



Workshop

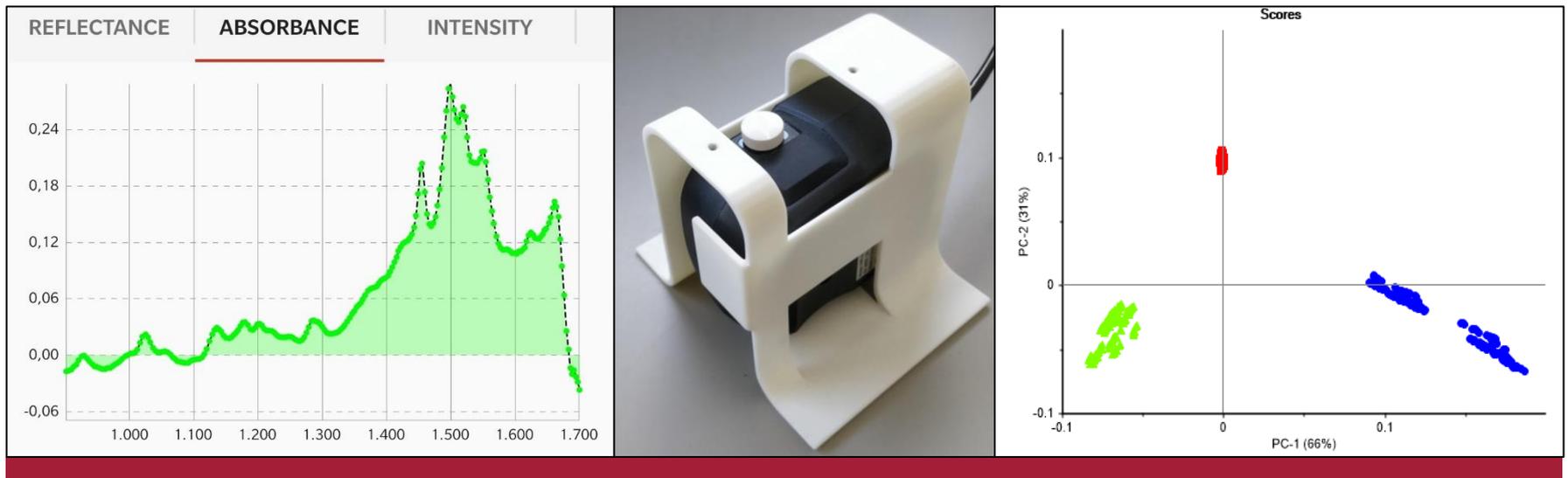
Drug lifecycle control in Sub-Saharan Africa

**From production to responsible safe disposal and elimination in
wastewater treatment plants**

(Med4Africa)



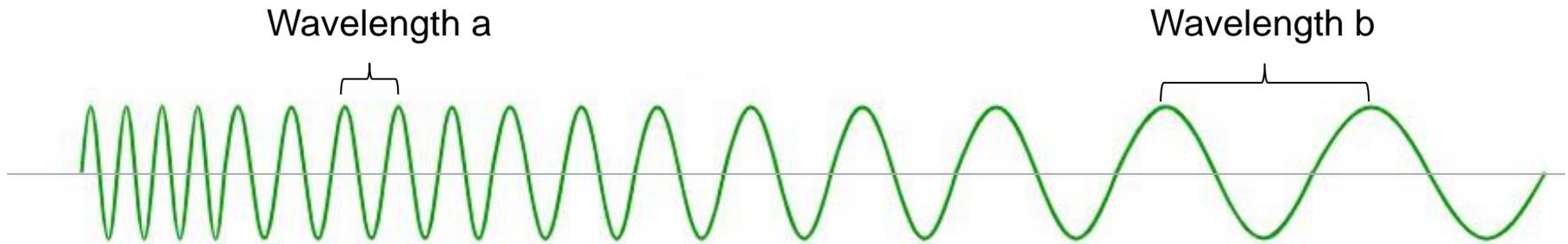
Workshop Drug Lifecycle Control in Sub-Saharan Africa



Excercise: Quality control of tablets by near-infrared spectroscopy

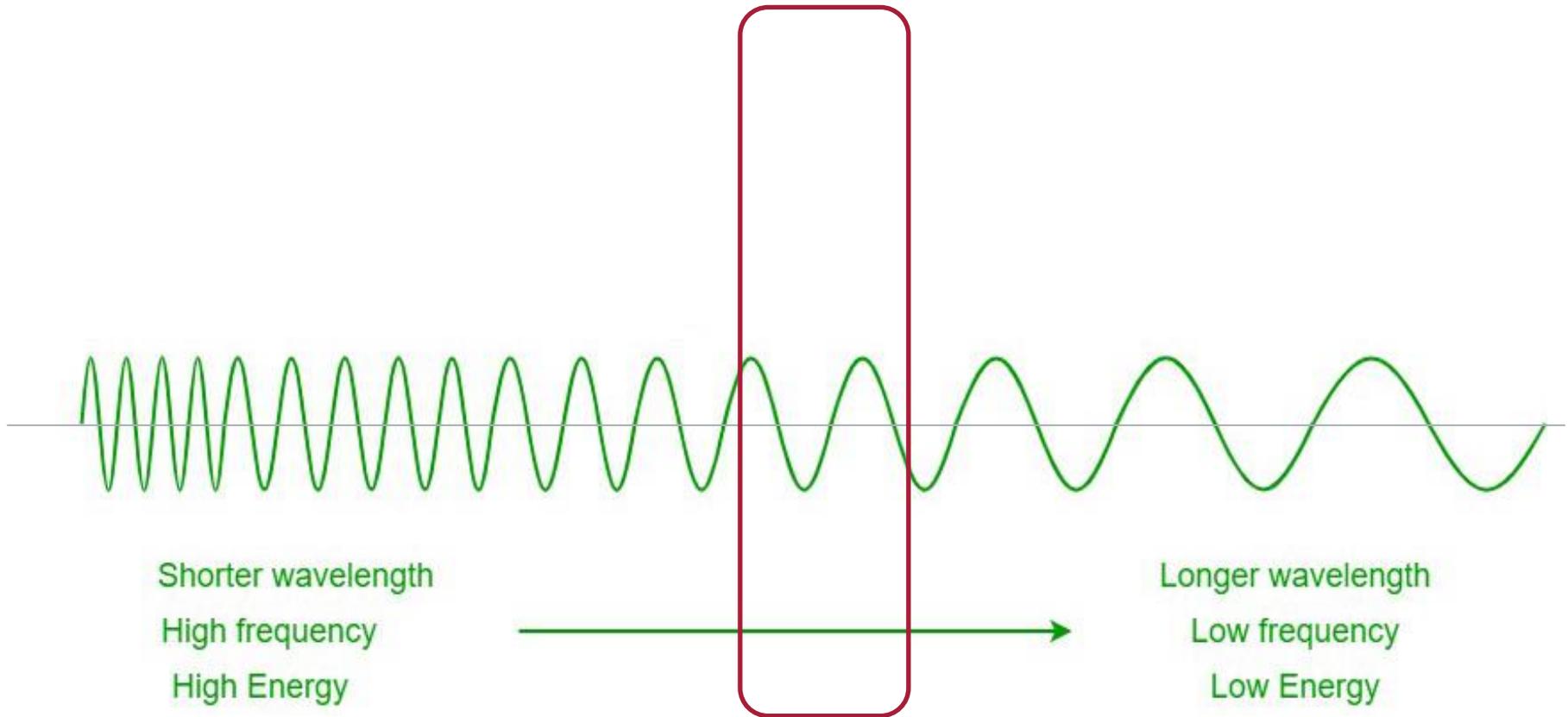


Some light please



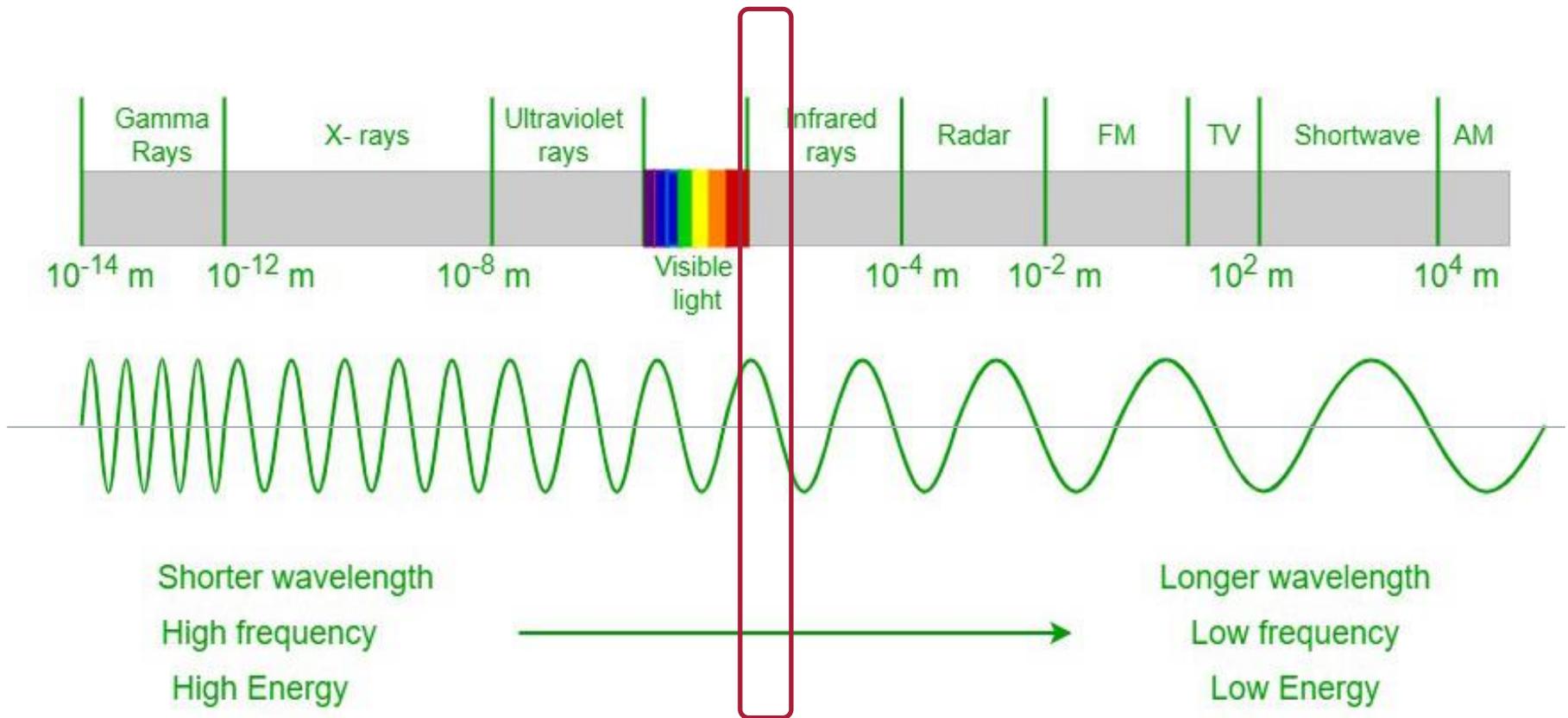


Some light please



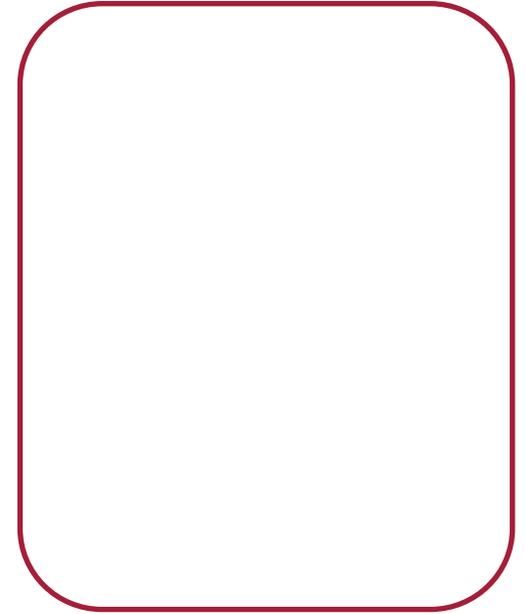
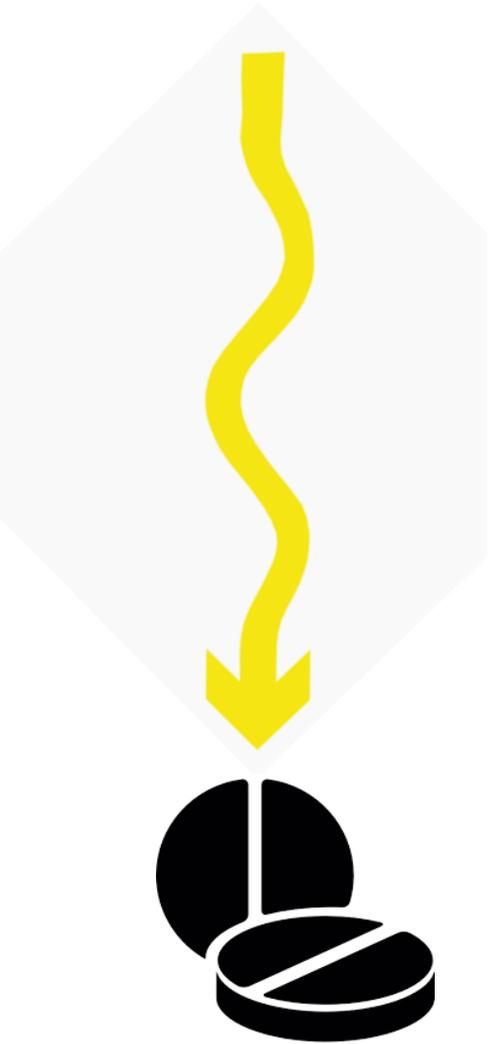


Some light please



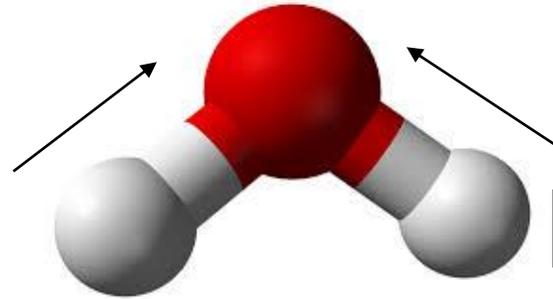
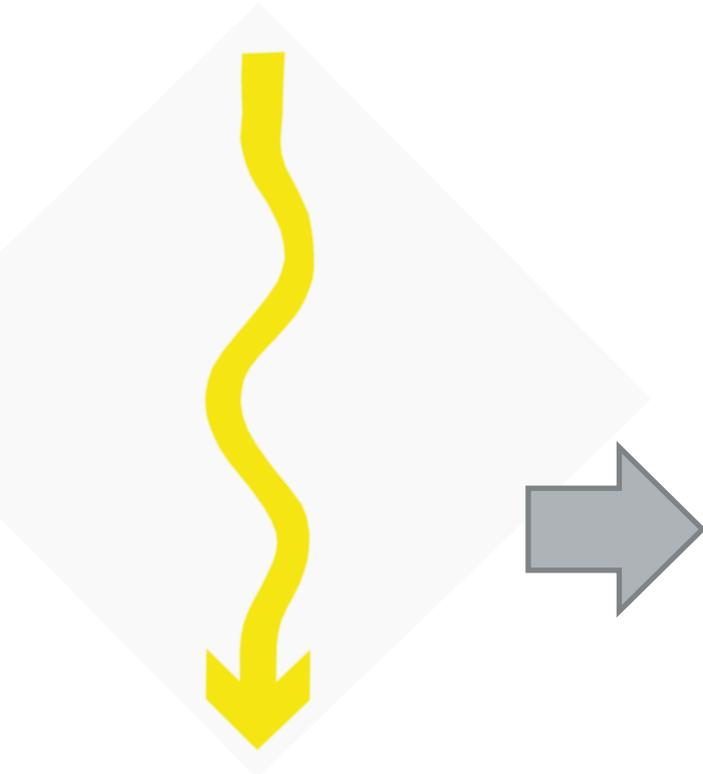
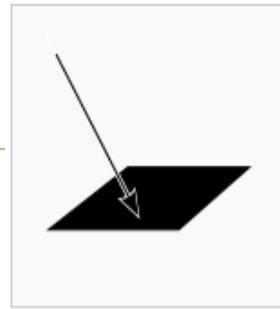


When light meets matter

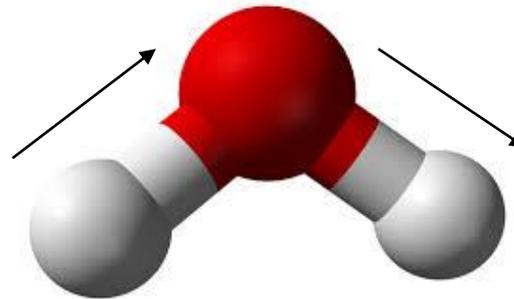




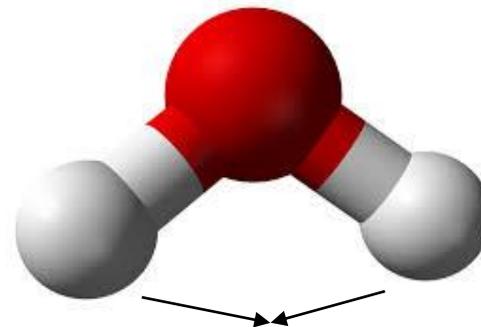
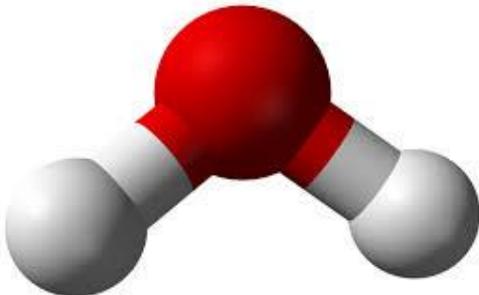
When light meets matter



Symmetrical stretching



Asymmetrical stretching

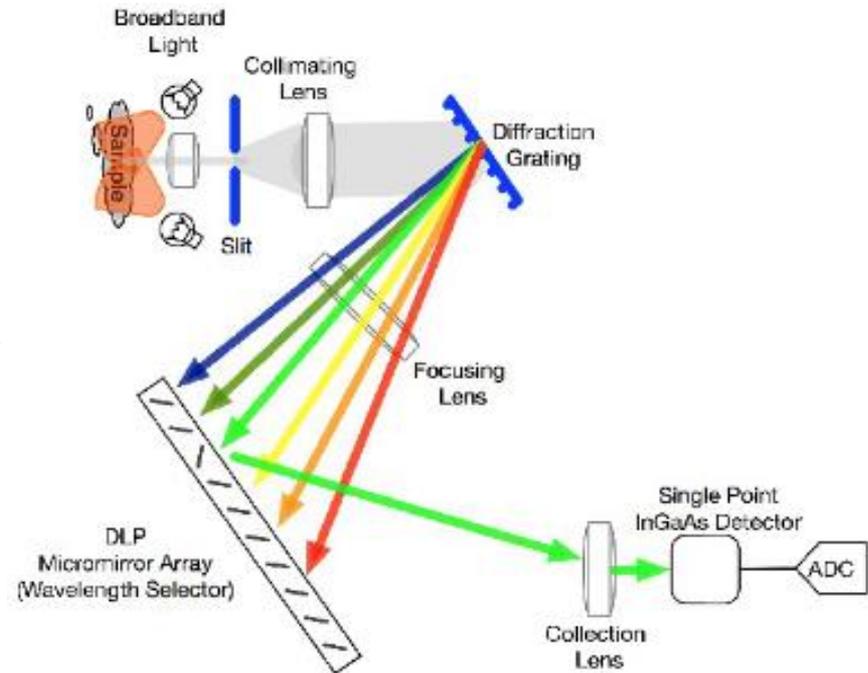
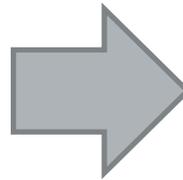


Bending



Introducing NIR* spectroscopy

*NIR = near-infrared



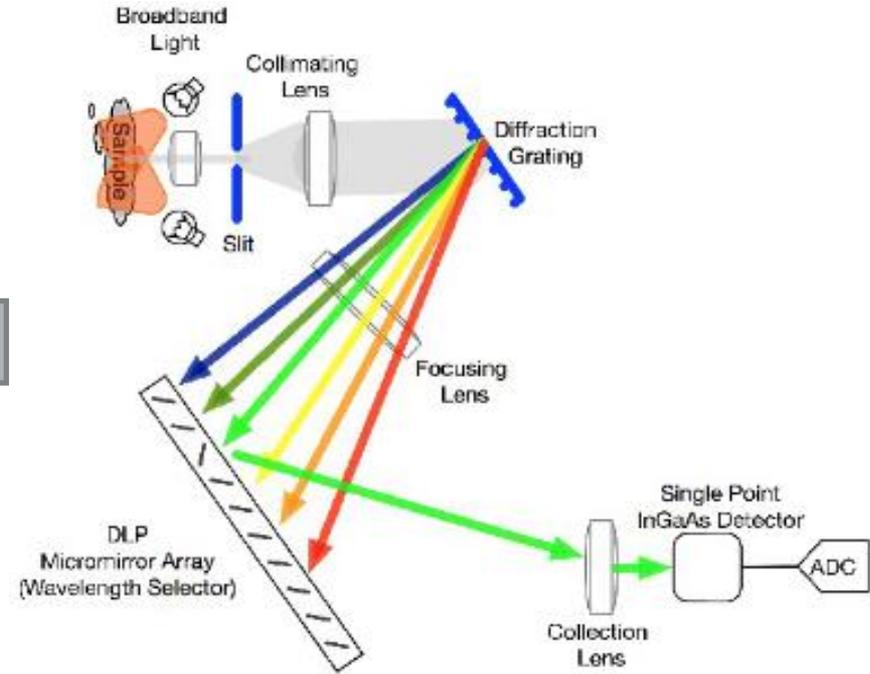
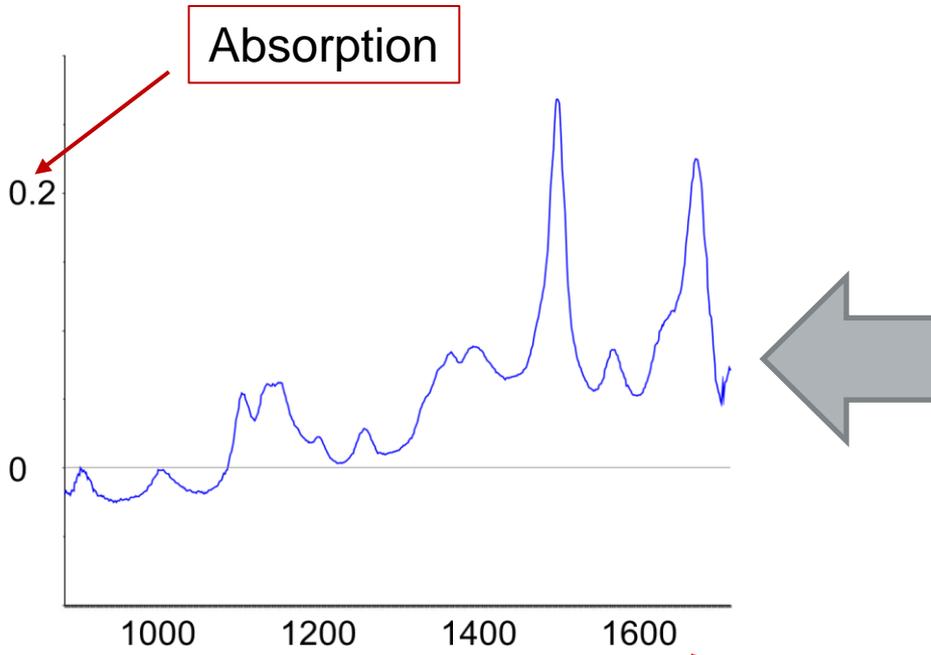
Handheld device:
NIR-S-G1
outside

Handheld device:
NIR-S-G1
inside



Introducing NIR* spectroscopy

*NIR = near-infrared



Spectrum
acquired with
NIR-S-G1

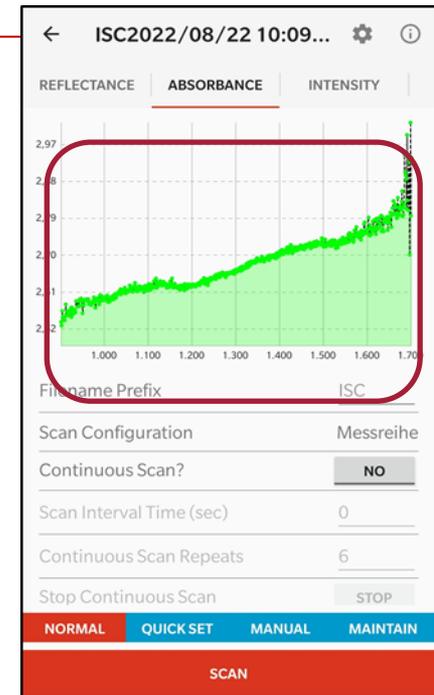
Wavelength [nm]

Handheld device:
NIR-S-G1
inside



A task for you: identification of unlabelled tablets

You have discovered an unlabelled bag, filled with tablets.
What could be in there?



1. Take a tablet

2. Take a scan

3. Compare your
spectrum with
reference spectra



Installation and usage of the „ISC NIRScan“ App

1. Download the ISC NIRScan App from google **Play Store** or from Apple **App Store**
2. Permit access to your **location** as well as to **photos and media** on your phone
3. Activate **bluetooth**

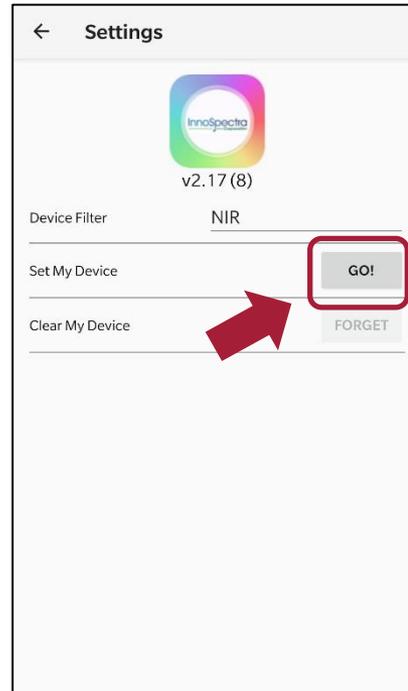




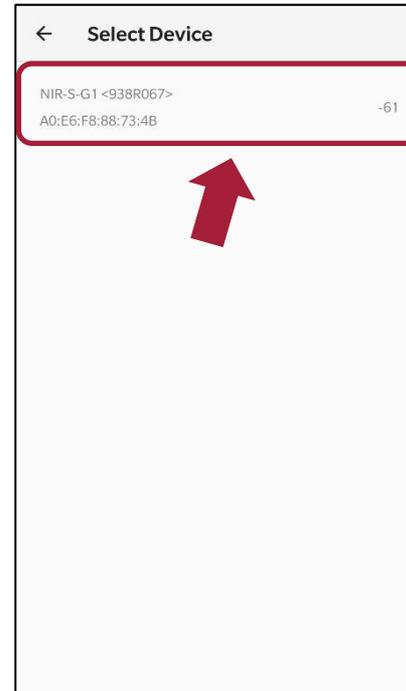
Installation and usage of the „ISC NIRScan“ App



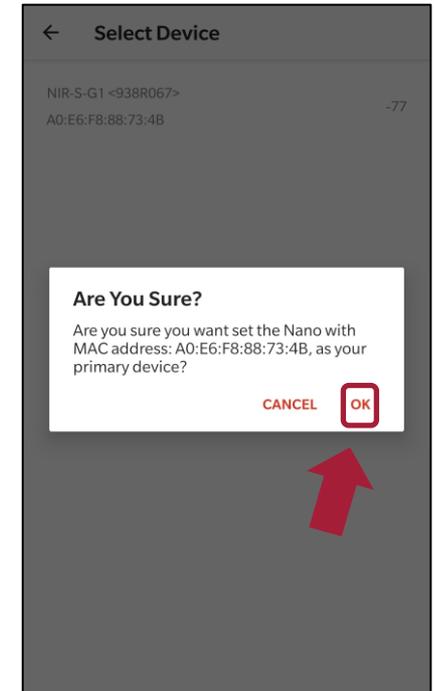
Click on the „settings“ symbol



Select „Go!“



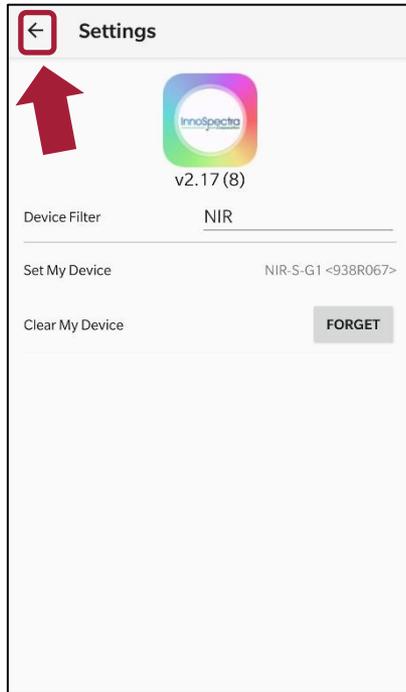
Once a device is found, click on it



Confirm your selection



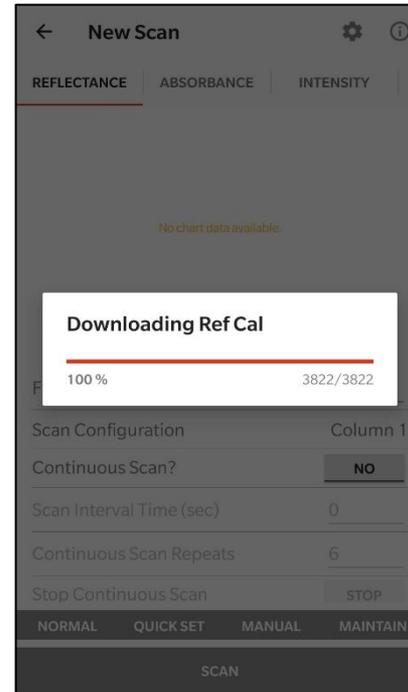
Installation and usage of the „ISC NIRScan“ App



Return, the device flashes blue



Click on the „magnifying glass“



Wait until the App downloaded calibration, reference and setting data from the device



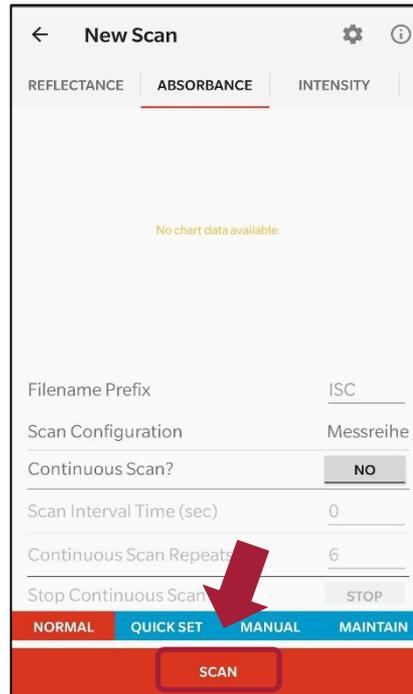
Once it is done, switch to „Absorbance“ and prepare the first scan



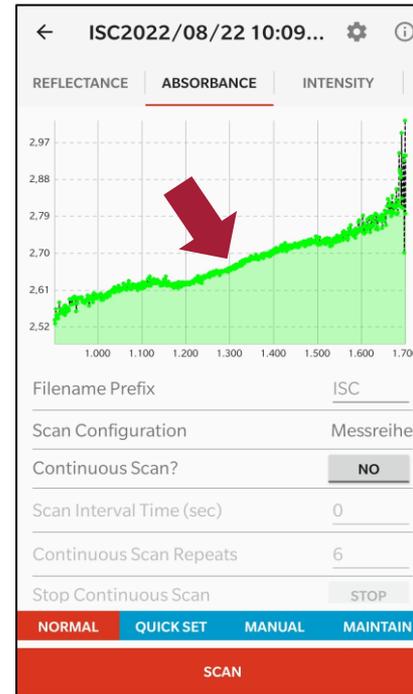
Installation and usage of the „ISC NIRScan“ App



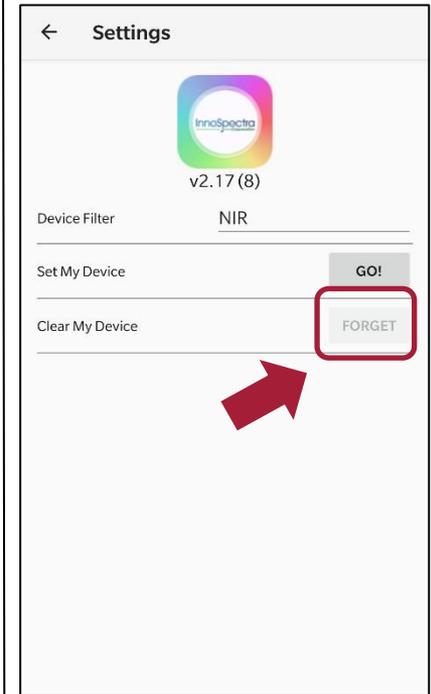
Put the device in the holder and place the tablet on the measurement window using tweezers



Press „Scan“, the device lights up orange



Congratulations, your first scan is ready



Select „Forget“ in settings to allow another person to use the device



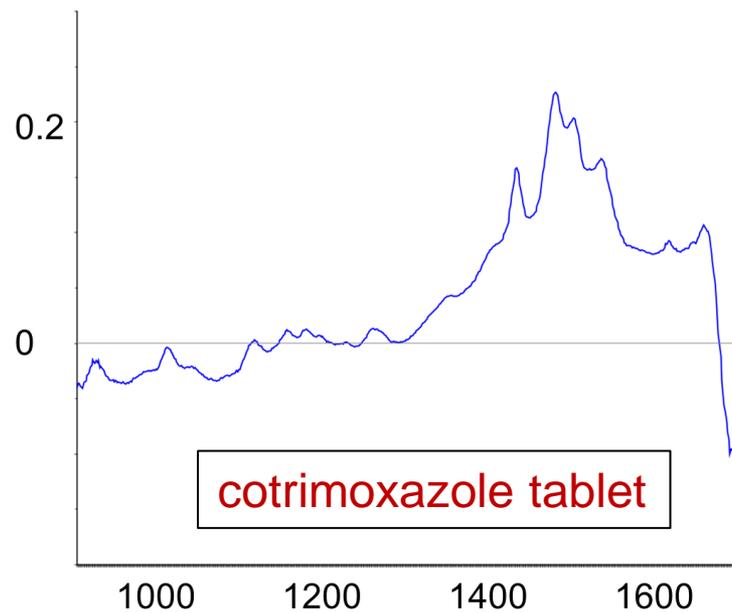
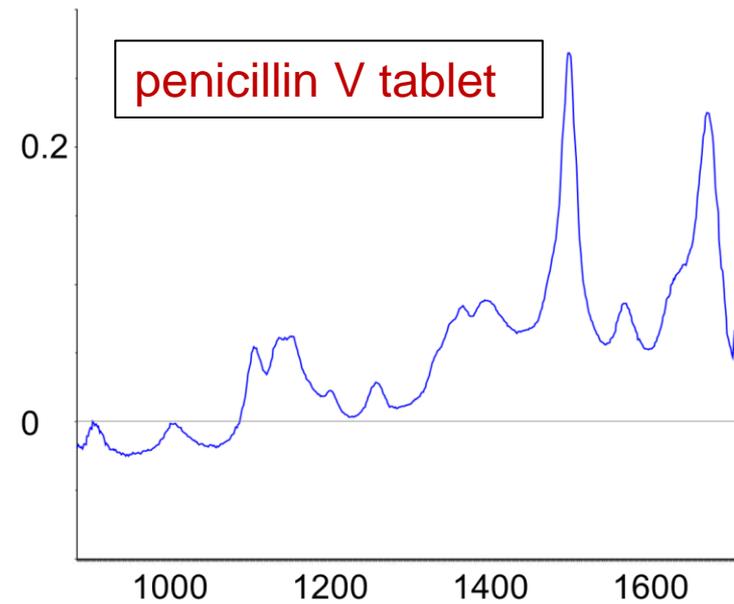
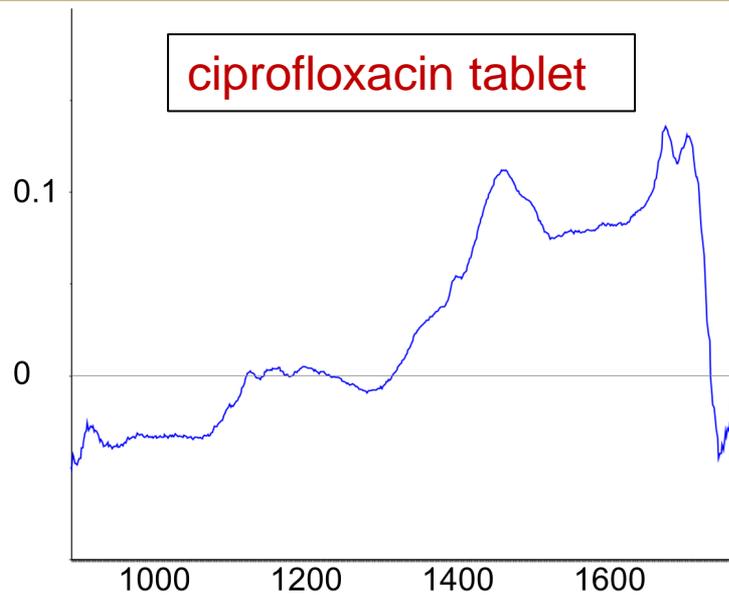
Practical exercise

- Please get together in groups of 3 persons
- At least one person in the group should have downloaded the App
- 3 NIR-S-G1 device are available
- Instructions for usage of the App are printed and can be found at every device
- In case of problems: we are here to help





Reference spectra

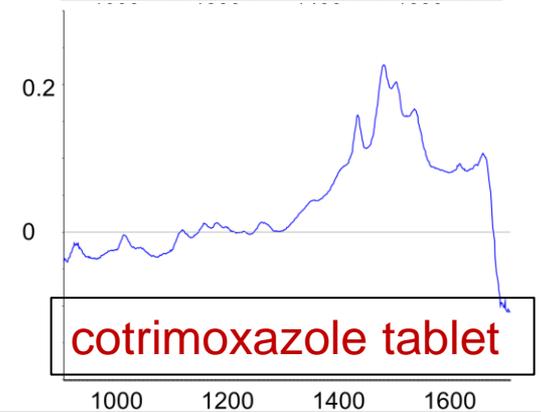
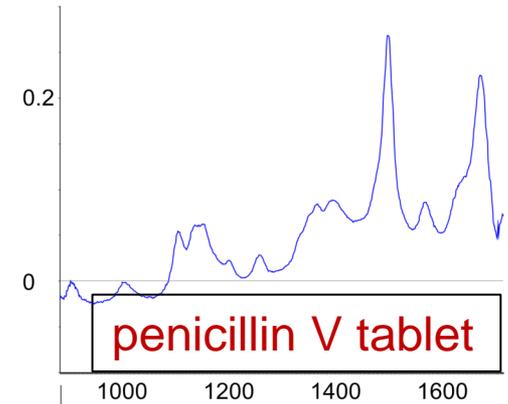
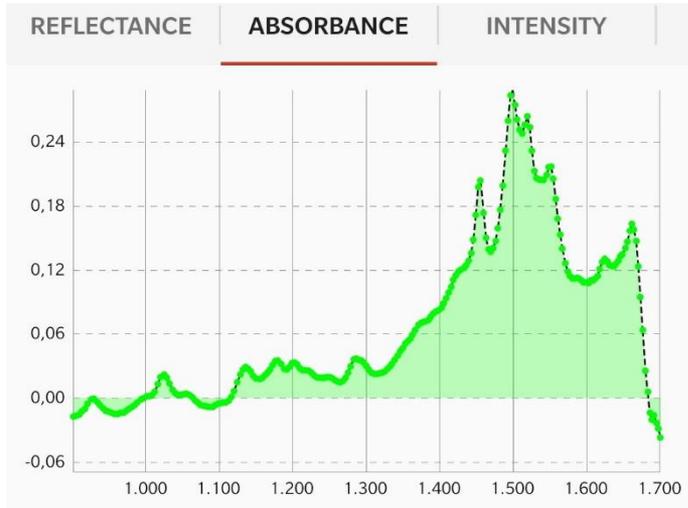




**Please return to your seat
for group discussion**

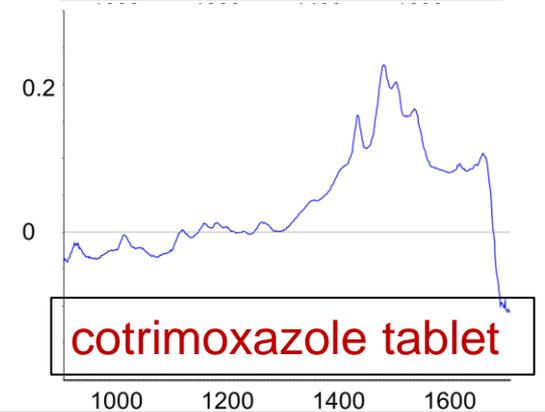
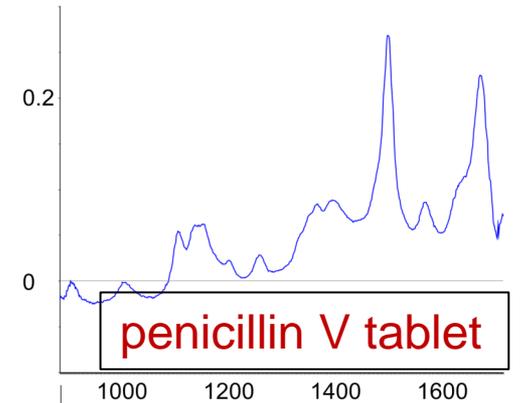
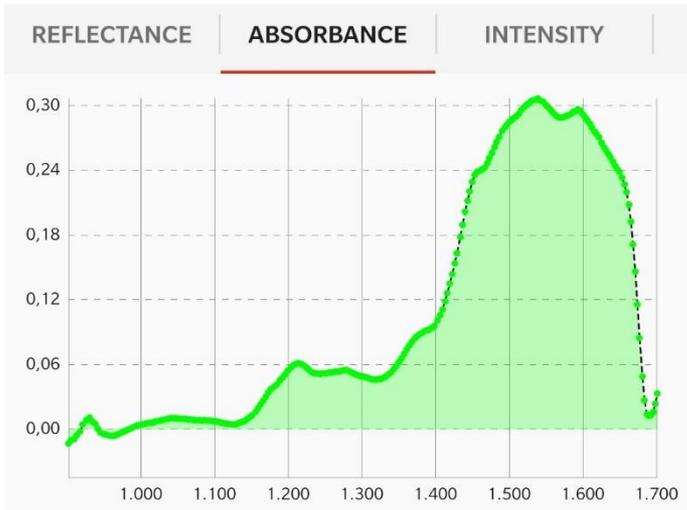
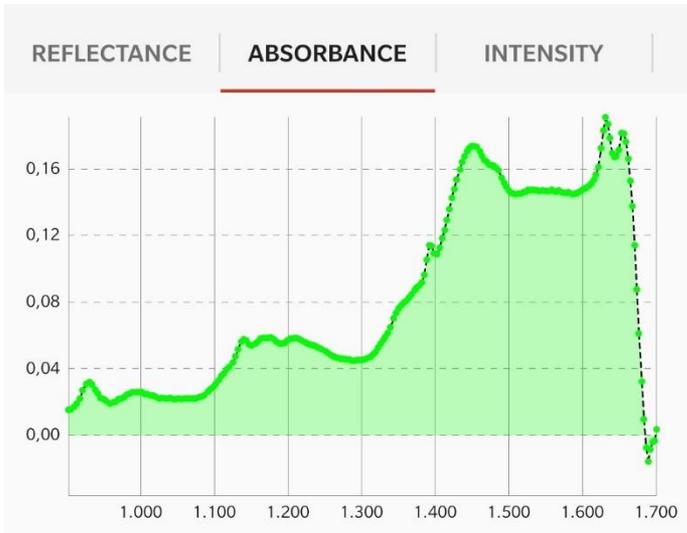


A task for you: identification of unlabelled tablets



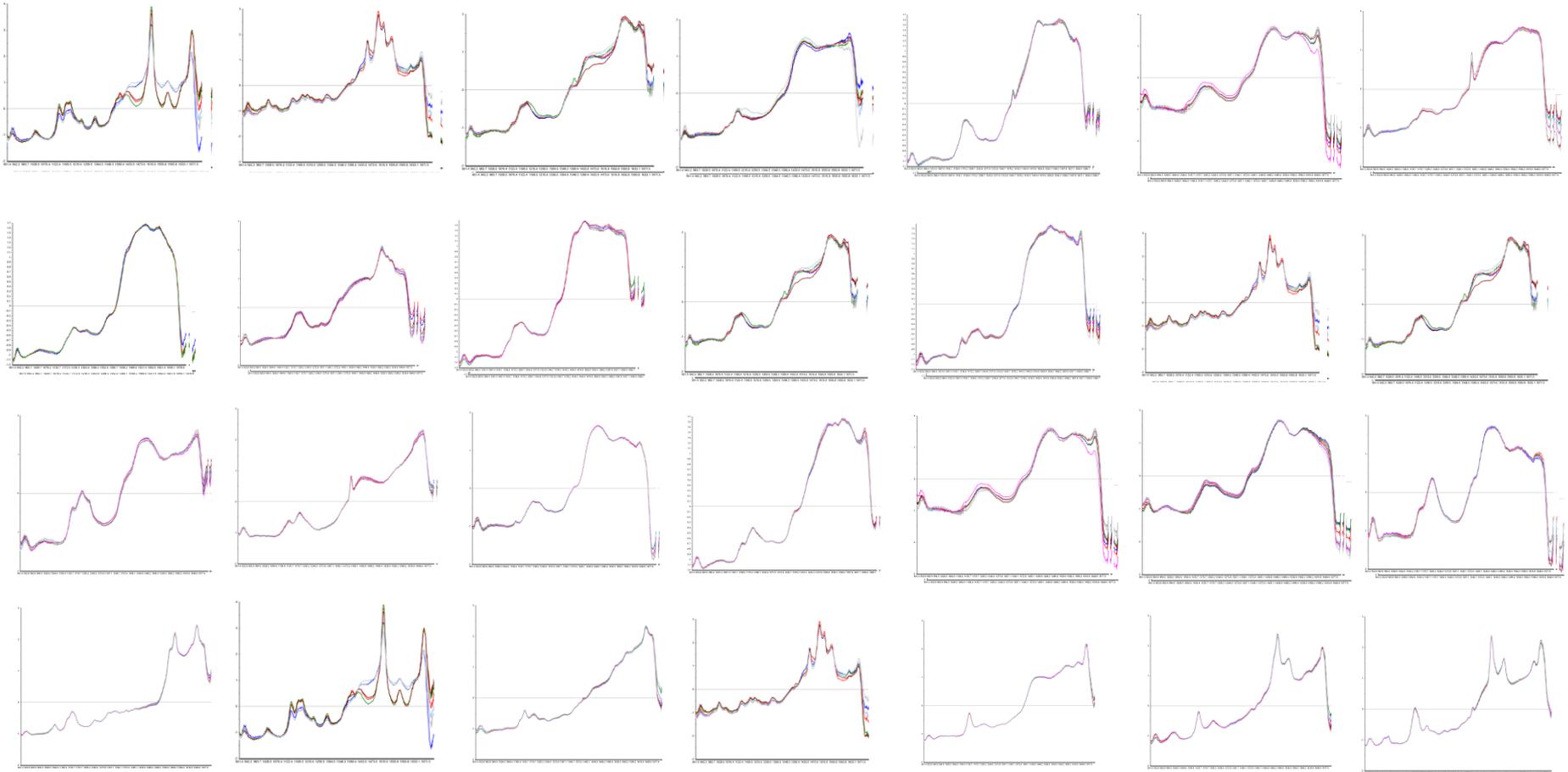


A task for you: identification of unlabelled tablets





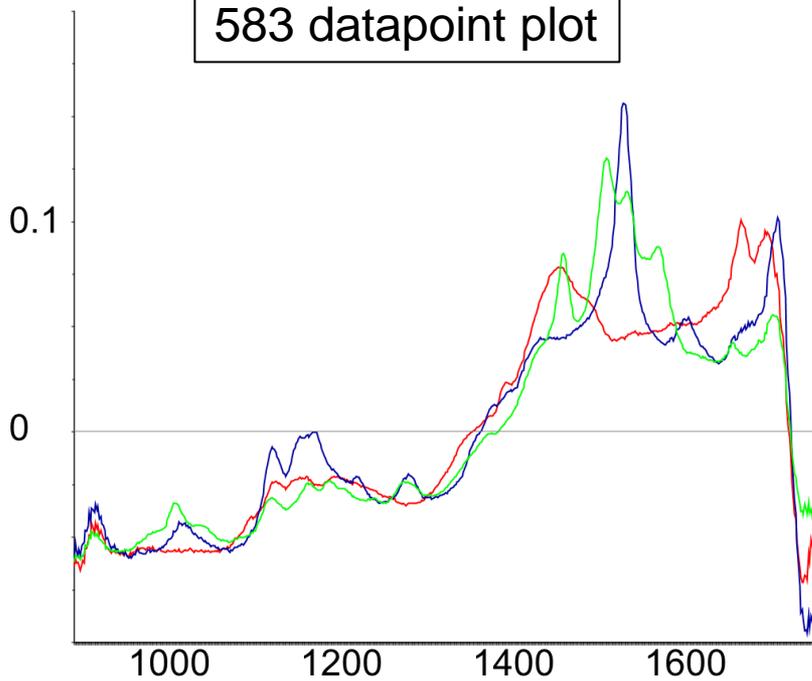
Imagine you had not 3 but 30 APIs* to choose from



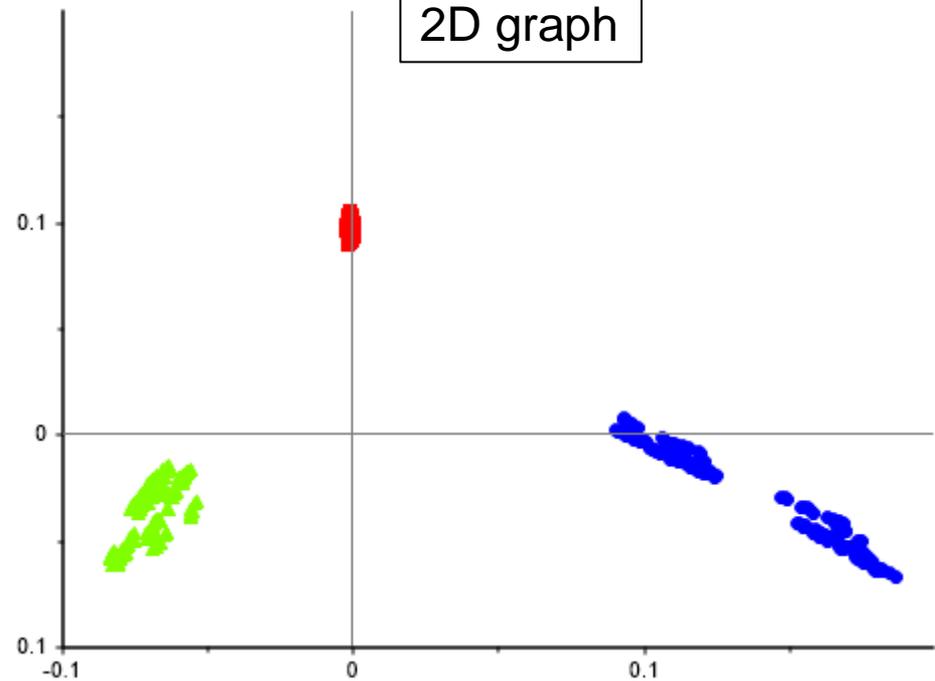
An automated solution would help!



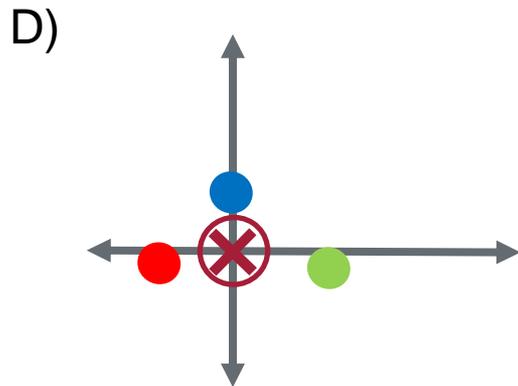
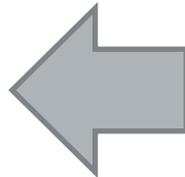
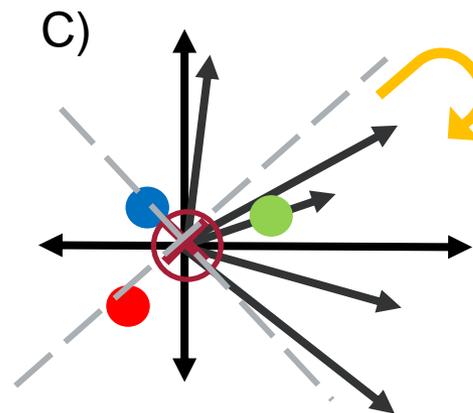
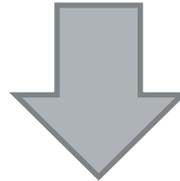
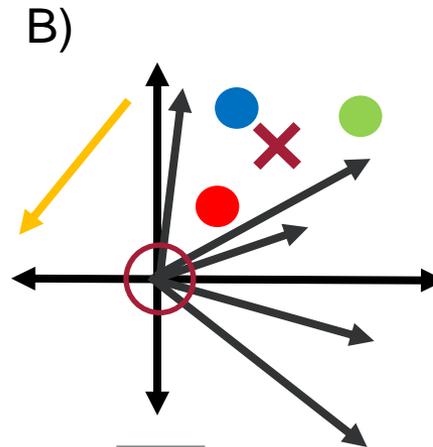
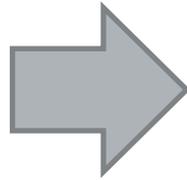
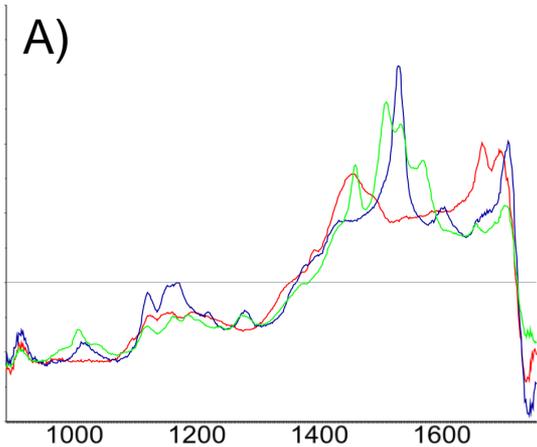
583 datapoint plot



2D graph



Aim: reduction of
dimensions



A) NIR spectra with 583 datapoints

B) Data are entered in coordinate system with 583 axes. Centre of data and origin of coordinate system determined. Data shifted so that data center and coordinate system origin overlap.

C) Direction of greatest and second greatest variance determined. These are defined as new axes.

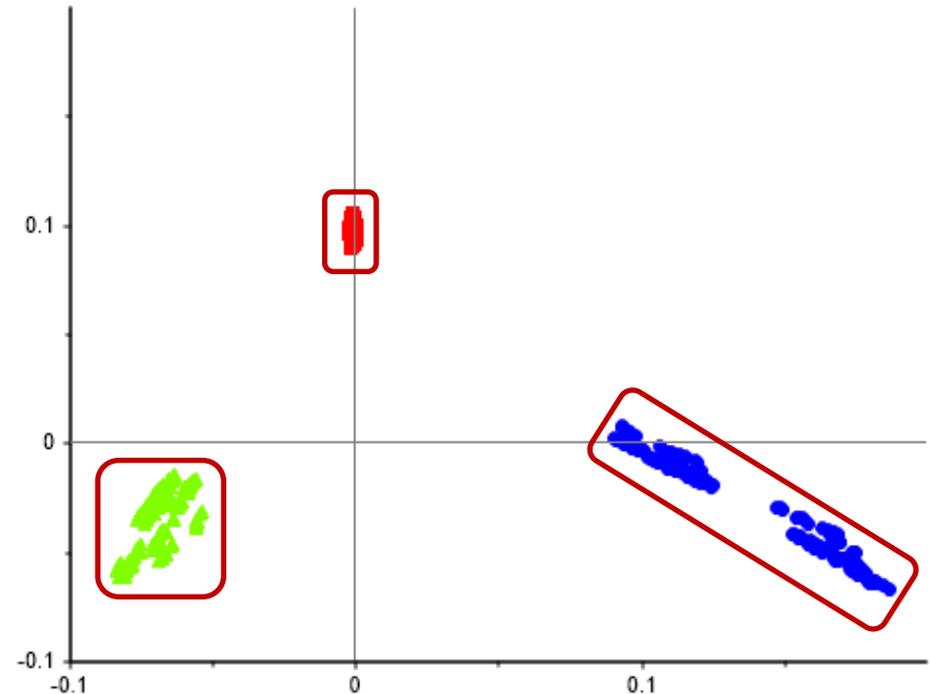
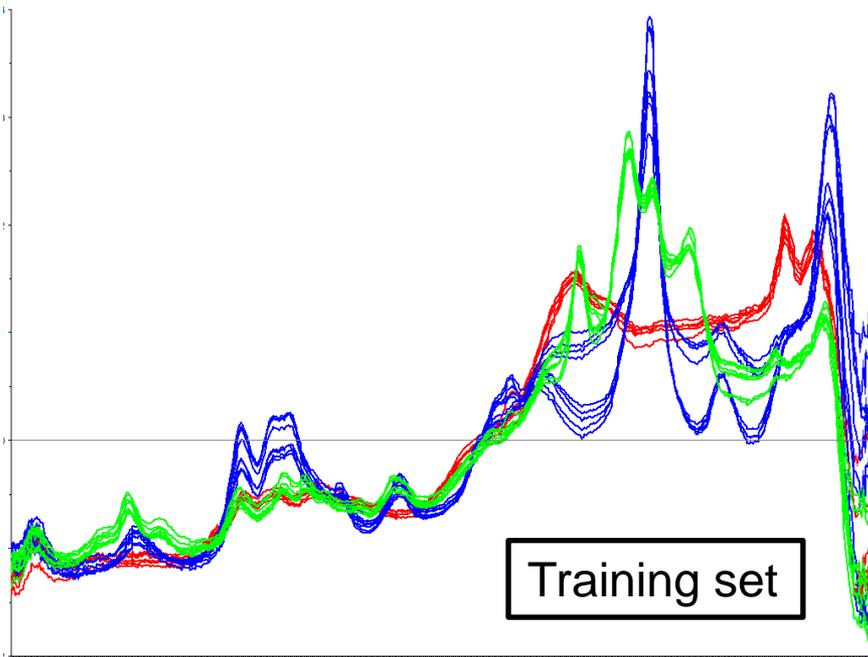
D) Now each datapoint can be described by the two coordinates of the new axes.



API* identification with PCA*

*API = active pharmaceutical ingredient

*PCA = principal component analysis



-  ciprofloxacin tablets
-  penicillin V tablets
-  cotrimoxazole tablets

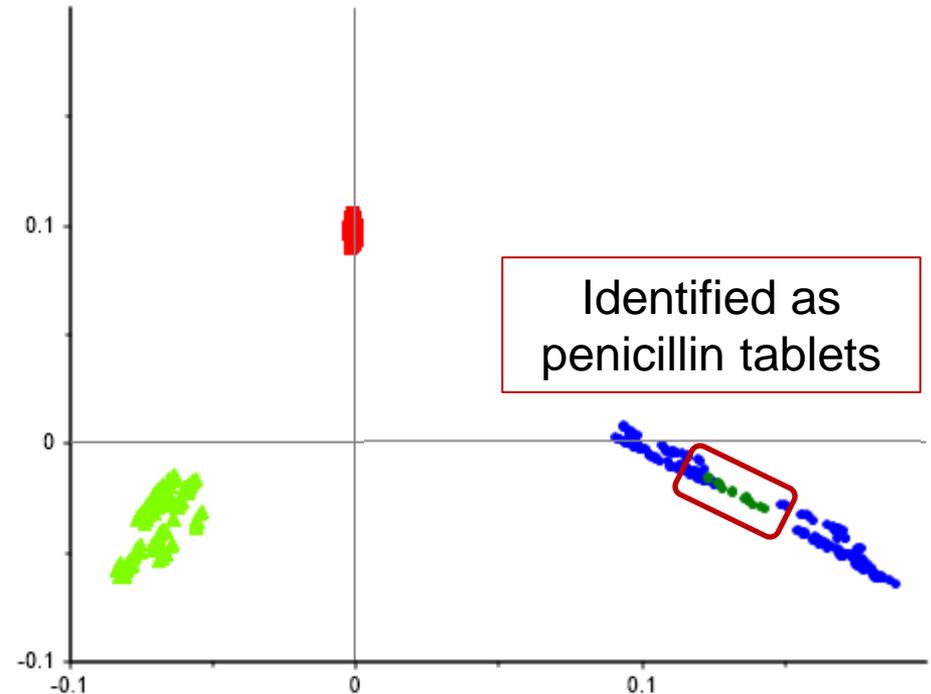
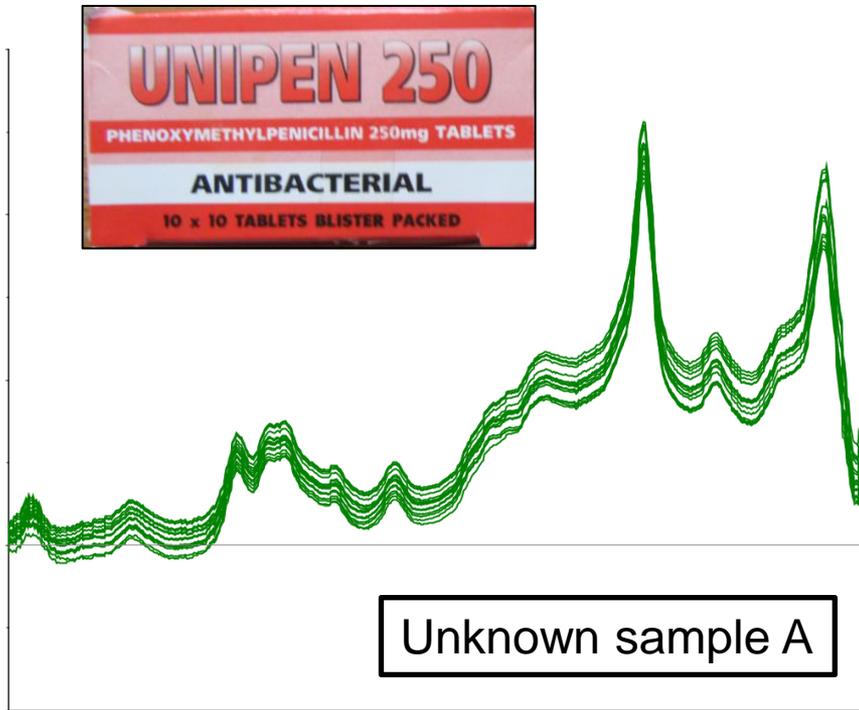




API* identification with PCA*

*API = active pharmaceutical ingredient

*PCA = principal component analysis



-  ciprofloxacin tablets
-  penicillin V tablets
-  cotrimoxazole tablets
-  unknown tablets

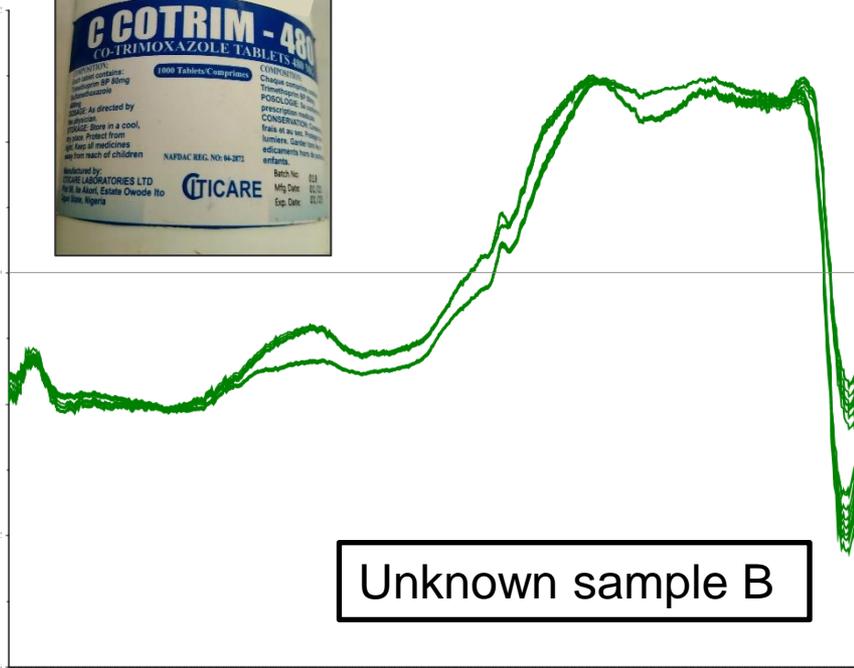




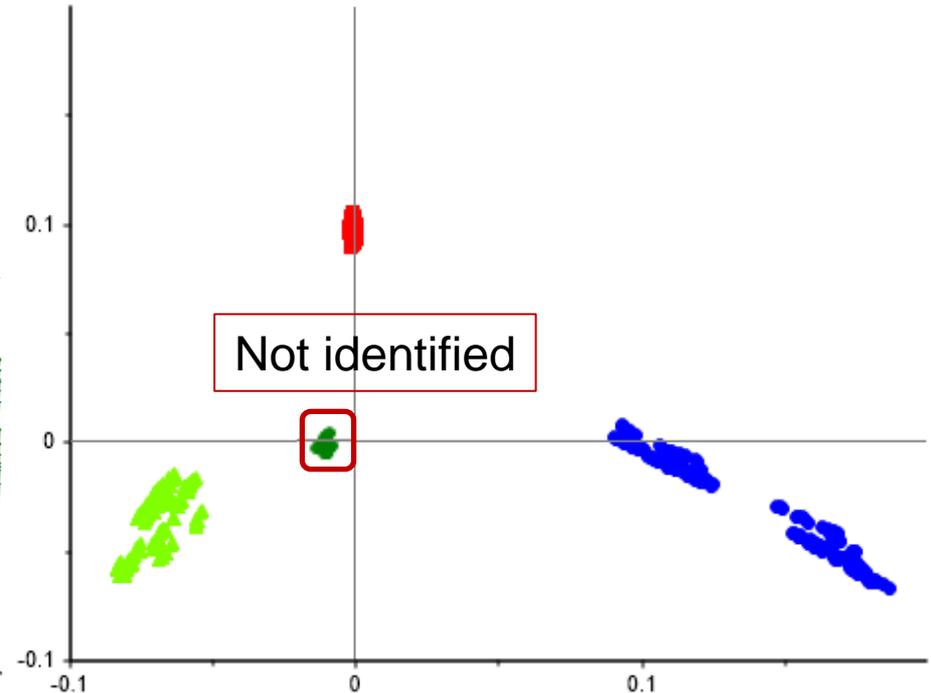
API* identification with PCA*

*API = active pharmaceutical ingredient

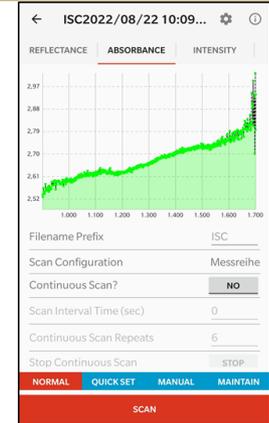
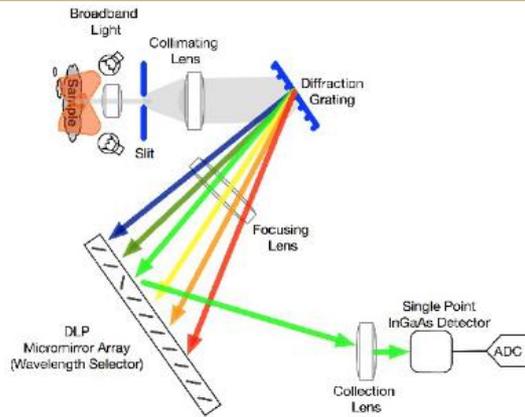
*PCA = principal component analysis



Unknown sample B



- ciprofloxacin tablets
- penicillin V tablets
- cotrimoxazole tablets
- unknown tablets



Thank you !

