

Collecting Experimental Data Using Vernier's ChemBio on the TI -83 Plus Graphing Calculator with the CBL

Your TI -83 Plus should be hooked up to a CBL via the link cable with the appropriate probe plugged into Channel 1 on the CBL. Turn the CBL on.

Press the **[APPS]** key and select ChemBio to start the program as an application (stored in archived memory). On the TI-83 calculators press **[PRGM]** to select ChemBio. Instructions for Vernier's Physics programs are the same and include different probes commonly used in physics experiments. It is assumed the programs are loaded on the calculator.

```

PROGRAMS
1: Finance...
2: CBL/CBR...
3: ChemBio
4: Prob Sim
    
```

After you select ChemBio, this screen on the left below should appear (where the date is the version). As Vernier adds new probes you will want to update this application from their website (<http://www.vernier.com>).

```

VERNIER SOFTWARE
BIOLOGY AND
CHEMISTRY
WITH THE CBL

8/11/00 [ENTER]
    
```

Press **[ENTER]** and the main menu appears as shown to the right.

```

*****MAIN MENU*****
1:SET UP PROBES
2:COLLECT DATA
3:VIEW GRAPH
4:VIEW DATA
5:FIT CURVE
6:RETRIEVE DATA
7:QUIT
    
```

Your first operation is to set up probes, so select **1:SET UP PROBES**. If the screen to the right appears, check the link cable connection to your calculator and the CBL. This is a very common problem. Press **[ENTER]** after checking the connections.

```

***LINK ERROR***
PRESS HALT ON
THE CBL. MAKE
SURE THE LINK
CONNECTORS ARE
FIRMLY PUSHED
IN.

[ENTER]
    
```

The first step of SET UP PROBES is to select the number of probes (see screen to the right) and which probes (for the complete list of probes for ChemBio on four screens, see below).

```

ENTER NUMBER OF
PROBES:1
    
```

```

SELECT PROBE
1:TEMPERATURE
2:PH
3:PRESSURE
4:COLORIMETER
5:VOLTAGE
6:CONDUCTIVITY
7:MORE PROBES
    
```

```

SELECT PROBE
1:O2 OXYGEN
2:BAROMETER
3:LIGHT
4:REL HUMID
5:BIO PRESSURE
6:HEART RATE
7:MORE PROBES
    
```

```

SELECT PROBE
1:VERNR STD TEMP
2:LONG TEMP
3:THERMOCOUPLE
4:RESPIR. BELT
5:EKG
6:CO2 SENSOR
7:MORE PROBES
    
```

```

SELECT PROBE
1:ION SELECTIVE
2:RETURN
    
```

For each probe, you will need to inform the program where it is connected on the CBL. You can have as many as three probes connected at once.

USE LOWEST
AVAILABLE
CHANNELS.

ENTER CHANNEL
NUMBER: 1

After the probe (probes) is (are) set up, you are ready to collect data. Some probes have further menus to select their units of measurement and other set-up requirements, such as calibration.

Select **2:COLLECT DATA** from the main menu. The data collection menu appears as shown below. Choice of method will depend on the experiment being performed.

DATA COLLECTION : Here is an explanation of the data collection options. Monitor
1: MONITOR INPUT input is a good way to check that the probe is functioning and
2: TIME GRAPH time graph allows you to set up a
3: TRIGGER/PROMPT trigger/prompt involves the trigger button on the CBL. When you
4: TRIGGER trigger gets both readings recorded in appropriate lists when you
5: SINGLE POINT single point involves the trigger button on the CBL. It asks if more data is to be collected.
6: RETURN

The Vernier software actually takes five readings on the CBL for each point and sends the average value to be stored in the calculator lists. Hence, do not record the reading on the CBL as this is only a single value. This process helps to minimize the noise in the CBL readings that you see in the monitor input.

After you finish collecting the data needed, select **3:VIEW GRAPH** to view a labeled plot of the data. If your data is acceptable, then select **7:QUIT** to exit the program. The data is stored in the appropriate lists of the calculator. Analysis is easier if you are not in the program. Please note: *If you restart ChemBio, the first thing it does is clear all the lists.* If you want to save the data from a previous run, store it in named lists on your calculator or transfer it to another calculator.

At this point you can also transfer the data to Vernier's Graphical Analysis program for further analysis on a computer with printing of the resulting graphs.