**Manual/ Checklist: Cracker measurements** (*vers. 31.07.2020*)

*Day before measurement*

* Prepare sample list (Lama, Excel-sheet: use file *Cracker\_Template.xlsx* on Server); Recommendation: print the list as well to keep the overview
* Save sample list on GIS-computer (Folder according to month)
* Prepare magazine with new/ unused targets
* Scratch the ampoules
* Insert magazine (see MICADAS manual)
* Create wake-up task in MICADAS:
  + Click “+”, choose ‘Wake up’ and set time (e.g. to 5 am) next day
  + Click Start in task list

*Start*

* Check that GIS is switched on
* Open He gas bottle of the GIS, set pressure to <1 bar (optimum 0.8 bar)
* Check if He capillary is correctly connected to GIS box
* Check if capillary from GIS box to ion source is connected
* Start the GIS pump (switch is next to power supply plug) and check if the manual valve on top of the pump is opened
* Start LabVIEW on GIS computer, press run (arrow top left), choose latest version (“BernGasIonSource1XX.vi”)
  + Click on white arrow (top left) to run program
  + Click “Start program”
  + Select Cracker ini file
  + Make sure V3 is found (=green): go to another tab (cancel message), go back to Cracker tab (accept message)
  + V7 must be ON as soon as temperature is above 115°C to avoid Cs build-up inside the capillary lines
  + Recommended to activate auto-adjust (“auto adj (trap only)”) on the right
* Check in LabVIEW (header “communication”) if the right IP (130.92.107.74) address is filled in, button top left should be green (connected)
  + Click “Establish communication”, then click “TCP test” and write ‘getstatus’ in the field. Answer should be 0/0. **Unclick** then “TCP test” (=blue again)
  + Computer cards should all state “DLN\_RES\_SUCCESS”
  + Button ‘Diolan State’ should be green
  + Click button “Auto-reconnect” (should turn green = reconnects automatically if is not in “Success” anymore)
* Check in LabVIEW (header “General parameter”) that the state machines are all in ‘idle’ or ‘release’
* When Cs reached the aimed temperature and V7 is ON: choose gas measurement conditions in MICADAS software
  + Take control (top left, grey account symbol)
  + Choose tuning settings from gas measurement with a comment
  + Click on ⁞, “show”, “apply”
  + Set Cs-Temperature to: 130 °C
* On MICADAS computer: open TightVNC (pw: *helloc14*) to see GIS screen (GIS-computer=06)
* Set magazine name/ number
  + Click on “+”, “measurement”, “Gas measurement”
  + Magazine name: CYYMMDDZZG (C=Carbon, G=Gas, ZZ=your initials, e.g. MB)
  + Click “Start” in task list
* Click “Clean Syringe” in LabVIEW (header “Cracker”)
* Evacuate the system, check that the pressure values reach 0. If not (or negative), go to “General parameter” and change the values in the field “Cracker offset” and “Syringe offset” until the right value shows 0.
* In LabVIEW, check the following “settings”
  + Next target=2, last target=40 (recommended), target home=1
  + Number of cycles=70, max 14C=2E6 (latter can remain mostly unchanged)
  + Aimed C flow=1.4-1.5
  + Trap syringe pressure=0.44

*Standards and Blanks: Target numbers 1621.1.xxx (Std), 1216.1.xxx (Bk)*

* In LabVIEW, go to “Tuning”
* Choose the correct reference gas (1=Standard, 2=Blank). Normally, you should measure 3xStd/2xBk before and 1xStd/2xBk after the samples
* First, flush the syringe 3x with the gas. To do so, close V1 to the pump
* Standard: left bottle/ valve
  + Shortly open/ close the valve (on/off valve) to reach ~1200 mbar
* Blank: right bottle/ valve
  + Shortly open/ close the screw valve at the bottle, then shortly open/ close the on/ off valve to reach ~1200 mbar
* Move the syringe 20 forward (set the steps to 20), “Fast forward”, “fast backward” (2x)
* Move the syringe completely to the end (set steps to 100) and when you click on “fast forward”, **immediately** open to the pump (V1). **Important**: set the steps back to 20 (cleaning) or 1 (for loading)
* When the line is evacuated, move the syringe back (“Home position”) and close V1
* Repeat this procedure 3x, make sure that the pressure offsets are corrected (may be needed to be done again) and V1 is closed before loading for measurement
* Load the gas: after open/close valve, close V2, make sure to have 1200-1250 mbar, move the plunger (stepwise, 1 step) until reaching this pressure.
* On MICADAS software, click ⁞ (in your task), “measure manually”, set target position (for the first measurement=2, then each 1 higher after). Target ID (from LAMA). Click “OK”.
* After a few cycles (2-3=20-30sec), switch V0 and click “GO” (next to syringe) in LabVIEW
* Duplicate the task in MICADAS (click ⁞, “Duplicate”)
* After reaching 70 cycles, click ⁞, “Finalize” and in LabVIEW, click “STOP” and switch V0.
* Between two sample of the same gas, you only need to flush with the gas 2x (as above), between std and bk, the entire cleaning procedure should be performed (“Cracker”, “clean syringe”, then “Tuning”, choose the other ref gas, flush with it the syringe 3x (see above).
* Duplicate the task in MICADAS (click ⁞, “Duplicate”)

*Samples*

* Import sample list on GIS computer: in LabVIEW (header “control panel”), press “sample list import” and select in “sample label” the first sample (BE-number)
* In LabVIEW (header “general parameter”), copy “Measurement file path” from the lower part of screen to the “Sequence folder”
* Check the “row to update” and “File row” (consecutive number on control panel in the sample list: position # minus 1 is the row to update). Note that the “File row” may extend the value of 8, e.g. cracker position 4 of the second cracker magazine has the File row 12.
* In LabVIEW (header “settings”), change Next target to 7 (or to the next one after having measured Std and Bk)
* Put samples in Cracker magazine/ tube, make sure, they are in the right order (1-8). To do so, close V2, click “open cracker magazine”. To unlock the magazine, there is a small lever.
* Flush the system twice
* Click “Start method” to start the measurement
* During the measurements, check that ampoules are correctly cracked. Recommended: sample mass should be taken from “p gauge” (header “settings”) and not from excel file. If the ampoule is not cracked, a massage will pop up and the measurement will not be continued.
  + Message: “Sample mass does not match the excepted mass”
  + If there is a pressure reading >0, but different from the excepted mass and the sample mass is uncertain 🡪 “continue”
  + If pressure=0 (ampoule not cracked or empty) 🡪 “correct”
  + First: Try to crack ampoule by manually pressing and releasing “Crack” several times
    - If it works (pressure rises): if you are confident in your own sample mass (excel file), write that value and click “SET” 🡪 procedure will continue as usually. If you are not confident about your mC, read the pressure and write down the mass as m=0.44\* pressure, click “SET”
    - If this does not work, you need to scratch the ampoule again. To do so, click “open”, remove the cracker, and scratch the ampoule again. Put the cracker back, press “open” again and manually flush the cracker with He 3 times. With syringe in home position, pump the line until V8 (closed), correct pressure offsets of both sensors and then close the pump and V2. Press and release “Crack”, and if it works, proceed as described in the previous bullet point.
* You can check the measurement result in BATS. Deactivate the first few cycles (until you see more or less stable 13C/12C-ratio (colour of the numbers is a good indication)) and the last cycle.
* Prepare the next cracker magazine before the first magazine reaches position 8: make sure that there are no glass particles anymore in the tubes (Dust off spray)
* After cracking and loading sample 8, a message will pop up, that the last position is reached. FIRST, take the measured magazine out and put the new magazine, THEN confirm the message.

*After the samples: Std and Bk*

* To measure Std and Bk after the samples, first duplicate the task in MICADAS. When the last sample is measured, finalize the sample task.
* You need to restart LabVIEW for Std/ Bk, as they are measured manually. To do so, click on “stop program”. If this does not work, force stop (red stop button top left). Then start again as in the start-up procedure. You may have to restart the LabVIEW twice. Make sure, that you stop LabVIEW without force stop the second time. If the connection between GIS and MICADAS is not found, you will have to restart the ACS service (grey account symbol, “restart service”).
* Measure Std and Bk (1 Std and 2 Bk usually): see above

*Finishing up*

* Click ⁞, “Finalize” and in LabVIEW: “STOP” and switch V0
* Change sample: type “1”, press Enter 🡪 magazine goes to its home position (1)
* Reduce the Cs temperature to 115°C
* Click on “+”, “System” and “Sleep”, click on “Start”
* Create a Wake-up task for the next day, click on “Start”
* When Cs-temperature reached 115 °C, V7 can be switched OFF
* LabVIEW can be stopped: “Stop program” (or if this does not work, force stop)
* Turn off GIS-pump
* Close Tight-VNC on MICADAS computer

**Changelog**

31.07.2020 First version, Template needs to be created and uploaded to the server.

31.07.2020 Comments by szi