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Nanopore Library Preparation for R10 Ligation Sequencing Kit V.2

Version 1 is forked from Nanopore (SQK-LSK109) without barcode

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Protocol status: Working
We use this protocol and it's working

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Abstract

Protocols for Nanopore R10 flow cell Ligation Sequencing library construction.

Step1. End-prep

1h

1 In a 200 µL PCR tube, mix the following chemicals:

	Reagent	Volume
	DNA	50 µL
	KAPA HyperPrep End Repair & A-tailing Buffer	7 µL
	KAPA HyperPrep End Repair & A-tailing Enzyme	3 µL

Note

Make sure the E&A buffer does not contain white precipitates before aspirate it.

Note

Mix the chemicals by flicking the tube with your finger. Spin down the tube.

1.1 Incubate in a thermocycler at 20 °C for 00:30:00 and 65 °C for 00:30:00. Hold at 4 °C

1h

Step2. Adapter ligation

30m

2 Thaw the Ligation Adapter (LA) and Ligation Buffer (LNB). Vortex and spin down the tubes, and place on ice immediately afterwards.

Note

Although the recommended 3rd party ligase is supplied with its own buffer, the ligation efficiency of Adapter Mix (AMX) is higher when using Ligation Buffer supplied within the Ligation Sequencing Kit.

Note

Ensure the Ligation Buffer is thoroughly vortexing until the droplets or any precipitations were dissolved.

2.1 Spin down the KAPA HyperPrep Ligase and place on ice immediately.

2.2 In a 1.5 mL tube, add the following chemicals:

	Reagent	Volume
	End-prep product	60 µL
	Ligation adapter	5 µL
	ddH2O	5 µL
	Ligation Buffer	30 µL
	Ligase	10 µL

Note

Mix the chemicals by flicking the tube with your finger. Spin down the tube.

2.3 Incubate overnight at Room temperature .

Step3. Cleanup 30m

3 Thaw either Long Fragment Buffer (LFB) or Short Fragment Buffer (SFB) at room temperature on a cooling block, mix by vortexing, spin down and place on ice.

4 Resuspend the AMPure XP beads by vortexing.

5 Add 0.45X AMPure XP Beads (AXP) to the tube and mix by flicking the tube.

6 Incubate for 5 minutes at Room temperature .

7 Spin down the sample and pellet on a magnet. Keep the tube on the magnet, and pipette off the supernatant.

Note

Pellet the beads on a magnet until the eluate is clear and colorless, for at least 1 minute.

8 Wash the beads by adding either 250 µL Long Fragment Buffer (LFB) or 250 µL Short Fragment Buffer (SFB). Flick the beads to resuspend, spin down, then return the tube to the magnetic rack and allow the beads to pellet.

Note

To enrich DNA fragments of >3 kb, use LFB
To retain DNA fragments of all sizes, use SFB

Note

Pellet the beads on a magnet until the eluate is clear and colorless, for at least 1 minute.

8.1 Remove the supernatant using a pipette and discard.

9 go to step #8 Repeat previous step .

10 Spin down and place the tube back on the magnet. Pipette off any residual supernatant. Allow to dry for 5~30 seconds.

Note

Do not dry the pellet to the point of cracking.

11 Remove the tube from the magnetic rack and resuspend the pellet in 15 µL Elution Buffer (EB). Spin down and incubate for 10 minutes at 37 °C on an incubator .

12 Pellet the beads on a magnet until the eluate is clear and colourless, for at least 1 minute.

13 Leave the tube aside, and go to the priming steps.

Note

If you are not going to sequence the prepared library in an hour later, remove and retain 14 µl of eluate containing the DNA library into a clean 1.5 mL microtubes.
For short-term storage or reloading flow cells between washes, you can keep the prepared libray at 4°C. While for long-sterm storage of more than 3 months, storing libraries at -80°C is recommended.

Step4. Priming and loading the SpotON flow cell

14 Thaw the flow cell, Sequencing Buffer (SQB), Loading Solution (LIS), and one tube of Flush mixture (FB & FLT) at room temperature on cooling block.

Note

The Flush Buffer (FB) and Flush Tether (FLT) is needed to be premixed for the first time opening the tube.

15 Open the MinION device lid and slide the flow cell under the clip. Press down firmly on the flow cell to ensure correct thermal and electrical contact.

Note

Make sure there is no bubbles in the flow cell.

16 Slide the flow cell priming port cover clockwise to open the priming port.

17 After opening the priming port, check for a small air bubble under the cover. Draw back a small volume to remove any bubbles:
1. Set a P1000 pipette to 800 µl.
2. Insert the tip into the priming port.

3. Turn the wheel until the dial shows 820–230 µl, or until you can see a small volume of buffer entering the pipette tip.

Note

Visually check that there is continuous buffer from the priming port across the sensor array.

18 Load 800 µl of the priming mix into the flow cell via the priming port by turning the pipet wheel, avoiding the introduction of air bubbles. Wait for 5 minutes. During this time, prepare the library for loading by following the steps below.

19 Aspirate 12 µL of the eluted prepared library into a new 1.5 mL microtube.

19.1 In that new tube, prepare the library for loading as follows:

	Reagent	Volume
	Sequencing Buffer (SB)	37.5 µL
	Library Solution (LIS)	25.5 µL

Note

Add all the chemicals directly into the liquid.

20 Complete the flow cell priming:
1. Gently lift the SpotON sample port cover to make the SpotON sample port accessible.
2. Load 200 µl of the priming mix into the flow cell via the priming port (not the SpotON sample port), avoiding the introduction of air bubbles.

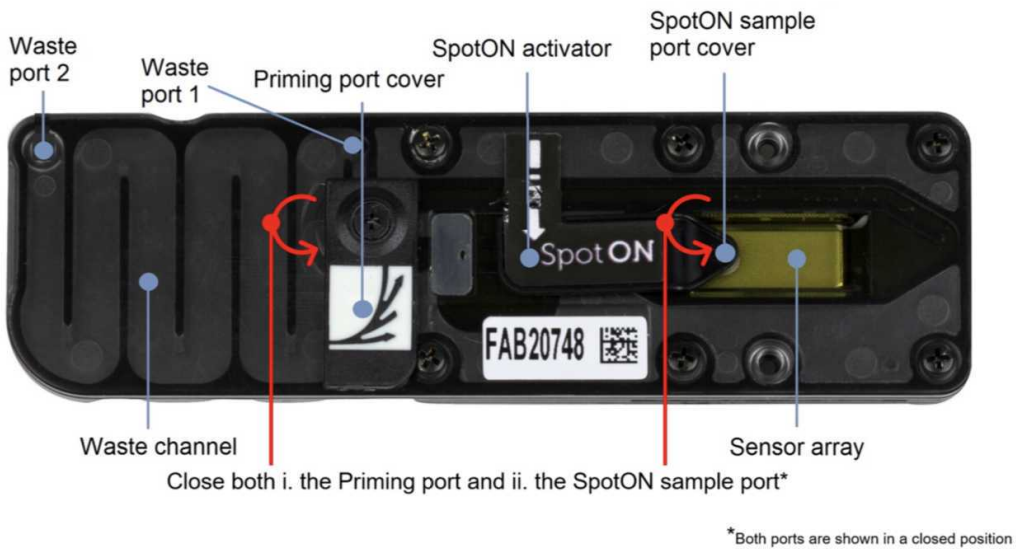
Note

Load the library as soon as possible after this step.

21 Mix the prepared library gently by pipetting up and down in the tip using a P200 pipet just prior to loading.

22 Add the library to the flow cell via the SpotON sample port in a dropwise fashion. Ensure each drop flows into the port before adding the next.

23 Gently close the SpotON sample port cover, making sure the bung enters the SpotON port, close the priming port, cover the sensor array with the sensory cover, and close the MinION device lid.



24 Quantify 1 µL of eluted sample and the original DNA library using Qubit.

Step5. Flow Cell Wash and Storage

30m

25 Stop or pause the sequencing experiment in MinKNOW, and leave the flow cell in the device.

Note

If you are not going to wash it immediately. Keep in 4°C.

26 Place the tube of Wash Mix (WMX) on ice. Do not vortex the tube.
Thaw one tube of Wash Diluent (DIL) at room temperature on a cooling block.

Note

Mix the contents of Wash Diluent (DIL) thoroughly by vortexing, spin down briefly and place on ice.

26.1 In a clean 1.5 mL microtube, prepare the following Flow Cell Wash Mix:

	Reagent	Volume
	Wash Mix (WMX)	1 µL
	Wash Diluent (DIL)	199 µL

Note

Mix well by pipetting, and place on ice. Do not vortex the tube.

26.2 Lift the sensory cover.

Note

Ensure that the priming port cover and SpotON sample port cover are in the positions indicated in the figure below.

26.3 Rotate the flow cell priming port cover clockwise so that the priming port is visible.

26.4 After opening the priming port, check for a small air bubble under the cover. Draw back a small volume to remove any bubbles:
1. Set a P1000 pipette to 800 µl.
2. Insert the tip into the priming port.
3. Turn the wheel until the dial shows 820–830 µl, or until you can see a small volume of liquid entering the pipette tip.

Note

Visually check that there is continuous buffer from the priming port across the sensor array.

26.5 Load 200 µl of the prepared Flow Cell Wash Mix into the flow cell via the priming port, avoiding the introduction of air.

26.6 Close the priming port and keep into 4°C for 2 days.

26.7 go to step #26 Repeat this step.

27 Take out the MinION device from 4°C fridge.

28 Thaw one tube of Storage Buffer (S) at room temperature on a cooling block.

28.1 Mix contents thoroughly by pipetting and spin down briefly.

29 Rotate the flow cell priming port cover clockwise so that the priming port is visible. Open the device lid.

30 After opening the priming port, check for a small air bubble under the cover. Draw back a small volume to remove any bubbles:
1. Set a P1000 pipette to 800 µl.
2. Insert the tip into the priming port.
3. Turn the wheel until the dial shows 820–830 µl, or until you can see a small volume of liquid entering the pipette tip.

Note

Visually check that there is continuous buffer from the priming port across the sensor array.

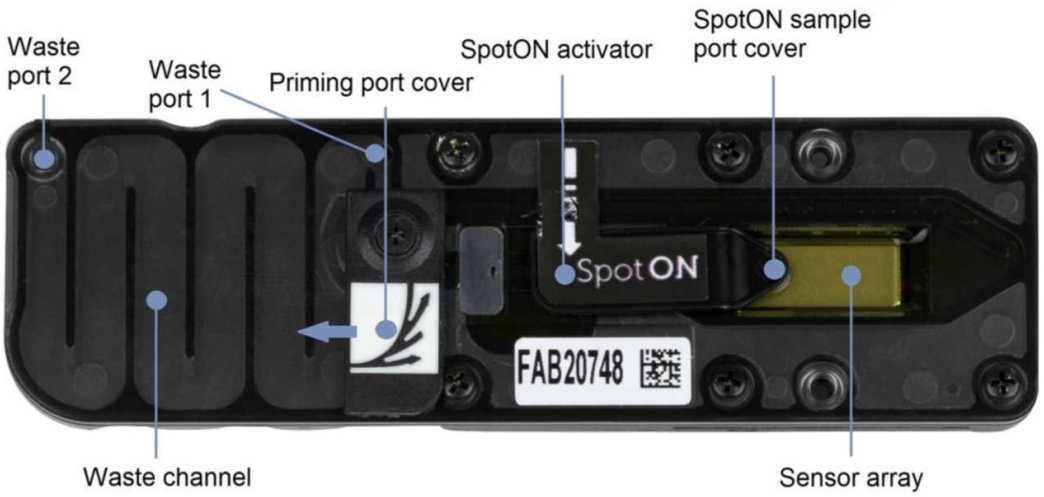
31 Add 500 µl of Storage Buffer (S) through the priming port of the flow cell by turning the pipet wheel.

31.1 Close the priming port.

32 Using a P1000, remove all fluids from the waste channel through Waste port 2. As both the priming port and SpotON sample port are closed, no fluid should leave the sensor array area.

Note

It is vital that the flow cell priming port and SpotON sample port are closed to prevent air from being drawn across the sensor array area, which would lead to a significant loss of sequencing channels.



33 Perform a Flow Cell Check.

34 The flow cell can now be stored at 4°C.