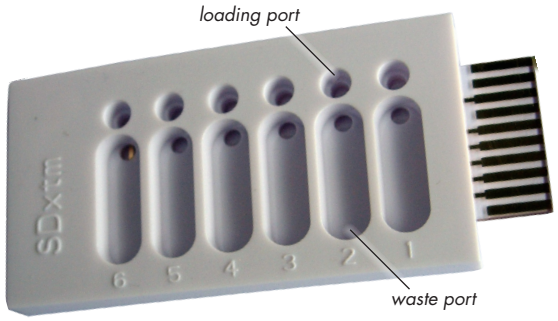
tethaPlate (Model SDx-T10)

Tethered Membrane Technology!

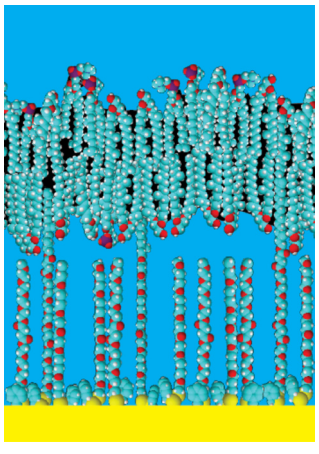


tethaPlate

Background

Tethered membranes are phospholipid bilayers held above a gold electrode by a set of hydrophilic polyethylene glycol (PEG) chains covalently bonded to a gold surface by organic disulfide anchor groups. A lipophilic alkane phytanyl group, bonded to the top of the PEG chain, acts as a scaffold around which membrane lipids can spontaneously cluster, eventually forming a continuous membrane.

Together the disulfide anchor, PEG chain, and phytanyl group is referred to as a 'molecular tether' because it ties the membrane to the gold surface. In practice the *tethers* are separated from each other on the gold substrate by similar molecules, called *spacers*, that lack the lipophilic phytanyl group. The spacers sit under the membrane and do not have any direct contact with it. Tethers and spacers completely cover the gold surface but they are not closely packed as they are separated by the by the bulk of the organodisulfide anchor groups.


tethered phospholipid bilayer

The space between the membrane and the gold surface is a mixture of PEG chains, organodisulfide anchor groups, water molecules, various cations and anions, and small water-soluble molecules, and is collectively known as the **tethaPlasm**™. It is analogous to the cytoplasm of a living cell, and like the cytoplasm may exhibit subtly different properties to those of bulk water.

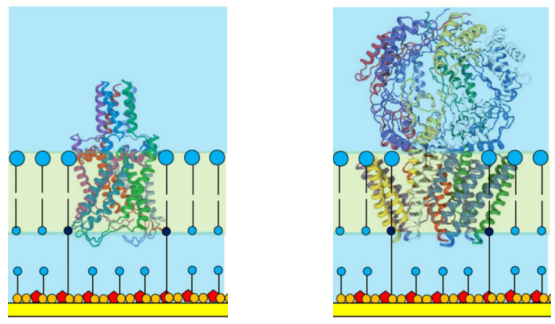
Tethered membranes are suitable for housing a wide variety of membrane proteins, particularly ion channels. These proteins are increasingly available in purified form, thanks to advances in genomic and proteomic techniques. A tethered membrane enables experiments to be conducted on millions of 'parallel' ion channels, giving a large total ion current and negating the need for the high gain amplifiers and complicated electronics typical of classical recording techniques, such as patch clamping.

Description

The SDx **tethaPlate**™ (SDx-T10) is a 6-chamber sample cartridge compatible with **tethaPod**™ (SDx-R1) and **tethaPatch**™ (SDx-R2) systems for the study of ion channel membrane proteins. Ten **tethaPlates** are supplied in this pack.

Each of the six sample chambers contains a pair of gold electrodes. The lower electrode is pre-coated with the tethering agent ready for the addition of phospholipids for bilayer membrane creation. The tether/spacer ratio is normally set at 1:10 which is suitable for housing ion channels with a monomer mass of up to 40 kDa. Other ratios (up to 1:100) can be supplied — smaller ratios house larger proteins but at the expense of membrane stability.

The tethaPlate is supplied in two sections, which are assembled with the aid of an Assembly Jig (SDx-A1), followed by addition of the Phospholipid Mixture (SDx-S1) which spontaneously forms the bilayer membrane.


MscL and MscS protein ion channels housed in a tethered membrane. Note the presence of the protein 'cap' that causes the channel to have a preferred orientation — just as it does in a real cell membrane. (Shown pproximately to scale)

Specifications

Chambers:	6, independently selectable
Tethering electrode:	Gold, 3.0 x 0.7 mm (area 0.21 mm^2)
Body:	White polycarbonate, 75 x 39 x 7 mm
Electrode substrate:	Transparent polycarbonate, 75 x 25 x 1 mm
Flow channel depth:	0.15 mm
Loading port:	4.5 mm diameter circle, 4.5 mm deep
Waste port:	22 x 7.5 mm, 4.5 mm deep
Tethers:	Benzyl-disulphide-bis-tetraethyleneglycolmonophytane
Spacers:	Benzyl-disulphide-bis-tetraethyleneglycol
Tether/Spacer ratio:	1/10
Long term storage:	4°C for up to 12 months
Usage:	0 – 45°C
eDAQ reserves the right to alter these specifications at any time.	

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