CO_2 calibration failed with DUP flag

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Case Background

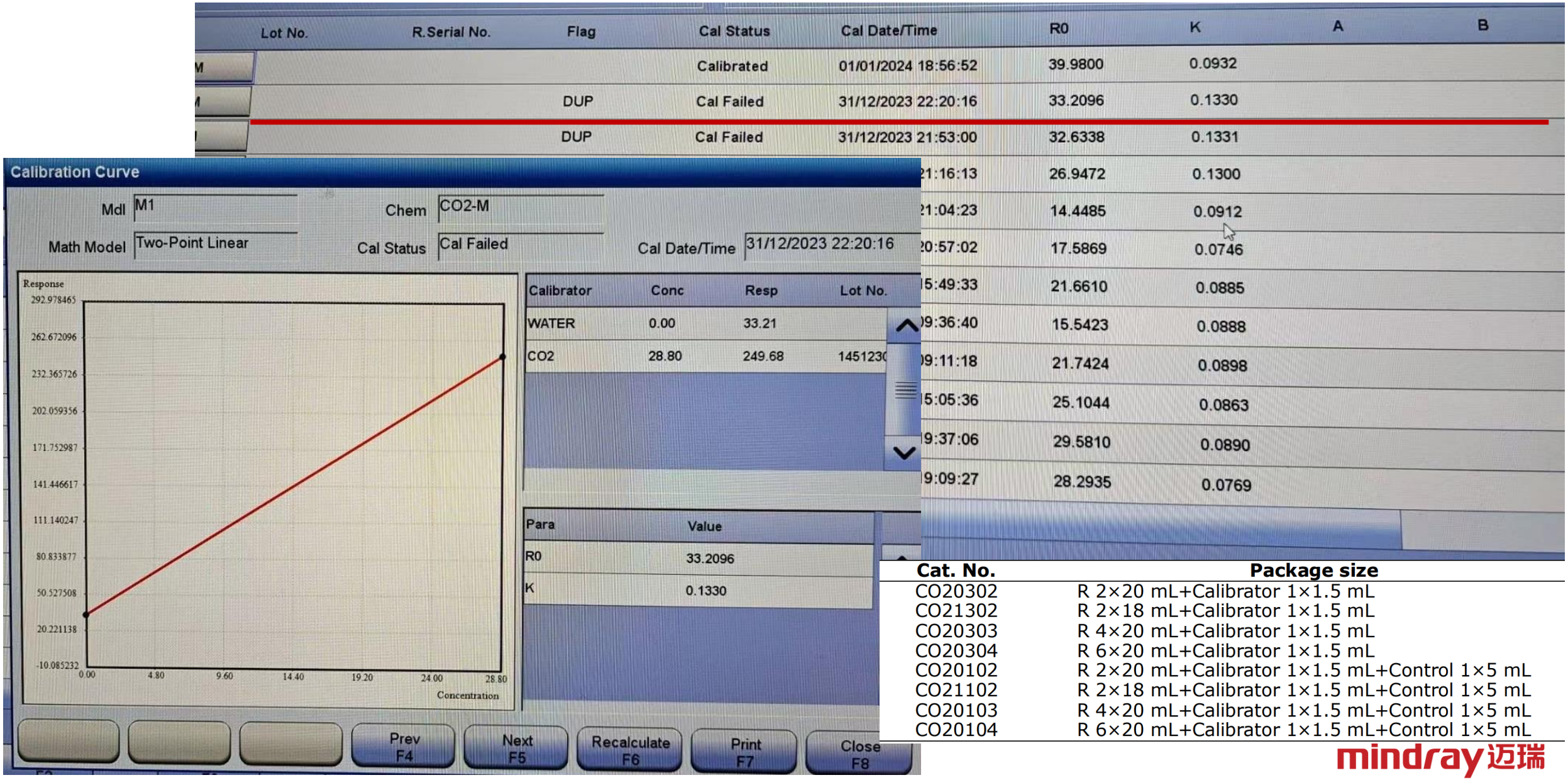
Hospital name : Banglen Hospital, General Hospital (First level 60-120 beds)
Distributor support : Firmer
Model : BS-800M
Sample : OPD/IPD ; Heparin blood tube

Problem : CO2 calibration failed; DUP flag. The reagent and new calibrator are not expired.

Problem detail :

1. The reaction curve is normal.
2. Calibration Resp result is water = 33.21, CO2 =249.68/ Value R0= 33.2096, K =0.1330
3. R0 resp is **25.4, 41.0**
4. CO2 calibration Resp is **146.0, 353.4**
5. Effected to other tests BUN,ALB,TG,TC

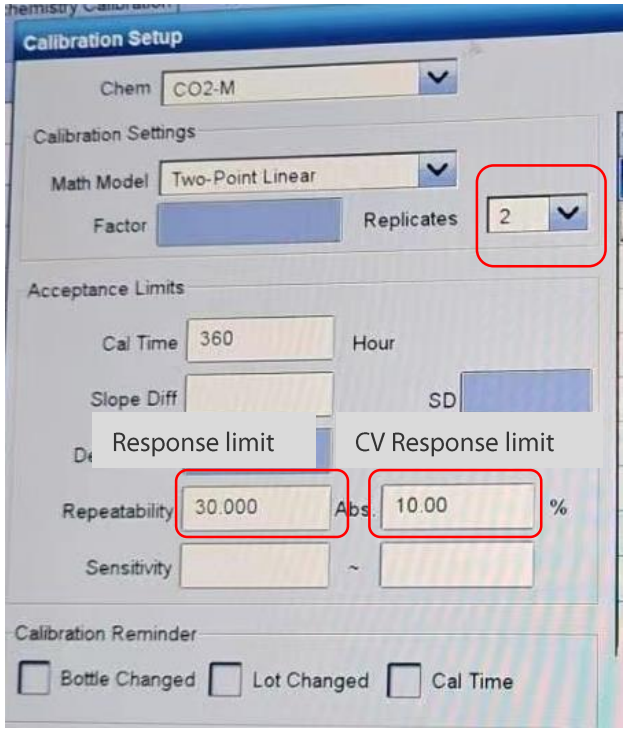
DUP flag for CO2 calibration result



Cat. No.	Package size
CO20302	R 2×20 mL+Calibrator 1×1.5 mL
CO21302	R 2×18 mL+Calibrator 1×1.5 mL
CO20303	R 4×20 mL+Calibrator 1×1.5 mL
CO20304	R 6×20 mL+Calibrator 1×1.5 mL
CO20102	R 2×20 mL+Calibrator 1×1.5 mL+Control 1×5 mL
CO21102	R 2×18 mL+Calibrator 1×1.5 mL+Control 1×5 mL
CO20103	R 4×20 mL+Calibrator 1×1.5 mL+Control 1×5 mL
CO20104	R 6×20 mL+Calibrator 1×1.5 mL+Control 1×5 mL

DUP flag for CO2 calibration result

Operation manual guide explanation

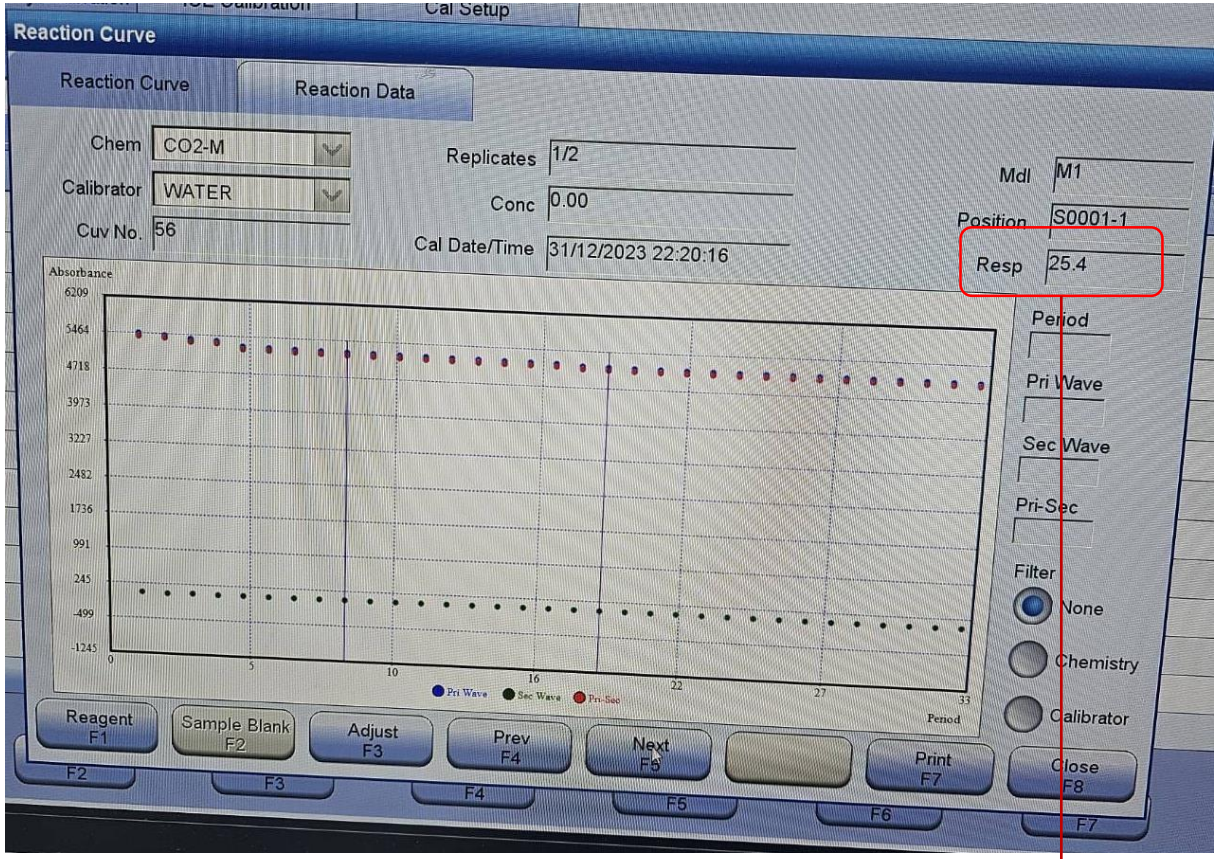


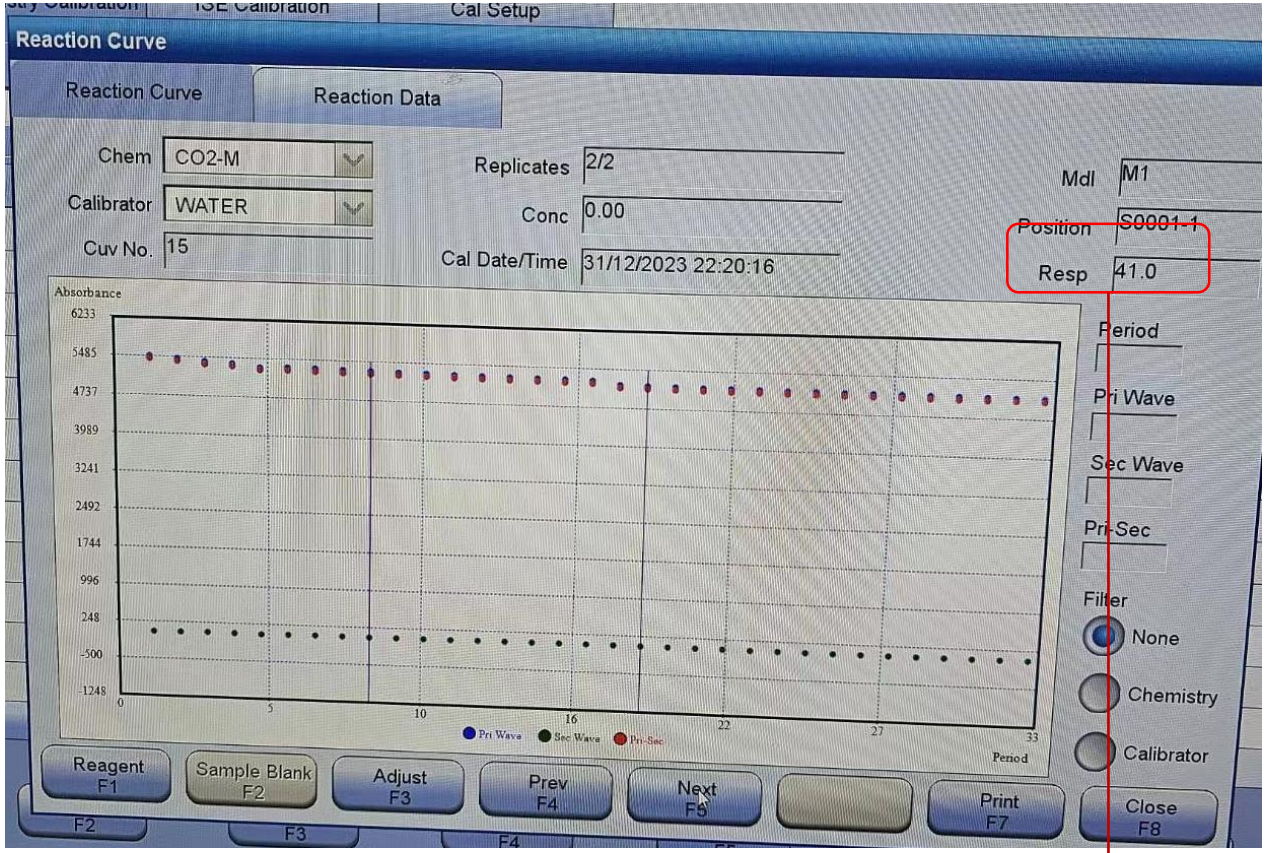
Repeatability	The repeatability is the difference of the maximum and minimum response of each calibrator. If the calculated calibrator response difference is greater than the set limit, the system will give the flag "DUP" and an alarm. The input range must be within 0-34,000. The default is blank, which means not performing this check.

DUP	Calibration related	Calibration repeatability error	The difference between the maximum and minimum response of the calibrator exceeds the specified limit.	Check if the acceptance limit is reasonable, troubleshoot the error, and then recalibrate.
DUP	Calibration related	Potential difference between two calibration replicates out of range	Calibrator of the same concentration level will be run repeatedly on the ISE module. If the difference between two adjacent runs is beyond the set range, this warning will be	If the calibration succeeds, ignore the error; If the calibration fails, take relevant actions according to the alarm.

DUP flag for CO2 calibration result

R0





Water : Rep1 = 25.4

Water : Rep2 = 41.0

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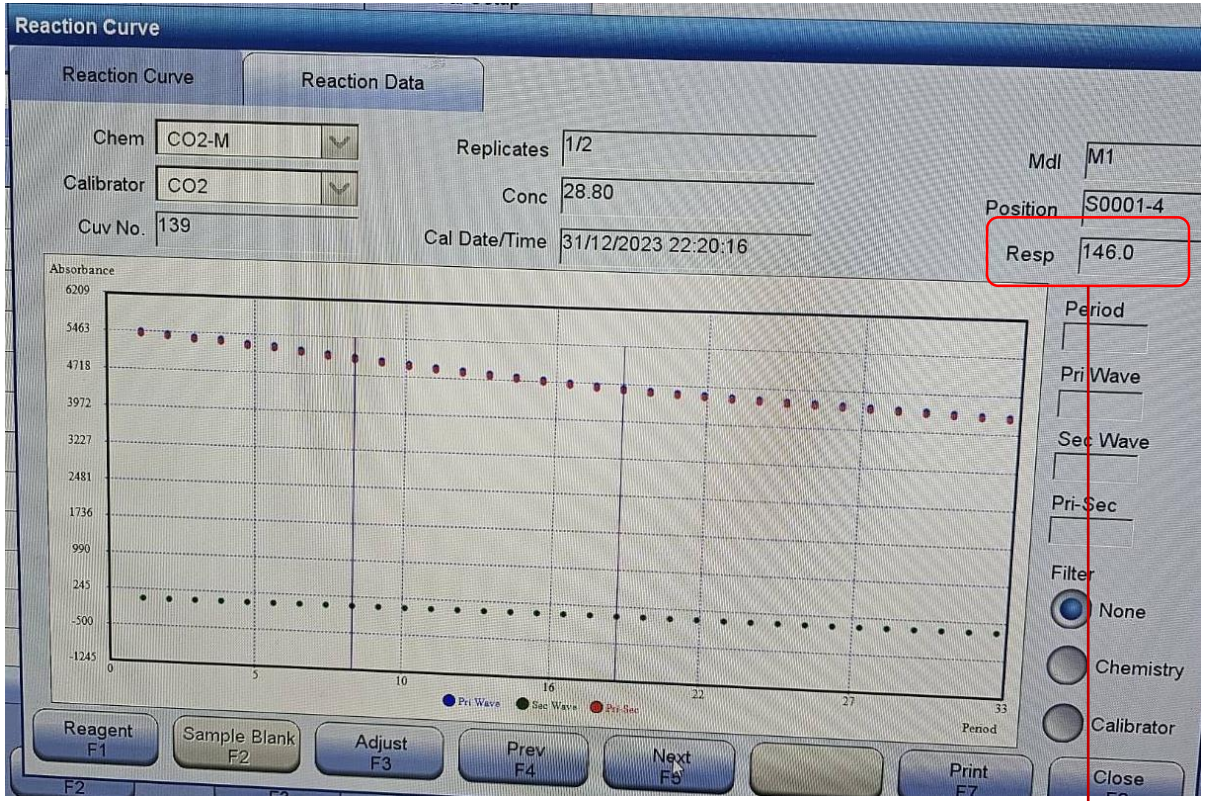
DUP flag for CO2 calibration result

CO2 Calibration result



CO2 cal Rep1 = 146.0

CO2 cal Rep2 = 353.4

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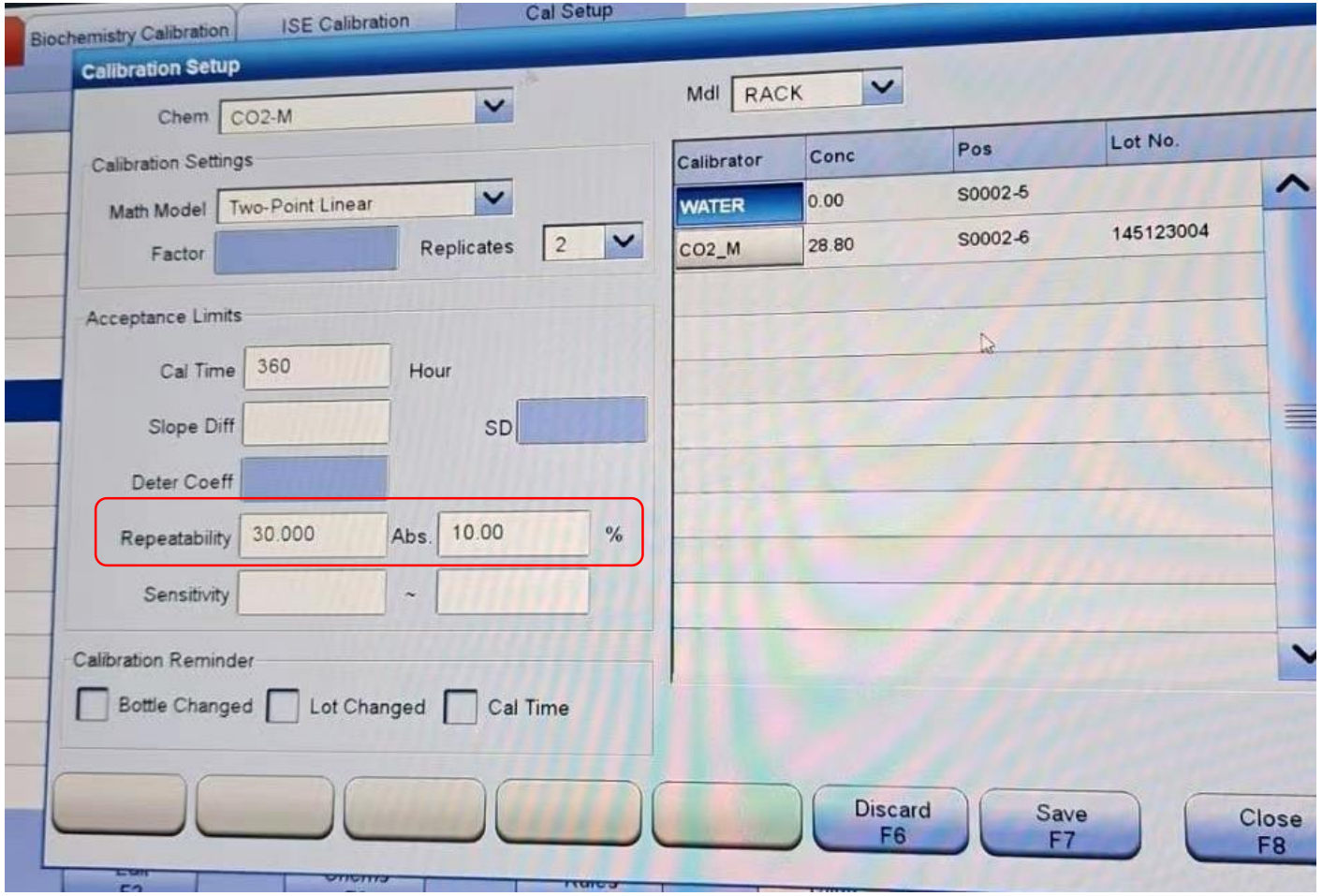
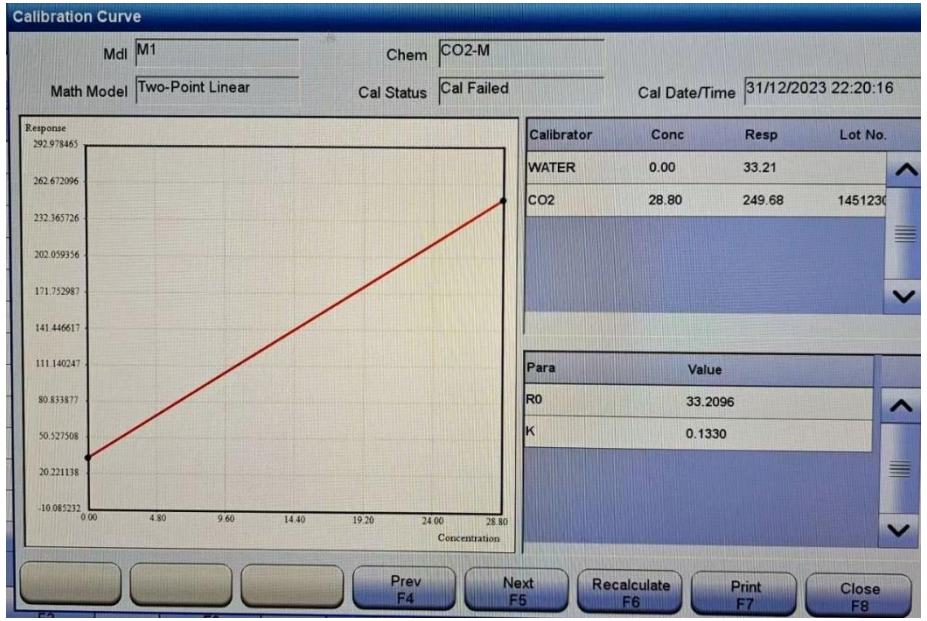
DUP flag for CO2 calibration result





	Water	CO2
Rep1	25.4	146.0
Rep2	41.0	353.4
AVG	33.2	249.7
SD	11.0	146.7
CV	33%	59%

Conc =K* (R-R0)

K = Conc/(R-R0)

K = 28.8/(249.7-33.2)

K = 0.1330

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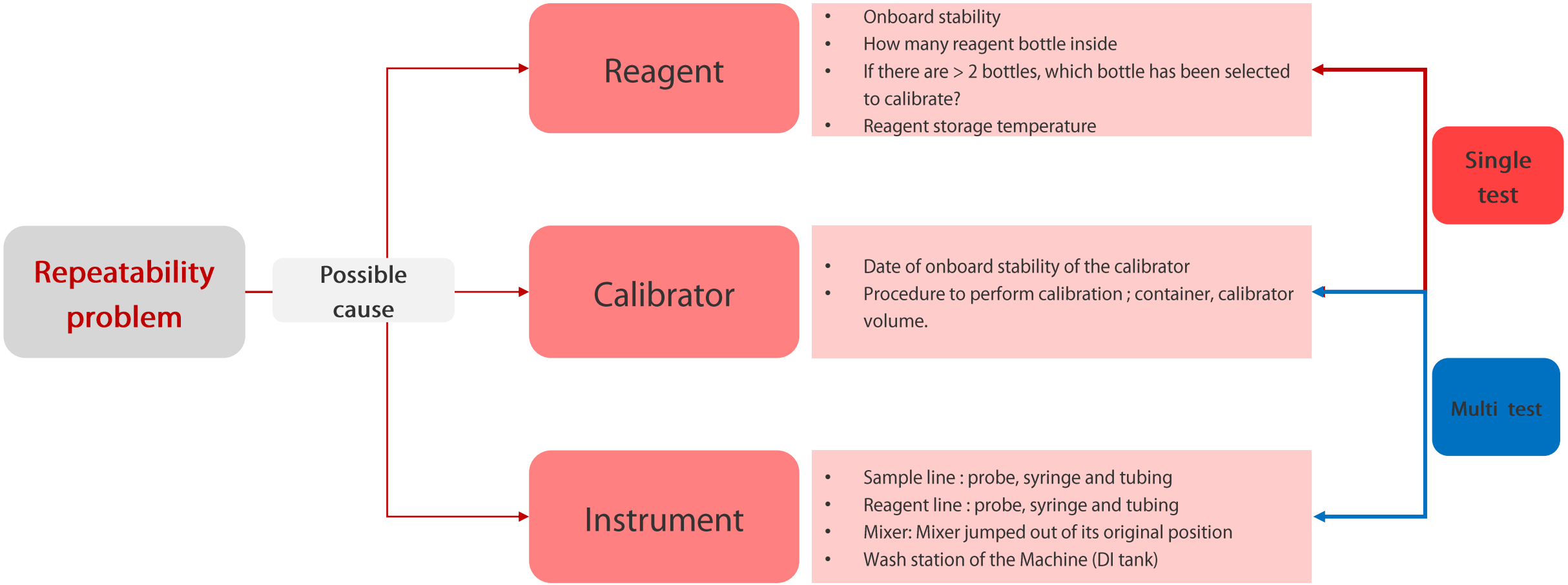
Case Ideas



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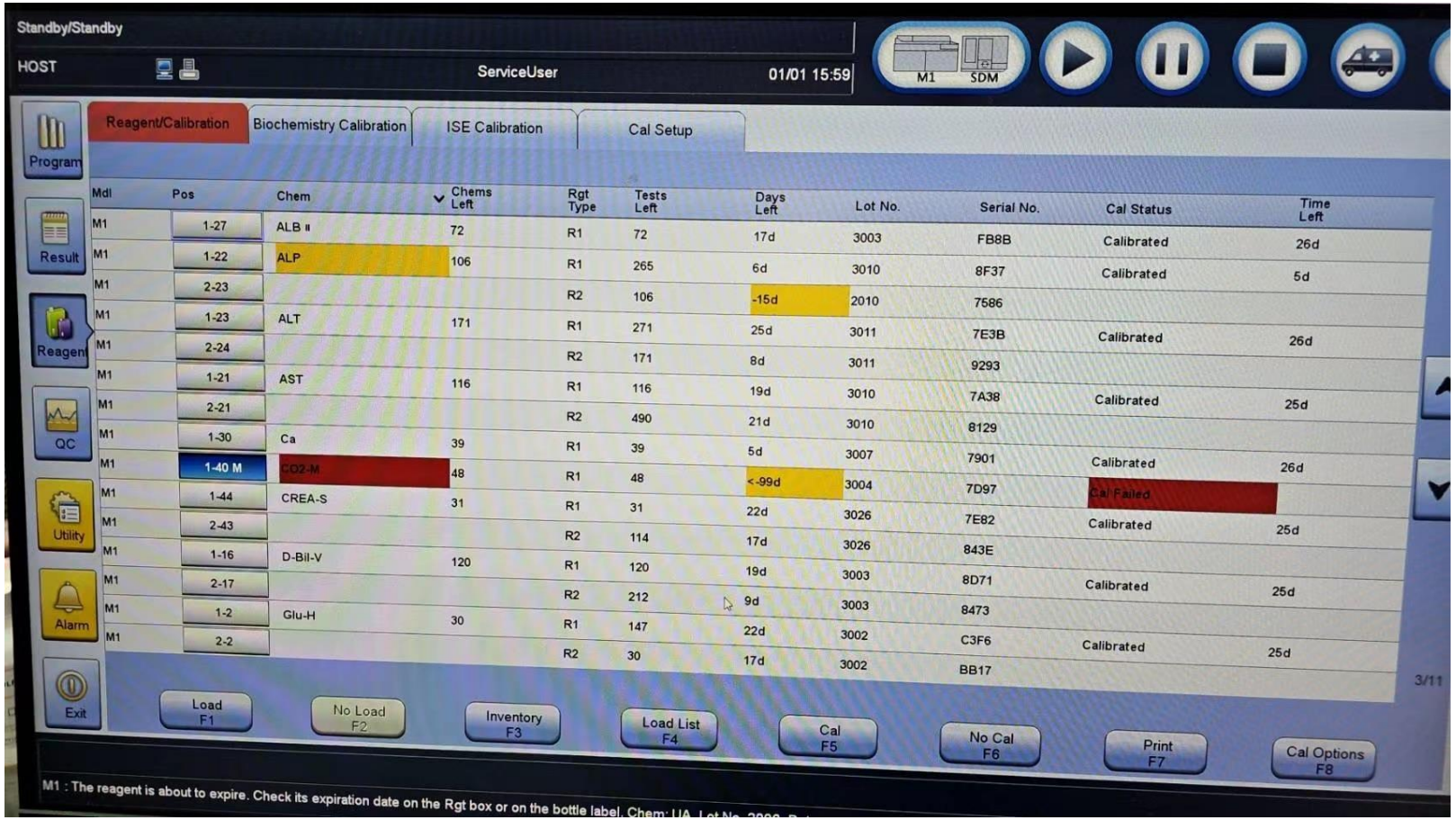
Reagent



Try to change the new bottle reagent, but still, calibration failed.

1. Onboard stability

1 day ago

2. How many reagent bottles are inside?

1 bottle

3. If there are > 2 bottles, which bottle has been selected to calibrate?

Lot.3004 SN.7D97 (1 bottle)

4. Reagent storage temperature

2-8 ℃

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Calibrator material

New Reagent/ New Calibrator (new lot)

DUP	Cal Failed	31/12/2023 22:20:16	33.2096	0.1330
DUP	Cal Failed	31/12/2023 21:53:00	32.6338	0.1331
DUP	Cal Failed	31/12/2023 21:16:13	26.9472	0.1300
DUP	Cal Failed	[illegible]	14.4485	0.0912
DUP	Cal Failed	31/12/2023 20:57:02	17.5869	0.0746

3 days usage reagent/
New calibrator (new lot)

3 days usage reagent/
calibrator opened more than 2 wks.

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Special position

W1 (No.69): physiological saline (sample dilution)

D1 (No.70): wash solution (R1 probe)

D2 (No.50): wash solution (R2 probe)

Replace detergent : W1, D1 and D2: No issues

Mixer is in the original position

Check syringe : sample/reagent: no issue

Check DI tank and filter: **DI water tank and filter is dirty, clean the tank and change filter, run calibration again**

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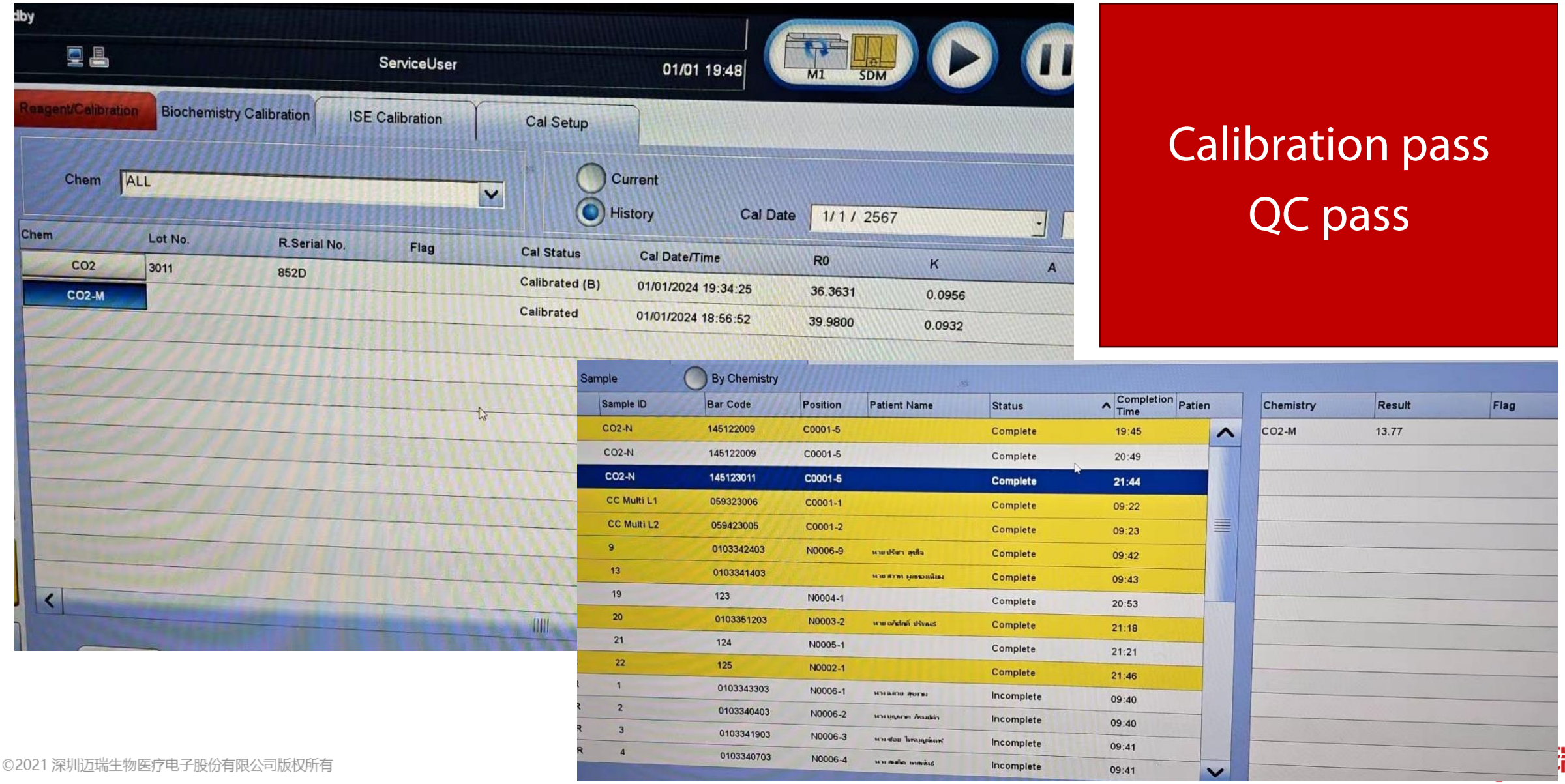
Calibration result after cleaning the DI want tank and changing the filter



Calibration pass

QC pass

Summary:

In conclusion, CO2 test item: if the reagent and calibrator are new, please focus the instrument, especially the water quality for washing; it will affect CO2 results.

When we received issue calibration failed, we need to pay attention to:

1. Flag and error alarm message
2. Single test or multi test
3. Analyze the possible cause according to the flag and test items.
4. DUP, repeatability are not acceptable.
    1. Check the reagent and test.
    2. Check the calibrator material and test.
    3. Instrument > which part affect to this test? DI water/washing part/ S.probe /R.probe/Mixer….
5. After testing for all, please rerun the calibration and QC check.

*** Test items will be sensitive to **Water Quality** : Mg, Ca, Fe, Phos, CO2, UA, TG

Thanks!

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