Risk Assessment Form

Procedure	Use of Nanophotometer NP80

Name(s) of person performing the work	Users (Lab manager & Lab Technician & Tenants)		
Name & position of assessor	Khwaja Islam & Laboratory Manager	**Signature**	
Date of assessment	01/10/2018	**RA Number**	BioE 0015

Outline of procedure / activity:

The Nanophotometer NP80 IS located in Innovation lab 1 (696.10.14). The Implen Nanophotometer® spectrophotometer is a mobile, touchscreen, low vibration Vortexer, USB port, simple to use UV/Visible instrument with a CCD array detector with options ranging from Nano volume to standard cuvette and all-in-one solutions. It measure sample volumes ranging from 0.3 - 2 µl. The Nanophotometer® runs on a Linux-based operating system (NPOS) that is designed for the use of pre-programmed and custom applications with a high degree of flexibility and processing power.

Sample Compression Technology™ provides easy sample handling which is independent of surface tension. This technology squeezes the sample between two quartz surfaces allowing for unmatched precision and accuracy without the need for dilutions. Combined with our True Path Technology™ the system offers lifetime accuracy and precision without the need for maintenance or recalibration.

Blank Control™ gives a warning message for blanks with high background. High background absorbance can be caused by a contaminated blank, blank buffer or by residues from previous users. Insufficient blank readings are the main cause for inaccurate measurements. Blank Control™ will protect the user from wasting time and precious sample on inaccurate readings caused by high background blanks or inappropriate cleaning.

Specifications:

Nano Volume Performance:

- Detection Range dsDNA 1 ng/µl to 16,500 ng/µl
- Detection Range BSA 0.03 mg/ml to 478 mg/ml
- Minimum Sample Size 0.3 µl to a maximum sample volume of 2.0 µl
- Photometric Range (10 mm equivalent) 0.02 – 330 A
- Path length 0.67 and 0.07 mm
- Dilution Factor 15 and 140
- Vortexer 2,800 rpm; tube size up to 2.0 ml

Cuvette Performance:

- Detection Range dsDNA 0.1 ng / µl to 130 ng / µl
- Detection Range BSA 0.003 mg / ml to 3.7 mg / ml
- Photometric Range 0 - 2.6 A
- Centre Height (Z-Height) 8.5 mm
- Cell Types outside dimension 12.5 x 12.5 mm
- Heating 37°C ± 0.5°C
- 10 mm, 5 mm, 2 mm, 1 mm and 0.5 mm path length quartz, glass, or plastic cuvettes with a centre height of 8.5 cm.

Optical Specifications:

- Wavelength Scan Range 200 – 900 nm
- Time for Full Scan Range 3.5 – 6.0 seconds
- Wavelength Reproducibility ± 0.2 nm
- Wavelength Accuracy ± 0.75 nm
- Bandwidth 1.8 nm
- Stray Light < 0.5% at 240 nm using NaI /< 1% at 280 nm using Acetone
- Absorbance Reproducibility < 0.002 A (0.67 mm path) @ 280 nm
- Absorbance Accuracy < 1.75 % @ 0.7 A (0.67 mm path) @ 280 nm of the reading
- Zero Stability ±0.003 A/hour after 20 min warm up @ 280 nm
- Noise 0.002 A rms at 0 A @ 280 nm; 0.002 A (pk to pk) at 0 A @ 280 nm
- Optical Arrangement 1 x 3648 CCD Array
- Lamp Xenon flash lamp
- Lifetime 109 flashes, up to 10 years

Processing Power and Compatibility:

- Operating System Linux based OS
- On board Processor Quad Core 1 GHz
- Internal Storage 32 GB
- Control Options – On board with built-in touchscreen, computer, smartphone, and tablet
- Software Compatibility Windows 7, Windows 8, Windows 10, OS X, iOS and Android

Operating procedure:

Nano volume measurement basics:

1. Switch the Nanophotometer on (touch screen).
2. Select a method depending on your sample and set the parameters for the measurement.
   Note: The minimum volume that can be used for Nano volume samples is 0.3 µl (dsDNA > 420 ng/µl and BSA > 12.6 mg/ml).
   Note: For automatic path length setting at least 1µl is needed.
   Note: The maximum volume that can be used for Nano volume samples is 2.0 µl.
   Note: The sample can be fully recovered after measurement with a pipette if desired.
   Note: Minimal cross contamination cannot be avoided on a molecular level.
3. Use the integrated Vortexer to mix your sample to achieve a homogenous sample.
   Note: It is recommended to vortex every sample right before the measurement.
4. Raise the sample arm and pipette the appropriate amount of blank solution onto the illuminated sample window. The Illumination automatically turns off when the arm is lowered.

Note: Do not overfill the well.
Note: The low energy red light (LED) illumination can be switched of in Preferences.

5. Lower the sample arm and initiate a blank measurement with the blank button.
6. Clean the measurement window and mirror on the sample arm with a slightly wet lint-free tissue. Use water, 70% ethanol or isopropanol if needed.
   Note: Proper cleaning is important to ensure accurate measurements. In most cases a dry lint-free laboratory wipe is sufficient to clean the sample quartz surfaces. In the case of highly concentrated samples or certain proteins, the recommended procedure for cleaning is to use a slightly wet lint-free laboratory wipe (with water or 70% ethanol depending on sample type) to thoroughly clean the sample surface.
   Note: Make sure that the metal contact face (around the measurement window and the mirror) is clean.
   Note: Do not use aggressive solvents such as strong acids or bases or organic solvents at any time (see also page 41 solvent compatibility of the manual). It is recommended to wipe the sample surface with a lint-free laboratory wipe immediately upon completion of each measurement.
7. It is possible to enter a sample name for each sample in the input window "enter sample name".
8. Raise the sample arm and pipette the appropriate amount of sample solution onto the illuminated sample window. Upon completion of measurement raise sample arm, clean the surfaces and apply the next sample.
   Note: Parameter setting Volume 1 - 2 µl adjusts the path length automatically. The parameter setting Volume 0.3 µl measures only the 0.07 mm path length for higher concentrations (dsDNA > 420 ng/µl / BSA > 12.6 mg/ml).
   Note: The sample window is illuminated with a low energy red light to assist with accurate sample application. The red light is switched off once the sample arm is closed.
   Note: The sample window must be clean and residual fluff from any cleaning wipe must be removed for optimum performance.

<u>Cuvette Measurements Basic:</u>

1. The Nanophotometer® is compatible with standard cuvettes having an 8.5 mm centre height. The light path is indicated with a red status LED arrow. The minimum volume for accurate measurements depends on the cuvette type used; it is necessary that the light passes through the sample for accurate measurements. Centre height is 8.5 mm.
   Note: For the NP80 the cuvette compartment needs to be activated by the "Change to Cuvette" button in the parameter area. Once the cuvette option is activated the sample compartment door will be opened automatically and a red arrow above the cuvette compartment will appear. The arrow indicates the light path.
   Note: The cuvette holder (NP80/C40 only) is compatible with standard 10 mm path length quartz, glass and plastic cuvettes with an optical height of 8.5 mm.
   Note: It is also possible to use cuvettes with 5 mm, 2 mm, 1 mm or 0.5 mm path lengths, but there may be an adapter necessary. Please ask your cuvette supplier for a suitable adapter.
   Note: The cuvette holder is not removable. Do not pour any cleaning solution into the cuvette holder as larger amounts of liquids can get into the instrument and cause damage.
2. Switch the Nanophotometer on (touch screen).
3. Select a method depending on your sample and set the parameters for the measurement.
4. Open the automatic cuvette cover by clicking the "Change to Cuvette" button below the parameter area.
5. Add a blank solution to a cuvette and ensure that the filling volume is sufficient to allow light path to pass through the solution.

6. Insert cuvette into the cell holder.
7. Initiate a blank measurement with the blank button. Upon completion of measurement remove the cuvette.
8. Add sample to a cuvette and ensure that the sample volume is sufficient to allow light to pass through the sample.
9. It is possible to enter a sample name for each sample in the input window “enter sample name”.
10. Initiate a sample measurement with the sample button. Upon completion of measurement remove the cuvette.
11. Apply further samples.

Data Transfer:

1. All data saved on the Nanophotometer® can easily be accessed from and transferred to a computer within the lab through LAN, a USB cable or a password secured Wi-Fi connection.
2. To access/transfer data from the Nanophotometer® network drive via LAN connection, the serial number or the Nanophotometer® IP needs to be entered in the address bar of the Windows Explorer (e.g. \\M80798\ or \\Assigned IP Address\).
3. Using a USB cable connection \\192.168.7.1\ will provide access and for password secured Wi-Fi connections \\192.168.8.1\ will need to be entered in the address bar to show the Nanophotometer® drive within Windows File Explorer.
4. For Mac OS X open the "Connect to Server" dialog in the "Go" menu of the Mac OS X Finder.
5. With a LAN connection enter the instrument serial number or the active Nanophotometer® IP address in the server address field to connect. For USB cable or Wi-Fi connection use 192.168.7.1 or 192.168.8.1, respectively.

Note:

1. It is recommended to use a properly calibrated pipette with high-quality tips to ensure delivery of appropriate sample volumes for Nano volume sample applications.
2. Long clicks (> 3 seconds) initiate a hard reset. Only activate a hard reset of the unit when necessary. To avoid excess hard reboots, it is recommended to power down the unit from the on board touch screen by clicking on the power button in the bottom left corner.
3. Use only the power adapter supplied with your instrument or a replacement part from the manufacturer or your supplier.
4. Do not spill any biological samples on instrument components. If spill occurs, disinfect the instrument immediately following your laboratory protocols and the cleaning instruction of the instrument (see page 109 Maintenance of the manual).
5. Do not expose your Nanophotometer® near liquids, chemicals, rain, moisture or dusty environments.
6. Temperature range 10-40°C; If the cuvette heating is used the range is 10-30°C.
7. If the instrument is subjected to extreme temperature changes, it may be necessary to allow the instrument to equilibrate. Turn the instrument off and then on again once thermal equilibrium has been established (~2-3 hours).
8. Maximum relative humidity (non-condensing) of 80% and up to 31°C decreasing linearly to 50% at 40°C.
9. The instrument must be placed on a stable, level surface that can support 4-5 kg. Ensure that air can circulate freely around the instrument. Confirm while powered on that no materials reduce air circulation. Avoid direct sunlight as it may bleach parts of the instrument and can cause damage to plastic parts.
10. The equipment should be positioned such that in the event of an emergency the main plug can be easily located and removed.

Safety:

- Do not open the instrument as this can expose the operator to electrical power, UV light, and delicate fiber optics or damage the instrument.
- Do not use damaged power cords, accessories, and other peripherals with your Nanophotometer®.
- Use only the delivered and specified power supply/charger.
- Do not expose the Nanophotometer® to strong magnetic, electrical fields, water, chemicals or any type of liquid as heavy rain or moisture.
- Do not store at or use near any type of heat source, especially temperatures above 60°C or in an explosive atmosphere.
- Do not leave your Nanophotometer® on your lap or near any part of your body to prevent discomfort or injury from heat exposure.
- Do not place objects on top of the Nanophotometer®.
- Always carry the instrument by holding the main corpus of the instrument and not e.g. on the optional attached display or Nano Volume pedestal.

Potential hazards

Substance or item handled	Associated Hazard (s)	Existing Control Measures	Risk (L/M/H)	Further Action required	Risk (L/M/H)
Use of Nanophotometer	Electrical hazard - Electrical shock – danger of death.	Only switch on the device if the device and power cable are undamaged. The device has been properly installed and there is a preventative maintenance in place. Only trained personal are allowed to use the machine. Machine is earthed, protective earth connection for the machine is provided using 13A plug fitted to the machine (RCD protected). Make sure it has been PAT tested.	L	No further action required if the existing control measures are adhere to.	L
Biological samples	Biohazard – refer to COSHH assessment	PPE must be worn all the time (lab coat, lab gloves and safety glasses). Spillage must be cleared up immediately and decontaminated appropriately in accordance to COSHH assessment. Instrument only to be used by trained personal	L	No further action required if the existing control measures are adhere to.	L
70% Ethanol	Highly flammable	PPE must be worn all the time (lab coat, lab gloves and safety glasses). Refer to COSHH assessment 0003.	L	No further action required if the existing control measures are adhere to.	L

Persons potentially at risk:

Only the user or others near by

Action in event of an accident or emergency:

1. **Fire**: raise the fire alarm and evacuate the area.

Arrangements for monitoring effectiveness of control:

Daily inspection of equipment by lab technician.

Instruction and training given to all operators which is reviewed annually.

Existing operators receive annual refresher training.

Arrangements for monitoring effectiveness of control: Review of the Risk Assessment:

Date of review		Name of reviewer	
Date of next review		Signature	

Have the control measures been effective in controlling the risk?

Yes	No

Have there been any changes in the procedure or in the information available which affect the estimated level of risk from the listed substances

Yes	No

What changes to the control measures are required?

Declaration by Tenant/Licensee/Technician:

I confirm that I have read this Risk Assessment and that I understand the hazards and risks involved and will follow all of the safety procedures stated. Where PPE has been identified as a control measure, I will ensure that it is worn.

Declaration by Laboratory Manager (LM):

I confirm that the tenant/licensee/technician who has signed below is competent to undertake the work. My counter-signature indicates that I am happy for the work to proceed.

Name (Please print)	Signature	LM Countersignature	Date

Name (Please print)	Signature	LM Countersignature	Date