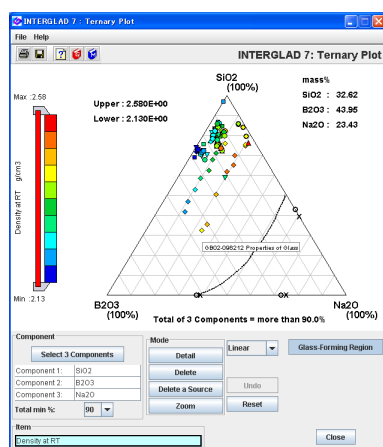
3 ***[Select 3 Components]** dialog box



4 ****[Select Item]** dialog box



5 **[Ternary Plot]** window



- 3) Select total minimum % of the selected 3 components in the [Total min.%] pulldown menu.
- 4) Double-click the light-blue colored [Item] column, and the [Select Item] dialog box** opens. Select an item of properties, and click the [OK] button.

- The default value of the total minimum % is 95%.

- When [All Glasses] is selected in the [Select Item] dialog box, the compositions of all the searched glasses are indicated on the Ternary Plot.

- By clicking the [Glass-Forming Region] button, the glass-forming region is shown as ○ (vitrified), x (non-vitrified), and limit lines.

- With the [Detail] button active, click any plot-point, and the [Detail Data of Property] window for the pointed glass appears.

- In the same manner, with the [Delete] button active, the pointed glass is deleted by clicking. The [Undo] button undoes the previous delete operation.

- With the [Zoom] button active, a specified part of the ternary plot can be enlarged by dragging with the mouse-pointer. The [Reset] button undoes the previous zoom operation.

- The pointers of the [Property Value] slider can be used to set upper and lower limiting values of the property in the Ternary Plot.

Result of ternary plot

In a ternary diagram, distribution of glasses with different-colored plots is displayed according to the colors of value ranges on the selected property in the slide bar on the left side of the screen.

When the condition of 3 components, the minimum total value, or the item is changed, the corresponding Ternary Plot appears.

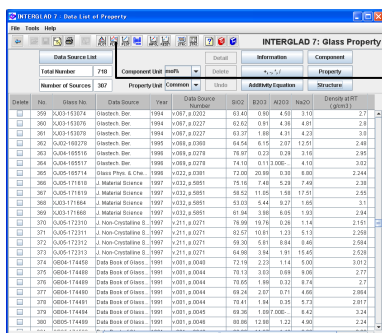
For closing the [Ternary Plot] window, click the [Close] button, or click the x mark in the right upper side of the screen

By clicking the [Print] icon, the window can be printed.

C.2 XY Plot

The procedures start from the [Data List of Property] window (8 of [B. Search for Property Database]).

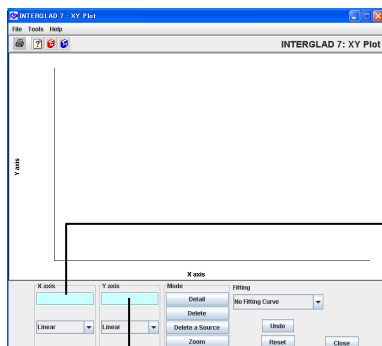
1 [Data List of Property] window



Data Source List	Component Unit (mol%)	Property Unit	Component	Property
001 0.001 15.074	0.001	15.074	0.001	15.074
002 0.001 15.074	0.001	15.074	0.001	15.074
003 0.001 15.074	0.001	15.074	0.001	15.074
004 0.001 15.074	0.001	15.074	0.001	15.074
005 0.001 15.074	0.001	15.074	0.001	15.074
006 0.001 15.074	0.001	15.074	0.001	15.074
007 0.001 15.074	0.001	15.074	0.001	15.074
008 0.001 15.074	0.001	15.074	0.001	15.074
009 0.001 15.074	0.001	15.074	0.001	15.074
010 0.001 15.074	0.001	15.074	0.001	15.074
011 0.001 15.074	0.001	15.074	0.001	15.074
012 0.001 15.074	0.001	15.074	0.001	15.074
013 0.001 15.074	0.001	15.074	0.001	15.074
014 0.001 15.074	0.001	15.074	0.001	15.074
015 0.001 15.074	0.001	15.074	0.001	15.074
016 0.001 15.074	0.001	15.074	0.001	15.074
017 0.001 15.074	0.001	15.074	0.001	15.074
018 0.001 15.074	0.001	15.074	0.001	15.074
019 0.001 15.074	0.001	15.074	0.001	15.074
020 0.001 15.074	0.001	15.074	0.001	15.074
021 0.001 15.074	0.001	15.074	0.001	15.074
022 0.001 15.074	0.001	15.074	0.001	15.074
023 0.001 15.074	0.001	15.074	0.001	15.074
024 0.001 15.074	0.001	15.074	0.001	15.074
025 0.001 15.074	0.001	15.074	0.001	15.074
026 0.001 15.074	0.001	15.074	0.001	15.074
027 0.001 15.074	0.001	15.074	0.001	15.074
028 0.001 15.074	0.001	15.074	0.001	15.074
029 0.001 15.074	0.001	15.074	0.001	15.074
030 0.001 15.074	0.001	15.074	0.001	15.074
031 0.001 15.074	0.001	15.074	0.001	15.074
032 0.001 15.074	0.001	15.074	0.001	15.074
033 0.001 15.074	0.001	15.074	0.001	15.074
034 0.001 15.074	0.001	15.074	0.001	15.074
035 0.001 15.074	0.001	15.074	0.001	15.074
036 0.001 15.074	0.001	15.074	0.001	15.074
037 0.001 15.074	0.001	15.074	0.001	15.074
038 0.001 15.074	0.001	15.074	0.001	15.074
039 0.001 15.074	0.001	15.074	0.001	15.074
040 0.001 15.074	0.001	15.074	0.001	15.074
041 0.001 15.074	0.001	15.074	0.001	15.074
042 0.001 15.074	0.001	15.074	0.001	15.074
043 0.001 15.074	0.001	15.074	0.001	15.074
044 0.001 15.074	0.001	15.074	0.001	15.074
045 0.001 15.074	0.001	15.074	0.001	15.074
046 0.001 15.074	0.001	15.074	0.001	15.074
047 0.001 15.074	0.001	15.074	0.001	15.074
048 0.001 15.074	0.001	15.074	0.001	15.074
049 0.001 15.074	0.001	15.074	0.001	15.074
050 0.001 15.074	0.001	15.074	0.001	15.074
051 0.001 15.074	0.001	15.074	0.001	15.074
052 0.001 15.074	0.001	15.074	0.001	15.074
053 0.001 15.074	0.001	15.074	0.001	15.074
054 0.001 15.074	0.001	15.074	0.001	15.074
055 0.001 15.074	0.001	15.074	0.001	15.074
056 0.001 15.074	0.001	15.074	0.001	15.074
057 0.001 15.074	0.001	15.074	0.001	15.074
058 0.001 15.074	0.001	15.074	0.001	15.074
059 0.001 15.074	0.001	15.074	0.001	15.074
060 0.001 15.074	0.001	15.074	0.001	15.074
061 0.001 15.074	0.001	15.074	0.001	15.074
062 0.001 15.074	0.001	15.074	0.001	15.074
063 0.001 15.074	0.001	15.074	0.001	15.074
064 0.001 15.074	0.001	15.074	0.001	15.074
065 0.001 15.074	0.001	15.074	0.001	15.074
066 0.001 15.074	0.001	15.074	0.001	15.074
067 0.001 15.074	0.001	15.074	0.001	15.074
068 0.001 15.074	0.001	15.074	0.001	15.074
069 0.001 15.074	0.001	15.074	0.001	15.074
070 0.001 15.074	0.001	15.074	0.001	15.074
071 0.001 15.074	0.001	15.074	0.001	15.074
072 0.001 15.074	0.001	15.074	0.001	15.074
073 0.001 15.074	0.001	15.074	0.001	15.074
074 0.001 15.074	0.001	15.074	0.001	15.074
075 0.001 15.074	0.001	15.074	0.001	15.074
076 0.001 15.074	0.001	15.074	0.001	15.074
077 0.001 15.074	0.001	15.074	0.001	15.074
078 0.001 15.074	0.001	15.074	0.001	15.074
079 0.001 15.074	0.001	15.074	0.001	15.074
080 0.001 15.074	0.001	15.074	0.001	15.074
081 0.001 15.074	0.001	15.074	0.001	15.074
082 0.001 15.074	0.001	15.074	0.001	15.074
083 0.001 15.074	0.001	15.074	0.001	15.074
084 0.001 15.074	0.001	15.074	0.001	15.074
085 0.001 15.074	0.001	15.074	0.001	15.074
086 0.001 15.074	0.001	15.074	0.001	15.074
087 0.001 15.074	0.001	15.074	0.001	15.074
088 0.001 15.074	0.001	15.074	0.001	15.074
089 0.001 15.074	0.001	15.074	0.001	15.074
090 0.001 15.074	0.001	15.074	0.001	15.074
091 0.001 15.074	0.001	15.074	0.001	15.074
092 0.001 15.074	0.001	15.074	0.001	15.074
093 0.001 15.074	0.001	15.074	0.001	15.074
094 0.001 15.074	0.001	15.074	0.001	15.074
095 0.001 15.074	0.001	15.074	0.001	15.074
096 0.001 15.074	0.001	15.074	0.001	15.074
097 0.001 15.074	0.001	15.074	0.001	15.074
098 0.001 15.074	0.001	15.074	0.001	15.074
099 0.001 15.074	0.001	15.074	0.001	15.074
100 0.001 15.074	0.001	15.074	0.001	15.074

Click the [XY Plot] icon, and the [XY Plot] window opens.

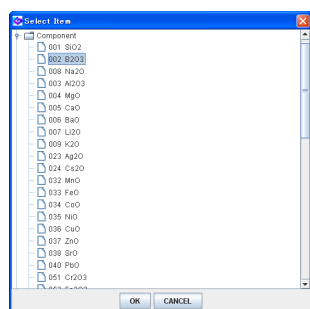
2 [XY Plot] window



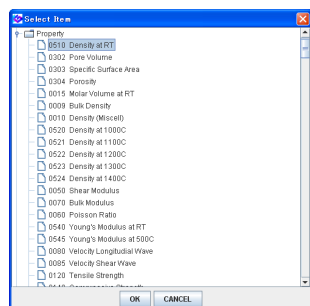
Specification of X and Y axes

① By clicking the [X axis] column (light-blue colored cell), the [Select Item] dialog box opens.

3 [Select Item] dialog box



4



② By clicking  mark of Component or Property, its submenu appears. Select an item for X axis by clicking and click the [OK] button.

③ By clicking the [Y axis] column (light-blue colored cell), the [Select Item] dialog box opens.

④ Select an item for Y axis by clicking and click the [OK] button.

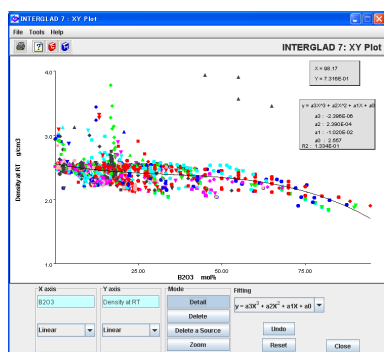
- All the items in the [Select Item] dialog box are available for X or Y axis. XY plots for component vs. component, component vs. property, and property vs. property can be drawn.

- By selecting the [Fitting] pull-down menu, a fitting curve (linear, quadratic or cubic) and its equation can be shown.

- The scale of the X-axis or Y-axis independently can be changed using the pull-down menu below the [X-axis] or the [Y axis] button. Linear, inverse, logarithmic and reverse scales are available.

- Indication of detail data, deletion of each point data, or enlargement of a part of the XY plot can be performed in the same manner as that for the Ternary Plot.

5 [XY Plot] window



Result of XY Plot

For closing the XY Plot, click the [Close] button, or click the x mark in the right upper side of the screen.

- Indication of detail data, deletion of each point data, or enlargement of a part of the XY plot can be performed in the same manner as that for the Ternary Plot.
- Using the [XY Plot Option (Axis)] dialog box in Tools on the menu bar, labels of axes, value range of axes and format of axis values can be changed. Using the [XY Plot Option (Mark)] dialog box, shape and color of plot-points can be changed.

C.3 Temperature-Property Plot

The procedures start from the [Data List of Property] window (8 of [B. Search for Property Database]).

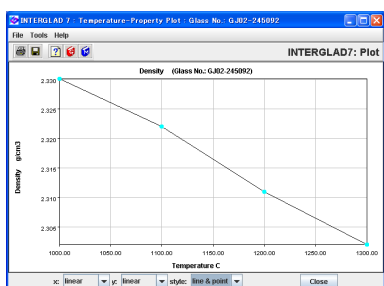
1 [Data List of Property] window

Index	Temp (K)	Property	Value	Temp (K)	Property	Value	Temp (K)	Property	Value
1276	0.005-245976	v001.p.0103	63.10	0.30	37.00				
1277	0.005-245976	v001.p.0103	60.00	10.00	35.00				
1278	0.005-245987	v002.p.1862	75.00	0.00	15.00				
1279	0.005-245988	v002.p.1862	69.00	12.00	15.00				
1280	0.005-245988	v002.p.1862	63.00	18.00	15.00				
1281	0.005-245988	v002.p.1862	63.00	30.00	15.00				
1282	0.005-245988	v002.p.1862	22.00	60.00	15.00				
1283	0.005-245988	v006.p.1087	66.70	22.26	11.00				
1284	0.005-245988	v006.p.1087	74.00	14.40					
1285	0.005-245988	v006.p.1087	71.25	13.77	2.30	2.302	2.314	2.30	
1286	0.005-245988	v006.p.1087	73.86	8.12	2.26	2.222	2.282	2.47	
1287	0.005-245987	v006.p.1087	71.26	7.81		2.250	2.212	2.19	
1288	0.005-245911	v006.p.1087	73.86	10.17	9.55	2.282	2.250	2.237	2.2
1289	0.005-245944	v001.p.0001	63.16	11.61	4.00			2.145	
1290	0.005-245944	v001.p.0001	63.16	4.26	1.93	2.31	2.313	2.282	2.15
1291	0.005-245944	v001.p.0005	86.17	0.77	3.72				
1292	0.005-245944	v001.p.0005	62.00	0.31	3.91				
1293	0.005-245944	v001.p.0005	77.62	0.97	8.04				
1294	0.005-245947	v001.p.0005	60.37	0.40	3.90				
1295	0.005-245948	v001.p.0005	74.10	0.41	8.90				
1296	0.005-245948	v001.p.0005	74.26	0.34	8.64				
1297	0.005-245949	v001.p.0005	77.07	13.81	4.37				

When property data at high temperatures ($\geq 50^{\circ}\text{C}$) are indicated in a glass row, click the row, and click the [Temperature-Property Plot] icon.

- Available properties for Temperature-Property Plot are listed in Table 1 of Appendix 2.

2 [Temperature-Property Plot] window



XY plot for temperature vs. the property is shown.

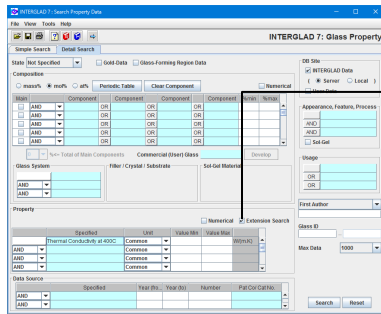
C.4 Data Interpolation

High-temperature property values can be calculated for given temperatures by interpolating or extrapolating with available data in the database. Here data interpolation from [Search Property Data] window is explained. The similar procedures are available also from [Search for Regression Analysis] window, and the obtained interpolated data can be applied for multiple regression analysis.

- Refer Appendix 2.
- Available properties for Data Interpolation are the same as those for Temperature-Property Plot listed in Table 1 of Appendix 2.

Click the [Detail Search] tab in the [Search Property Data] window at 2 of [B. Search for Property Database].

1 [Search Property Data] window



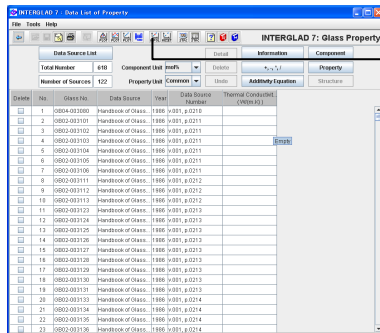
1) Select a property item with few data for data interpolation.

* Example: Thermal Conductivity at 400°C

2) Click the [Extension Search] checkbox in the right upperside of the [Property] column. By this checkbox, data with other temperatures of the property can be searched.

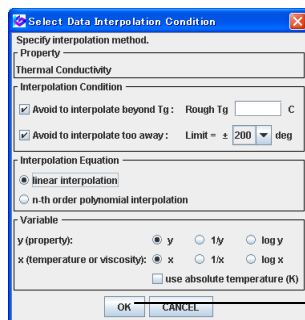
3) Click the [Search] button.

2 [Data List of Property] window



4) Click the [Data Interpolation] icon in the [Data List of Property] window, and the [Select Data Interpolation Condition] dialog box appears..

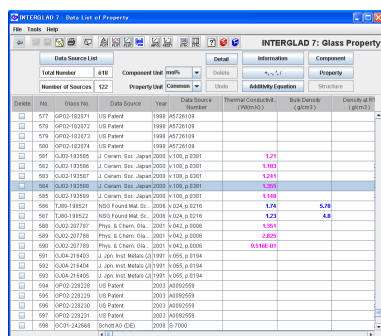
3 [Select Data Interpolation Condition] dialog box



5) Select conditions for data interpolation, and click the [OK] button. Default conditions are preset.

In case of 2 or more property categories such as Density, Thermal Conductivity, and Viscosity for data interpolation, [Select Data Interpolation Condition] dialog box appears in each.

4



6) Interpolated data are shown with red-purple color letters in the table.

7) Activate the row of a glass with interpolated data by clicking and click the [Temperature-Property Plot] icon. XY Plot with interpolated data appears.

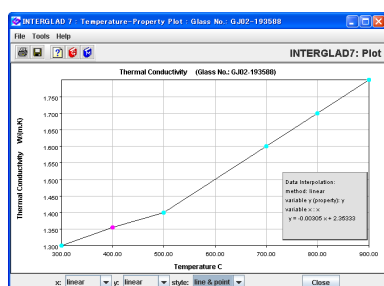
- Instead of clicking the [Extension Search] checkbox, data interpolation can be performed by selection of more than 2 property items in the same category with different temperatures connected by OR.

- Interpolated data are obtained under the specified condition, when 2 or more data at different temperatures for a property exist in the glass.

- For reset of conditions of interpolation, click the [Reset] icon.

- Interpolated data can be used for analysis such as ternary plot and for multiple regression analysis.

5 [Temperature- Property Plot: Glass No:xxxx-yyyyyy] window



Interpolated data are indicated as red-purple colored points. Light-blue points are for fact data.

In the example, X axis: temperature, Y axis: thermal conductivity.

- Type of axis scale (linear, inverse, logarithmic or reverse) and style of plot (point and/or line) can be converted with the pull-down menus in the bottom side of the window.

C.5 Element Analysis

The procedures start from the [Data List of Property] window (8 of [B. Search for Property Database]).

1 [Data List of Property] window

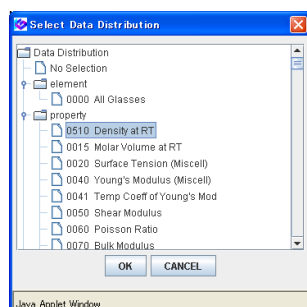
Click the [Element Distribution] icon, and the [Element Distribution] window opens.

2 [Element Distribution] window

Condition of element analysis

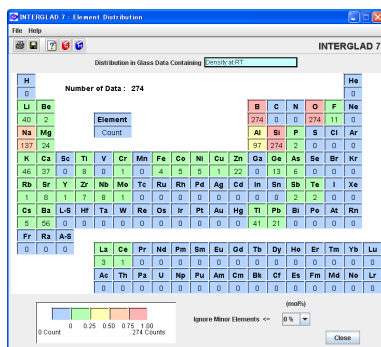
1) Double-click the [Distribution in Glass Data Containing] column (light-blue colored cell), and the [Select Items] dialog box appears.

3 [Select Item] dialog box



2) Click a property item for element analysis, and click the [OK] button.

- By selecting All Glasses of Element in the [Select Item] dialog box, element analysis of all the listed glasses can be performed



Result of element analysis

Under each element of the periodic table, number of glasses containing the element as component is indicated for glasses with the specified property data in the data list.

Five different colors for the count are used, assigned according to the ratio of the maximum count as indicated in the color bar in the bottom of the window.

For closing the element distribution window, click the [Close] button, or click the x mark in the right upper side of the window.

- The upper limit of minor elements can be selected from 8 levels in the [Ignore Minor Elements] pull-down menu.

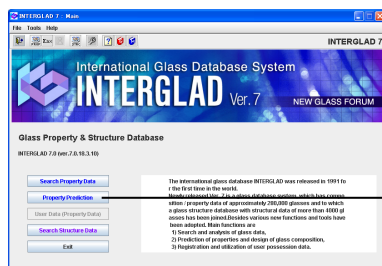
D. Property Prediction and Composition Optimization

In the Property Database, property prediction by additivity equations can be performed, and multiple regression analysis can be used for property prediction and composition optimization. The procedures are as follows.

D. 1 Property Prediction by Additivity Equation

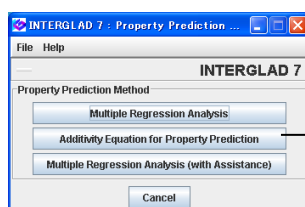
The properties of glasses with given compositions are predicted using additivity equations.

1 [Main] window



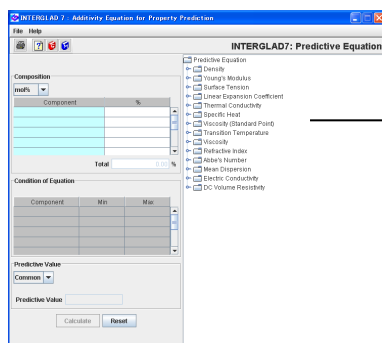
Click the [Property Prediction] button.

2 [Property Prediction Method] dialog box



Click the [Additivity Equation for Property Prediction] button.

3 [Additivity Equation for Property Prediction] window

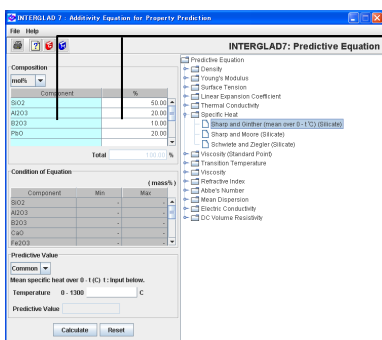


Selection of Additivity Equation

1) In the [Prediction Equation] menu, select a property by clicking  of the left, and additivity equations of the property appears. Check the checkbox of a selected equation.

In the [Condition of Equation] column, the composition condition of the selected equation appears.

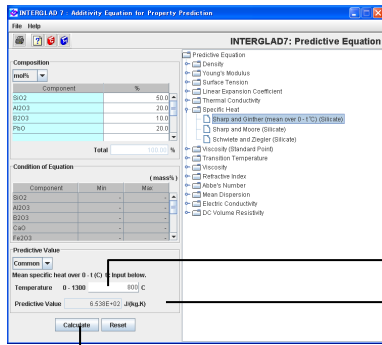
4



2) Specify a given composition in the [Composition] column. First open the [Select Components] dialog box by double-clicking a light-blue cell. Click a component and click the [OK] button. Second choose a unit from the pull-down menu of unit. Then input a given value of the component in the right white cell.

- To select two or more components, click components holding down the Ctrl key.

5



Calculation of Property Value

When a white cell appears in the [Predictive Value] column, input temperature or viscosity in the cell.

Then click the [Calculate] button, and a predicted value appears in the [Predictive Value] cell.

For closing the window, click the x mark in the right upper side of the screen. For finishing INTERGLAD, click the [Exit] button in the [Main] window.

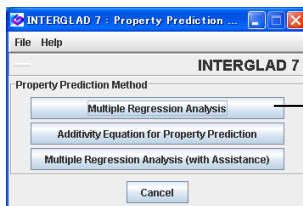
- When the [Check equation conditions] dialog box appears, check the condition of equation and the User's Manual, and correct the condition and calculate again.

D. 2 Property Prediction by Multiple Regression Analysis

The properties of glasses with a given composition can be predicted by multiple regression analysis. Data only with "Glass" state are usable for the analysis.

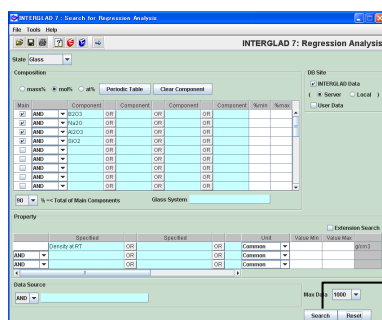
Start from 2 of D. 1 Property Prediction by Additivity Equation.

1 [Property Prediction Method] dialog box



Click the [Multiple Regression Analysis] button.

2 [Search for Regression Analysis] window



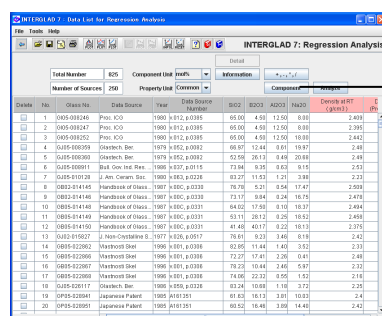
Search condition for regression analysis

Specify search conditions of main components and properties of glasses for property prediction in the same procedures of 2 to 7 in B. Search for Property Database.

Search

Click the [Search] button.

3 [Data List for Regression Analysis] window



Searched result

Condition for regression analysis

1) By clicking the [Component] button, open the [Select Component Terms] dialog boxes for selection of explanatory variables from that for 1-component terms to 3-component terms in order.

- Refer Appendix 1 regarding multiple regression analysis with multiple-order polynomials.

- [Multiple Regression Analysis (with Assistance)] is available as an easy guide for the procedures

- Rough search condition of components is recommended to collect many data as possible.

- State can be selected from "Glass", "Glass+Melt" or "Melt" in the [State] pulldown menu.

- Therefore such conditions are recommended as specifying only Glass System, or inputting a minimum sum amount of only essential components, or inputting 0 as minimum value of components. It is effective to specify property as Typical or Property Category (with boldface), or to specify plural items of properties combining them by OR when the data are few.

4 [Select Component Terms] dialog box 1-component terms

2) In the [Selection of 1-Component Terms] column, input a values for each cell and check in each checkbox. Then click the [Apply] button.

- 1st cell : the minimum percentage of glasses that contain the component out of the total searched glasses.
- 2nd cell : the minimum number of glasses that contain the component.

Click the [Next] button to go to the following [Selection of 2-Component Terms] or click the [OK] button to finish the selection of the component terms. When the default values are OK, only click the [Next] button or the [OK] button in the dialog box.

5 [Select Component Terms] dialog box 2-component terms

3) Select 2-component terms in the same manner as for 1-component terms.

- 1st cell : the same as that for 1-component terms.
- 2nd cell : the same as that for 1-component terms.
- 3rd cell : the maximum percentage of components for the 2-component terms to the the number of 1-component terms.

- In the example of the dialog box for 2-component terms, the 3rd cell is changed to 30%, and the [Apply] button is clicked before clicking the [OK] button.

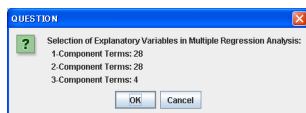
6 [Select Component Terms] dialog box 3-component terms

4) Select 3-component terms in the same manner as for 2-component terms.

- 1st cell : the same as that for 1-component terms.
- 2nd cell : the same as that for 1-component terms.
- 3rd cell : the maximum percentage of components for the 3-component terms to the the number of 1-component terms.

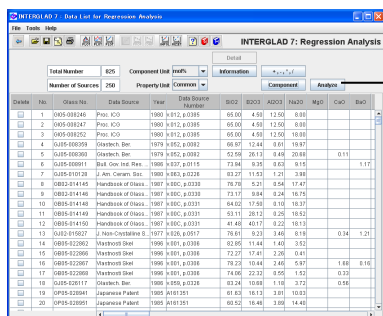
- In the example of the dialog box for 3-component terms, the 3rd cell is changed to 10%, and the [Apply] button is clicked before clicking the [OK] button.

7 [Confirm Component Terms] dialog box



5) Check the numbers of 1-, 2-, 3-component terms, and click the [OK] button.

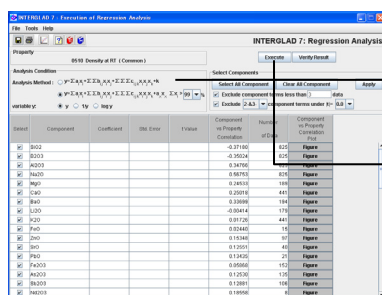
8 [Data List for Regression Analysis] window



Calculation of regression analysis

- 1) Click the [Analyze] button, and the [Execution of Regression Analysis] window opens.

9 [Execution of Regression Analysis] window



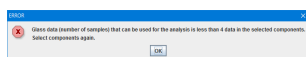
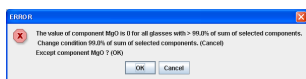
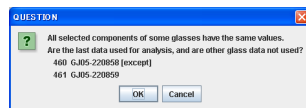
2) Check the property shown in the upper left of the screen, and select a regression equation and a type of the variable Y by radio buttons in the [Analysis Condition] column.

When the 2nd equation without the constant is chosen, select the minimum sum content % of the selected components by pull-down menu.

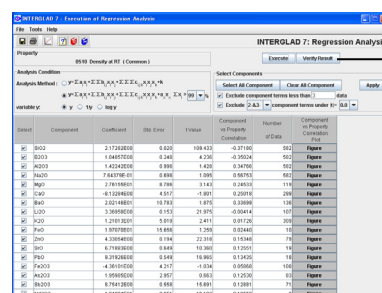
When the default condition is OK, go to the next procedure as it is.

3) Click the [Execute] button. When [Question] or [Error] dialog boxes appear, click the [OK] button, or follow the instructions.

Examples



10



Regression coefficients of the component terms, etc. are shown.

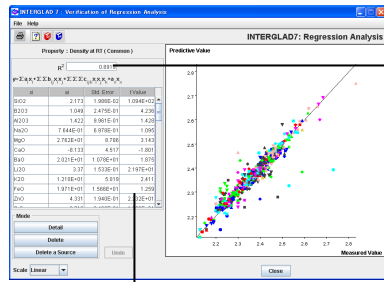
– Verify the result

Click the [Verify Result] button.

- When the number of component terms is too many or too few, correct the selection of component terms. The total number of component terms is recommended to be less than 100. Increasing the values of the 1st cell or the 2nd cell results in decrease of the numbers of the component terms. To decrease the number of 2- or 3-component terms, decrease of the maximum % of the number of the components (the 3rd cell) is effective. Checking the number of glasses for each component, deleting the check can be done in the table

- By clicking the [Figure] button in the right side, XY plot of the component and the property can be checked

11 [Verification of Regression Analysis] window



The relation between measured values (on the horizontal axis) and predicted values (on the vertical axis) is plotted.

The closer the contribution rate (R^2) is to 1, the higher the accuracy of the prediction. The preferable R^2 is higher than 0.8. Therefore when the obtained R^2 is low, correct the search conditions or selection of component terms.

Moreover, the absolute value of t (=regression coefficient/standard error of regression coefficient for each component) is recommended to be higher than 1 (more preferably 2) for each component terms. To control t value, select α and β in the pull-down menu of [Extrude a component terms under $|t| = \beta$] in the [Select Components] column of the [Execution of Regression Analysis] window, and click the [Apply] button. (For example, $\alpha: 2 \times 10^{-3}$, $\beta: 0.5$) Then perform the procedures 9-11 again. Increase $|t|$ value step by step, and complete the regression equation.

- Checking the t value and the number of glasses, deleting the check of the component terms can be used in the table of the [Execution of Regression Analysis] window. For re-check of component terms, clicking the [Select All Components] and [Apply] buttons is required.

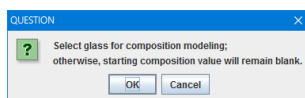
Property prediction from glass composition

12 [Data List for Regression Analysis] window

- 1) Go back to the [Data List for Regression Analysis] window, and click the Property Prediction [PROP] icon.

- When Display Glass Data using Regression Analysis is selected in Tools of the menu bar, the No. cells of glasses, whose data have not been used for the regression analysis, are changed to dark-grey color.

13 [Question] dialog box



- 2) In the [Question] dialog box which appears next, click the [OK] button. Click the [OK] button.

14 [Property Prediction] window

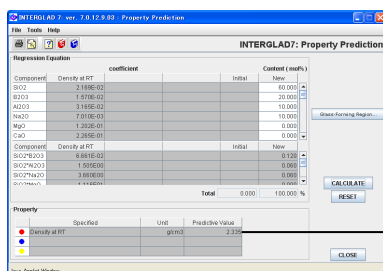
- 3) Input component ratios of a composition for property prediction in white cells of New in the [Regression Equation] column.

- 4) Click the [Calculate] button.

- When a glass is selected in the [Data List for Regression Analysis] window, the composition of the selected glass is shown in the [Initial] and [New] cells of the [Regression Equation] column.

- When the aggregate of the component ratios in the [New] cells is not 100%, the operation divides the components proportionally.

15



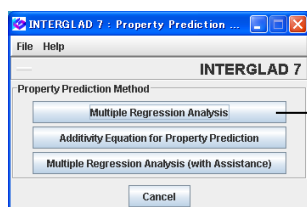
5) The predicted value of property appears in the [Predictive Value] cell of the [Property] column.

D. 3 Composition Optimization by Multiple Regression Analysis

Composition optimization for a glass with given properties can be performed by multiple regression analysis.

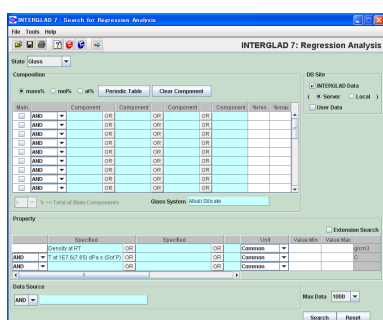
Start from 2 of D. 1 Property Prediction by Additivity Equation.

1 [Property Prediction Method] dialog box



Click the [Multiple Regression Analysis] button.

2 [Search for Regression Analysis] window



Search for prediction

Specify search conditions of property items and main components of glasses for composition optimization in the same procedures of 2 to 7 in B. Search for Property Database.

- Up to 3 properties can be specified for prediction.

<Example>

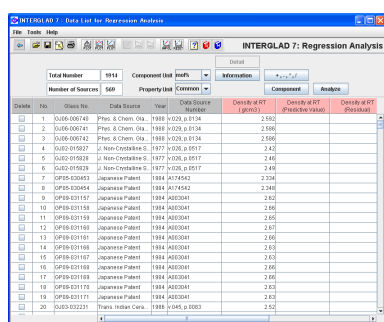
Optimize the composition of an alkali-silicate glass with 2.65g/cm³ of density at RT and 750°C of softening temperature (viscosity: 10^{7.6}dPa s).

- Refer the memo of 2 of D. 2 regarding the search conditions.

Select [Density at RT] for the cell of the 1st row in the [Property] column and [T at 1E7.6(7.65)dPa s (Sof T)] for that of the 2nd row. In the [Glass System] column select 'Alkali Silicate.'

Click the [Search] button.

3 [Data List for Regression Analysis] window



No.	Glass No.	Data Source	Year	Density at RT (g/cm3)	Density at RT (Predicted Value)	Density at RT (Predicted Error)
1	0406-006740	Phys. & Chem. Gls.	1989	2.029	2.029	0.000
2	0406-006741	Phys. & Chem. Gls.	1989	2.029	2.029	0.000
3	0406-006742	Phys. & Chem. Gls.	1989	2.029	2.029	0.000
4	0402-015027	J. Non-Crystalline S.	1977	2.026	2.026	0.000
5	0402-015028	J. Non-Crystalline S.	1977	2.026	2.026	0.000
6	0402-015029	J. Non-Crystalline S.	1977	2.026	2.026	0.000
7	0405-030453	Japanese Patent	1984	2.026	2.026	0.000
8	0405-030454	Japanese Patent	1984	2.026	2.026	0.000
9	0405-030455	Japanese Patent	1984	2.026	2.026	0.000
10	0405-030456	Japanese Patent	1984	2.026	2.026	0.000
11	0405-030457	Japanese Patent	1984	2.026	2.026	0.000
12	0405-030458	Japanese Patent	1984	2.026	2.026	0.000
13	0405-030459	Japanese Patent	1984	2.026	2.026	0.000
14	0405-030460	Japanese Patent	1984	2.026	2.026	0.000
15	0405-030461	Japanese Patent	1984	2.026	2.026	0.000
16	0405-030462	Japanese Patent	1984	2.026	2.026	0.000
17	0405-030463	Japanese Patent	1984	2.026	2.026	0.000
18	0405-030464	Japanese Patent	1984	2.026	2.026	0.000
19	0405-030465	Japanese Patent	1984	2.026	2.026	0.000
20	0405-030466	Japanese Patent	1984	2.026	2.026	0.000

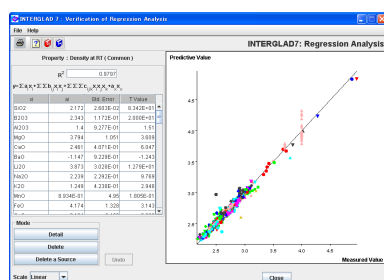
Regression analysis

Perform regression analysis according to the procedures of 3 to 11 in D. 2 Property Prediction.

Click the [Execute] button in the [Execution of Regression Analysis] window for each property.

- When 2 or 3 properties are specified, 2 or 3 [Execution of Regression Analysis] windows and [Verification of Regression Analysis] windows appear little shifted.

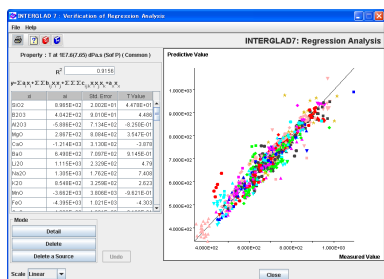
4 [Verification of Regression Analysis] window 1 (Example: Density)



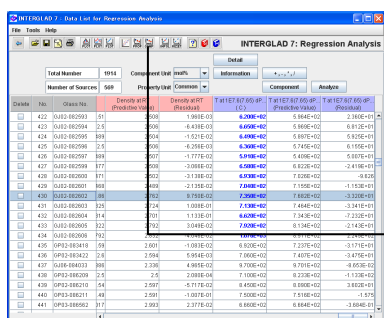
Check the [Verification of Regression Analysis] window for each property. Higher than 0.8 of R² and higher than 2 of |t| values are preferable.

- When R² and t values are not in preferable ranges, repeat the regression analysis according to the procedures written in 11 of D. 2

5 [Verification of Regression Analysis] window 2 (Example: Softening Temp.)



6 [Data List for Regression Analysis] window



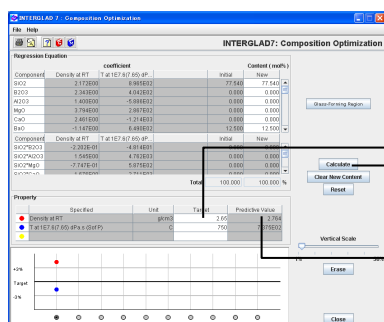
No.	Glass No.	Data Source	Year	Density at RT (g/cm3)	Density at RT (Predicted Value)	Density at RT (Predicted Error)
422	0402-002093	SI	1998	1.993E-02	6.300E-02	5.306E-02
423	0402-002094	SI	1998	6.410E-02	6.400E-02	6.815E-03
424	0402-002095	SI	1998	1.521E-02	6.400E-02	5.875E-02
425	0402-002096	SI	1998	6.396E-02	6.400E-02	5.140E-03
426	0402-002097	SI	1998	1.777E-02	6.400E-02	5.687E-02
427	0402-002098	SI	1998	3.088E-02	6.400E-02	2.418E-02
428	0402-002099	SI	1998	5.138E-02	6.400E-02	1.220E-02
429	0402-002100	SI	1998	2.138E-02	7.000E-02	1.152E-02
430	0402-002101	SI	1998	9.788E-02	7.000E-02	3.208E-02
431	0402-002102	SI	1998	1.038E-01	7.000E-02	1.341E-01
432	0402-002103	SI	1998	1.133E-01	6.600E-02	7.232E-02
433	0402-002104	SI	1998	3.088E-02	5.100E-02	5.745E-02
434	0402-002105	SI	1998	6.400E-02	1.000E-02	5.400E-02
435	0402-002106	SI	1998	1.038E-01	6.500E-02	3.888E-02
436	0402-002107	SI	1998	5.944E-02	7.000E-02	1.055E-02
437	0402-002108	SI	1998	4.981E-02	9.700E-02	-4.719E-02
438	0402-002109	SI	1998	2.098E-01	7.100E-02	1.388E-02
439	0402-002110	SI	1998	6.717E-02	8.400E-02	-1.682E-02
440	0402-002111	SI	1998	1.027E-01	7.500E-02	2.777E-02
441	0402-002112	SI	1998	2.377E-02	6.000E-02	-3.622E-02

Composition optimization

Go back to the [Data List for Regression Analysis] window, and select a glass which has a composition and properties with near values to the target by clicking the row of the glass.

Then click the Composition Optimization [COMP] icon.

7 [Composition Optimization] window



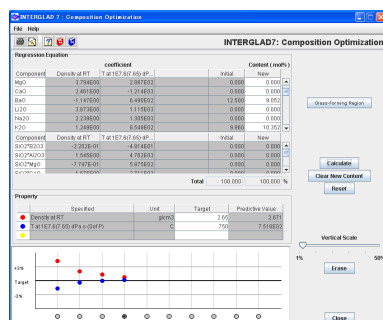
Input the target values of properties in the [Target] cells of the [Property] column.

When the [Calculate] button is clicked, the predicted values of the properties for the selected glass in the list appear in the [Predictive Value] cells of the [Property] column.

The percentage of the difference between the predictive value and target value of a property to the target value is shown in the graph. Different colors are assigned to the plot-points as shown at the left of the [Property] column.

- The vertical scale of the graph can be changed by from 1 to 50% using the slider in the right side.

8



To approximate the predicted values to the target values, input corrected values in the [New] white cells of the [Regression Equation] column, and click the [Calculate] button.

The predicted values for the glass composition shown in the [New] cells appear in the [Predictive Value] cells.

Repeat the above procedures for composition optimization.

<Example>

A composition of an alkali-silicate glass with 2.67g/cm³ of density at RT and 752°C of softening temperature (viscosity: 10^{7.6}dPa s) was obtained.

By clicking the [Erase] button, the composition in the [New] cells and the corresponding properties with ON of the radio button in the graph are deleted.

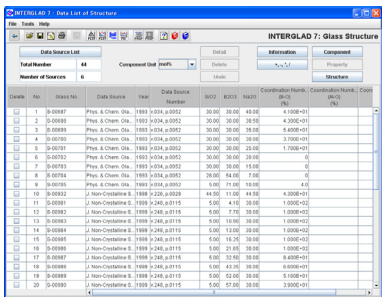
- In the [Regression Equation] column, the regression coefficients with large 3 values are indicated in red color; those with small 3 values in blue color.

- When the content of a component with a relatively large regression coefficient is increased, the property value tends to increase.

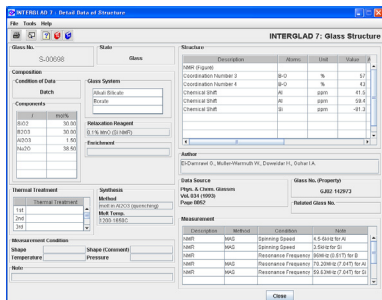
- Regression coefficients can be sorted by clicking the property label (high to low, low to high, and original).

- The property values in the [Predictive Value] cells and the plot-points of the radio button [ON] in the graph are corresponding to the composition in the [New] cells at all times.

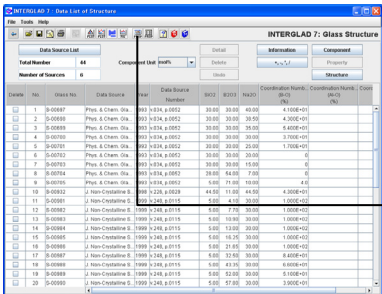
4 [Data List of Structure] window



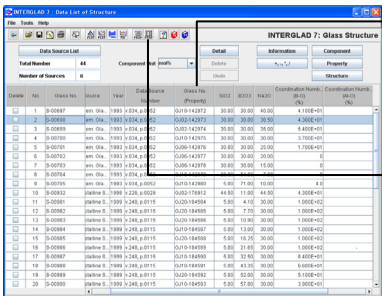
5 [Detail Data of Structure] window



6 [Data List of Structure] window



7



Search result

Searched glasses are listed in the [Data List of Structure] window.

Detail data

Click a glass row and click the [Detail] button, and [Detail Data of Structure] window for the selected glass opens.

Search property data

The property data of glasses listed in the [Data List of Structure] window can be searched.

Click the Search Property DB [DB STRC] icon.

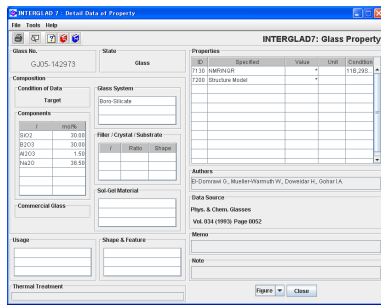
Glass Nos. in the Property Database are shown in the list, when corresponding glasses exist in the Property Database.

The [Detail Data of Property] window for a glass can be opened by clicking the glass row in the list and then clicking the Detail Data of Property [STRC] icon.

As for figures such as spectral curves, only examples are registered.

[Data Source List] window and [Glasses from a Data Source] window can be shown in the same manner as those in the Property Database.

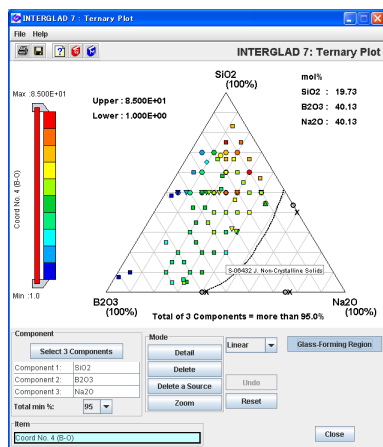
8 [Detail Data of Property] window



For closing the windows, click the x mark in the right upper side of the screen.

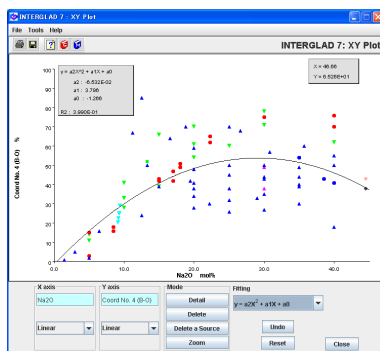
Analysis

9 [Ternary Plot] window



Ternary Plot for glass structure data can be shown in the same manner as the procedures of [C. 1. Ternary Plot] for the Property Database.

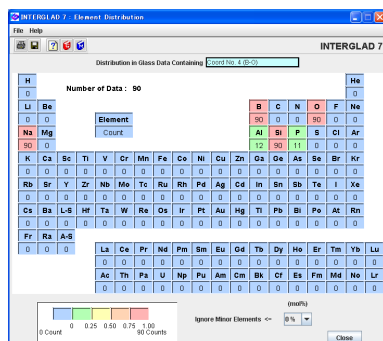
10 [XY Plot] window



XY Plot for glass structure data can be shown in the same manner as the procedures of [C. 2. XY Plot] for the Property Database.

- XY plot of property data vs. structure data can be drawn, when structure data and property data are added to the list in the [Data List of Structure] window.

11 [Element Analysis] window



Element Analysis for glass structure data can be performed in the same manner as the procedures of [C. 5. Element Analysis] for the Property Database.

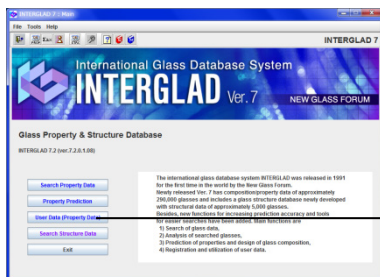
F. Registration of User Data and its Use

The user can register his/her own data to INTERGLAD and can construct an original glass database. The registered data can be used for search, analysis and prediction together with the data in INTERGLAD.

The procedures are as follows.

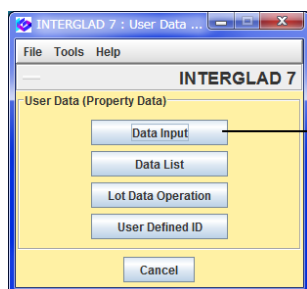
F.1 Data Registration

1 [Main] window



Click the [User Data (Property Data)] button to open the [User Data Menu] window.

2 [User Data Menu] window



Click the [Data Input] button to open the [Data Input] window.

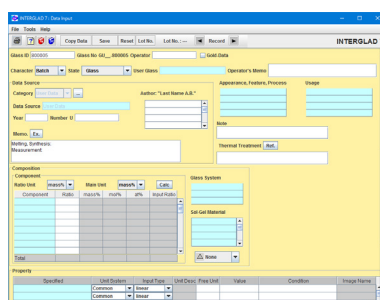
3 [Select Lot No.] dialog box



In the opened [Select Lot No.] dialog box, enter a Lot No. in the [New Lot No.] cell and click the [OK] button. The default No. is 001.

- When a before-registered Lot No. is used, select the [Existing Lot No.] radio button and click a Lot No. in the pulldown

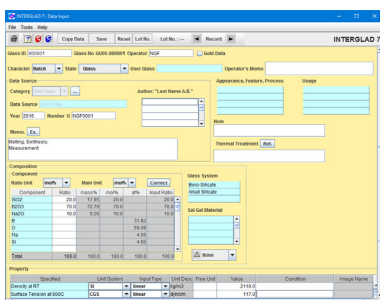
4 [Data Input] window



Select items to specify and enter data.

In this example, a part of the INTERGLAD data 184111 (NGF's Additional New Data) is used.

5



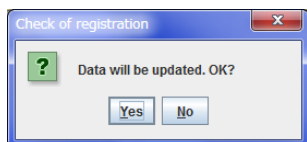
In this example, select items and enter values as follows.

► (3, 4, 5, 6) : indispensable items.

- 1) Check the Glass ID. The next No. of the registered No. appears as the Glass ID.
- 2) Enter the Operator. Ex. NGF.
- 3) Select the Character. ► Ex. Batch.
- 4) Select the State. ► Ex. Glass.
- 5) Enter Year and Number of the Data Source. ► Ex. 2016, NGF0001.
- 6) Select the Glass System. ► Ex. Boro-Silicate, Alkali Silicate.
- 7) Select the Ratio Unit of the Components. Ex. mol%.
- 8) Select the Components and enter their values. Ex. SiO₂=20, B₂O₃=70, Na₂O=10.
- 9) Click the [Calc] button.
By this procedure the composition is adjusted proportionally to total 100%, the contents are converted to the values of the other unit, and the input ratios appear in the [Input Ratio] column.
- 10) Select the Specified of the Property.
Ex. Density at RT, Surface Tension at 800C.
- 11) Select the Unit System of the Property.
Ex. SI for Density at RT, CGS for Surface Tension at 800C.
- 12) Enter property values.
Ex. Density at RT: 2118.0 (kg/m³),
Surface Tension at 800C 117.0 (dyn/cm).

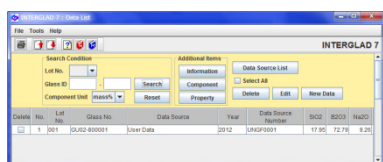
Glass No. is fixed to GU05-800001 automatically in this example.

6 [Check of registration] dialog box



Click the [Save] button, and the [Check of Registration] dialog box (Data will be updated. OK?) appears. By clicking the [Yes] button, data input is completed.

7 [Data List] window

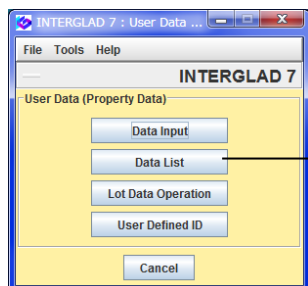


Close the [Data Input] window, and click the [Data List] button in the [User Data Menu] window. By clicking the [Search] button in the [Data List] window, the registered data can be checked in the list.

F.2 Batch Entry of New Data

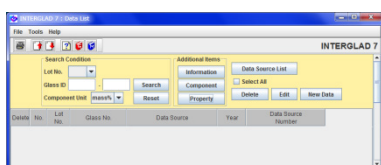
Datasets of a spreadsheet can be registered by the batch entry procedures. Here the procedures for Microsoft Excel Sheet is explained.

1 [User Data Menu] window

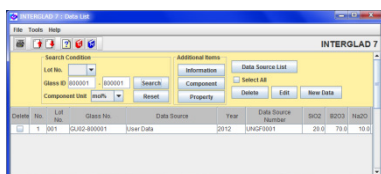


Click the [Data List] button.

2 [Data List] window



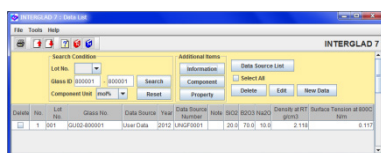
3



In the registered data, select a model glass which has the same components and property items as those of batch entry data, and enter the No. in the [Glass ID] cell. In this example, enter '800001', which has been registered in F.1. Select the Component Unit. Change the Component Unit from the default mass% to mol% in this example. Then click the [Search] button, and the model glass data appears in the list. Property values in the list are converted to the Common unit.

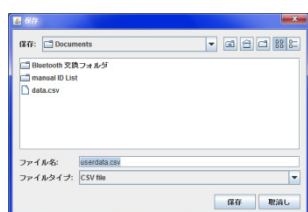
- When there are no appropriate model glass data, register a dataset in the batch entry data by procedures in F.1, and use the registered dataset as the model glass.

4



Only the items appearing in the list can be entried as the batch data. So when there is lack of items, add the items from the [Information] button. In this example add the [Note] column.

5 [Save] dialog box



Click the  [Export] icon, and the [Save] dialog box opens. Here enter a file name, select a save folder, and click the [Save] button.

In this example, select the default [userdata.csv] as a file name. The extension of the file should be csv.

6 [Excel] window

Lot No.	Glass No.	Data Source	Year	Data Source Note	SiO2	B2O3	Na2O	Density at RT	g/cm3	Surface Tension at 8000	PROP_FIG
1	GU02-800001	900<>User Data	2012	UNGF0001	20	70	10	2.118		0.117	

Start up the Microsoft Excel and open the saved CSV file. The model data appear in the 3rd row of the Excel Sheet. Leave the [Data List] window as it is opened.

7

Lot No.	Glass No.	Data Source	Year	Data Source Note	SiO2	B2O3	Na2O	Density at RT	g/cm3	Surface Tension at 8000	PROP_FIG
1	GU02-800001	900<>User Data	2012	UNGF0001	20	70	10	2.118		0.117	
2	GU02-800002	900<>User Data	2013	UNGF0001 A	30	60	10	2.145		0.13	
3	GU02-800003	900<>User Data	2014	UNGF0001 B	40	50	10	2.182		0.143	
4	GU02-800004	900<>User Data	2015	UNGF0002 C	50	40	10	2.239		0.162	
5	GU02-800005	900<>User Data	2016	UNGF0002 D	60	30	10	2.292			

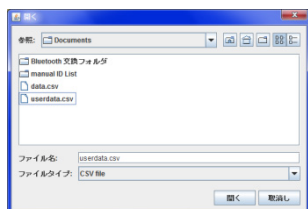
Enter (Copy/Paste) batch entry data below the model data of the 3rd row.

The Data Source should be '900<!>User Data' the same as that of the model data. The Glass No. should be different for each dataset. Do not change the columns and the description of the 1st and 2nd rows. Enter property values in the Common Unit.

Save the Excel (CSV) file (userdata.csv) and close it.

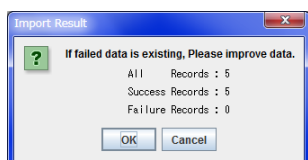
In this example enter the part of 4 data of 184112-184115 (NGF's Additional data) in the INTERGLAD data.

8 [Open] dialog box



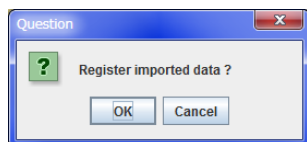
Go back to the [Data List] window, and click the  [Import] icon. In the [Open] dialog box, select the saved CSV file (userdata.csv), and click the [Open] button.

9 [Import Result] dialog box



In the opened [Import Result] dialog box, check the number of the batch entry data (including the model data), and click the [OK] button.

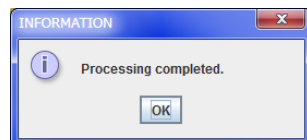
10 [Question] dialog box



The batch entry data are shown in the list of the [Data List] window.

The [Question] dialog box (Register imported data?) appears, and click the [OK] button.

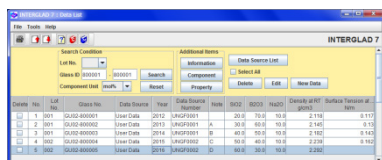
11 [Information] dialog box



Next, the [Information] window (Processing completed.) appears, and click the [OK] button.

By these procedures 2-11, the batch entry and registration of datasets are completed.

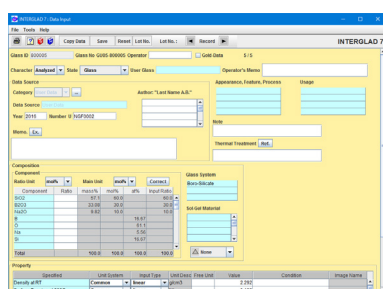
12 [Data List] window



When the user needs to add data or correct the registered data, click the glass row to be active, and click the [Edit] button to open the [Data Input] window.

In this example open the [Data Input] window of 800005.

13 [Data Input] window

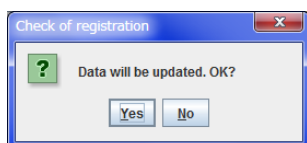


Add or correct data in this [Data Input] window, and click the [Save] button.

In this example, select 'Surface Tension at 900C' for the Specified of Property, and enter the value in the default Common Unit, N/m from the data of 184115.

- Note that the property unit changes to the Common Unit after exporting and importing in the [Data Input] window.
- Not to change the property unit of the model glass, delete the row of the model glass in the Excel Sheet, and import only the batch entry data.

14 [Check of Registration] dialog box



The [Check of Registration] dialog box (Data will be updated. OK?) appears. Click the [Yes] button.

F.3 Use of User Data

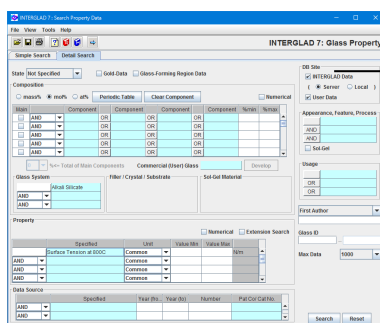
a) Search using INTERGLAD Data and registered User Data

1 [Main] window



Click the [Search Property Data] button.

2 [Search Property Data] window



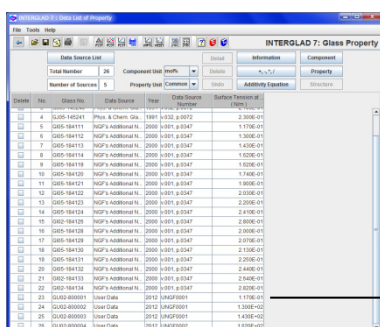
Open the [Search Property Data] window with the [Detail Search] tag.

In the [DB Site] column, click the [INTERGLAD Data] and [User Data] checkboxes both. The default is check for the [INTERGLAD Data (Server)].

In this example, the user data registered in F.1 and F.2 are searched.

Select 'Alkali-Silicate' for the Glass System, and 'Surface Tension at 800C' for the Specified of Property, and click the [OK] button.

3 [Data List of Property] window



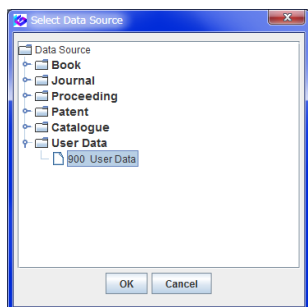
Glass data which include the registered user data fit to the search conditions are listed.

User data rows appear in the last part of the list.

In this example, 26 glasses are searched including 4 glasses of the registered GU02-800001-800004.

b) Search in registered User Data

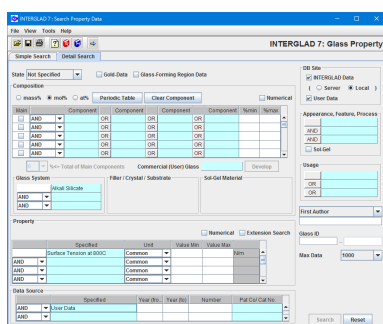
1 [Select Data Source] dialog box



In the [Search Property Data] window, specify the same search conditions as those of a) 2. In addition select 'User Data' in the [Select Data Source] dialog box opened by double-clicking a light-blue [Specified] cell of the [Data Source] column.

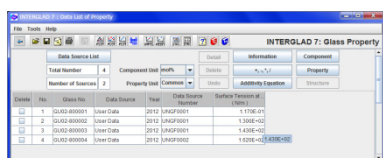
- When the user searches only in the User Database, he/she can check only in the [User Data] checkbox of the [DB Site] instead of the specification of the 'User Data' in the [Data Source] column.

2 [Search Property Data] window



Click the [Search] button.

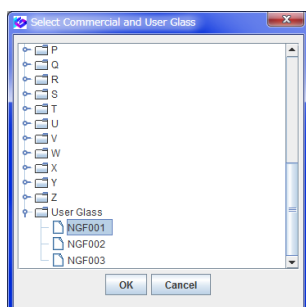
3 [Data List of Property] window



Only the glass data registered in the User Database are searched and shown.

c) Search of the User Defined Glass

1 [Select Commercial and User Glass] dialog box



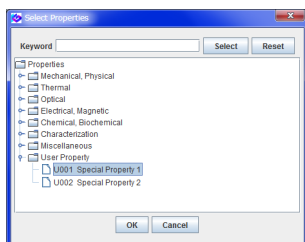
Double-click the [Commercial (User) Glass] column in the [Search Property Data] window, and the [Select Commercial and User Glass] dialog box opens. Select a User Defined ID in the User Glass, in the last part of the list.

Click the [Search] button, and the data of the User Defined Glass are listed in the [Data List of Property] window.

- Refer 6.5 of Chapter 4 in the User's Manual about the User Defined ID.
- When there are no registration of the User Defined ID or the User Defined Property ID, User Glass or User Property does not appear in each select dialog box.

d) Search of glasses with data of the User Defined Property

1 [Select Properties] dialog box



Double-click a light blue [Specified] cell of the [Property] column in the [Search Property Data] window, and the [Select Properties] dialog box opens. Select a User Defined Property ID of the User Property in the last part of the list.

Click the [Search] button, and the data with the User Defined Property are listed in the [Data List of Property] window.

e) Multiple regression analysis using the registered User Data

Select the [Prediction of Property Data] button in the [Main] window, and in the [Search for Regression Analysis] window specify the conditions of DB Site described in a) or b), etc. Through these procedures the user can perform multiple regression analysis using the registered user data.

Appendix 1. Multiple Regression Analysis with Multiple-order Polynomials

In Ver. 6 $y = a_{other}C_{other} + \sum_j a_j C_j$ linear eq.

In Ver. 7 $y = a_{other}C_{other} + \sum_j a_j C_j + \sum_j \sum_k a_{jk} C_j C_k + \sum_j \sum_k \sum_m a_{jkm} C_j C_k C_m$ cubic eq.

$a_{other}, a_j, a_{jk}, a_{jkm}$: regression coefficient, C_j : content of component j

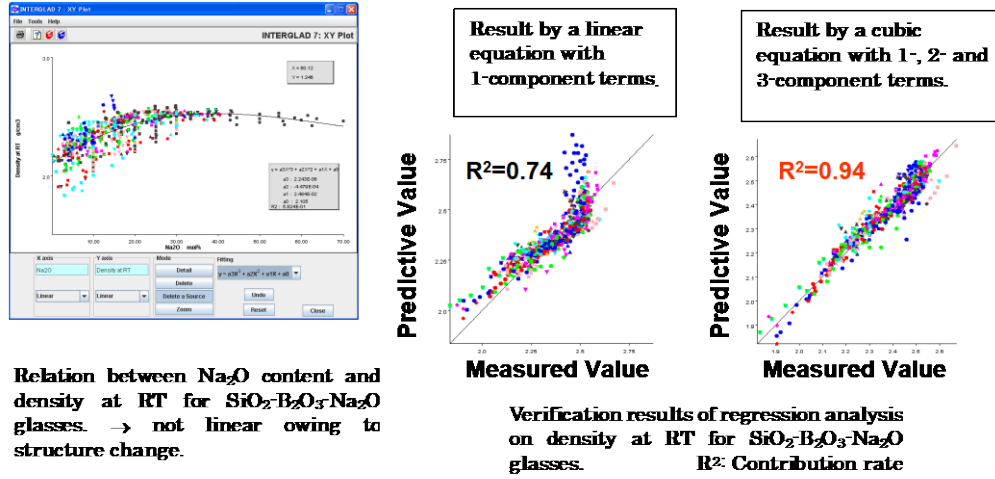


Fig. 1 An example for regression analysis with multiple-order polynomials

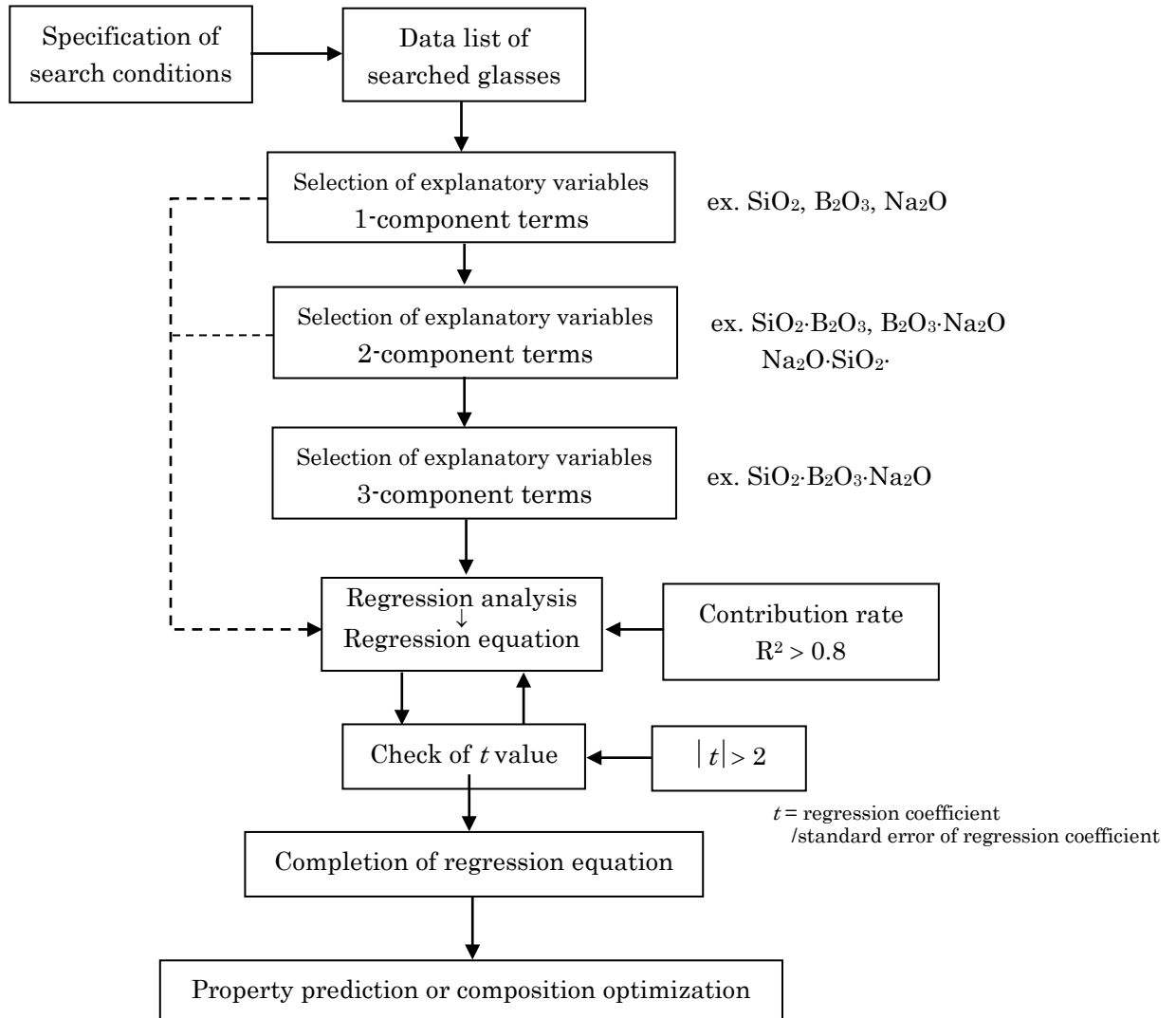


Fig. 2 Flow of multiple regression analysis with multiple-order (cubic) polynomials

Appendix 2. Data Interpolation

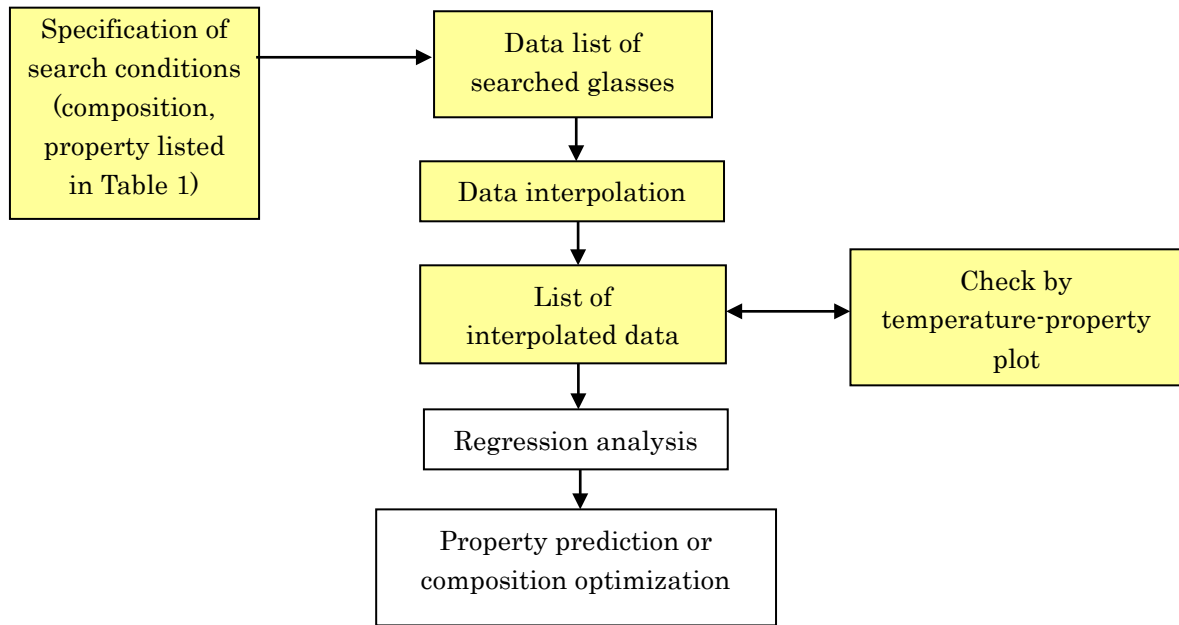


Fig. 1 Flow of data interpolation for high temperature properties.

Table 1 Property List for Temperature-Property Plot and Data Interpolation

Property Category	Temperature (°C)									
Density	100	200	300	400	500	600	700	800	900	1000
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Young's Modulus	100	200	300	400	500	900	1000	1100	1200	
Surface Tension	100	200	300	400	500	600	700	800	900	1000
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Specific Heat	100	200	300	400	500	600	700	800	900	1000
	1100	1200	1300	1400	1500					
Thermal Conductivity	100	200	300	400	500	600	700	800	900	1000
	1100	1200	1300	1400	1500					
Viscosity	100	200	300	400	500	600	700	800	900	1000
	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550
	1600	1650	1700	1750	1800	1900	2000	2200	2500	
Electric Conductivity	50	100	150	200	250	300	350	400	500	600
	700	800	900	1000	1100	1200	1300	1400	1500	1600
	1700	1800	1900							
DC Volume Resistivity	50	100	150	200	250	300	350	400	500	600
	700	800	900	1000	1100	1200	1300	1400	1500	1600
	1700	1800	1900							
AC Volume Resistivity	50	100	150	200	250	300	350	400	500	600
	700	800	900	1000	1100	1200	1300	1400	1500	1600
	1700	1800	1900							
Dielectric Loss Tangent 1kHz	50	100	150	200	250	300	500			
Dielectric Loss Tangent 1MHz	50	100	150	200	250	300				
Dielectric Loss Tangent 1GHz	50	100	150	200	250	300				
Viscosity (dPa·s)										
Standard Point of Viscosity* (temperature)	1E1	1E2	1E2.5	1E3	1E4	1E5	1E6	1E7	1E7.5	1E7.6
	1E8	1E9	1E10	1E11	1E12	1E13	1E14	1E14.5		

* x-axis: viscosity, y-axis: temperature

Appendix 3. Typical Data

Property and structure data are registered in the database with different ID for each condition of measurement or analysis. The property or structure items shown in the next table have typical items in each.

When typical item is selected as a search condition, data with the highest priority order in the table are indicated as typical data if at least one data of the property in a glass is registered in the database. Search with typical item is useful for collecting many data with many property or structure items.

1. Property

		Mechanical, Physical		Thermal			
		ID	Vickers Hardness	ID	Linear Expansion Coeff.	ID	Glass Transition Point
Priority Order	Typical	0180	Vickers Hardness (Typical)	1020	Expansion Coeff (Typical)	1140	Tg (Typical)
	1	0174	Vickers Hardness 100g	1022	Expansion Coeff (20-300°C)	1120	Tg (DTA)
	2	0175	Vickers Hardness 200g	1023	Expansion Coeff (20-100°C)	1121	Tg (Expansion)
	3	0176	Vickers Hardness 500g	1021	Expansion Coeff (0-300°C)	1125	Tg (Miscell)
	4	0173	Vickers Hardness 50g	1030	Expansion Coeff (0-100°C)		
	5	0170	Vickers Hardness (Miscell)	1031	Expansion Coeff (20-400°C)		
	6			1035	Expansion Coeff (20-500°C)		
	7			1036	Expansion Coeff (30-300°C)		
	8			1027	Expansion Coeff (20-Transit.Point)		
	9			1028	Expansion Coeff (30-380°C)		
	10			1026	Expansion Coeff (-30-70°C)		
	11			1024	Expansion Coeff (50-350°C)		
	12			1032	Expansion Coeff (100-200°C)		
	13			1025	Expansion Coeff (100-300°C)		
	14			1033	Expansion Coeff (200-300°C)		
	15			1034	Expansion Coeff (300-400°C)		
	16			1029	Expansion Coeff (X °C)		
17			1039	Expansion Coeff (Miscell)			

	Optical				Electric, Magnetic	
	ID	Refractive Index Visible	ID	Birefringence	ID	Dielectric Constant
Typical	2010	Refract Index (Typical)	2850	Birefringence (Typical)	3174	Dielectric Const (Typical)
Priority Order	1	2017 Refract Index 587.5nm d	2851	Birefringence 0.63μm	3170	Dielectric Const 1kHz
	2	2018 Refract Index 589.3nm D	2852	Birefringence 0.85μm	3177	Dielectric Const 10kHz
	3	2016 Refract Index 546.1nm e	2853	Birefringence 1.30μm	3176	Dielectric Const 100Hz
	4	2015 Refract Index 486.1nm F	2854	Birefringence Xμm	3175	Dielectric Const 60Hz
	5	2020 Refract Index 656.3nm C			3178	Dielectric Const 100kHz
	6	2013 Refract Index 435.8nm g			3171	Dielectric Const 1MHz
	7	2019 Refract Index 643.8nm C'			3172	Dielectric Const 1GHz
	8	2014 Refract Index 480.0nm F'			3179	Dielectric Const 3GHz
	9	2021 Refract Index 706.5nm r			3181	Dielectric Const 10GHz
	10	2012 Refract Index 404.7nm h			3173	Dielectric Const Other Data
	11	2035 Refract Index (Miscell)			3189	Dielectric Const (Miscell)

2. Structure

Typical items (except Ring Size) in the table are defined for each combination of atoms.

2. Structure

Typical items (except ring size) in the table are defined for each combination of atoms.

		Interatomic Information					
		ID	1st Interatomic Distance	ID	2nd Interatomic Distance	ID	n-th Interatomic Distance
Typical		02401	1st Distance (Typical)	02501	2nd Distance (Typical)	02901	n-th Distance (Typical)
Priority Order	1	02402	1st Distance (Av)	02502	2nd Distance (Av)	02902	n-th Distance (Av)
	2	02403	1st Distance (Peak)	02503	2nd Distance (Peak)	02903	n-th Distance (Peak)

		Interatomic Information					
		ID	Bond Angle	ID	Ring Size	ID	Coordination Number
Typical Priority Order		02601 Bond Angle (Typical)		03001 Ring Size (Typical)		04001 Coord No. (Typical)	
	1	02602 Bond Angle (Av)		03002 Ring Size (Average)		04002 1st Neighb Coord No.	
	2	02603 Bond Angle (Most Prob)		03003 Ring Size (1st Peak)		04003 2nd Neighb Coord No.	
	3	02605 Bond Angle (1st Peak)		03004 Ring Size (2nd Peak)		04004 3rd Neighb Coord No.	
	4	02607 Bond Angle (2nd Peak)		03014 Dist Ring Struct (Fig)		04017 Dist Coord No. (Fig)	
	5	02609 Bond Angle Distrib (Fig)					