### Background
PEB is an extraction buffer for disruption and solubilisation of total protein from plant tissue and algal cells. The use of the anionic detergent LDS together with the recommended procedure (combination of sonication and freeze/thaw cycles) has been shown to increase the number of solubilised and non-degraded proteins when compared to other methods of cell disruption (see reference). The estimated hands-on time for the recommended procedure is 20-30 minutes for 1-2 samples. Expected yields will be 1.5-6 µg/µl total protein (recovered from standard procedure) depending on the starting material, e.g. its biological stage, homogenization method used (bead beater vs. sonication).

### Quantity
5 x 2 ml (4x stock) allows up to 75 isolations of plant material (using 500 µl 1x PEB for 100 mg fresh weight) or 190 isolations of algal material (using 200 µl 1x PEB for cell amounts corresponding to 4-10 µg total chlorophyll).

### Storage
Stable at RT for at least 1 month; short-term storage (6 month) at 4°C and long term storage (1 year or more) at -20°C.

### Tested applications
- Protein extraction

### Additional information
- **Buffer components (4x):** contains ~ 40% v/v glycerol \([\text{HOCH}_2\text{CH(OH)}\text{CH}_2\text{OH}]\), Tris-HCl \([\text{NH}_2\text{C(CH}_2\text{OH)}_3·\text{HCl}]\) pH 8.5, LDS \([\text{CH}_3\text{(CH}_2\text{)}_{11}\text{OSO}_3\text{Li}]\), EDTA \([\text{(HO}_2\text{CCH}_2\text{NCH}_2\text{CH}_2\text{N(CH}_2\text{CO}_2\text{H)}_2}\)]\.

It is recommended to include a protease inhibitor (not supplied with this buffer) from a freshly made stock while preparing the ready-to-use 1x PSB.

PEB has been optimized for quantitative small-scale preparation of whole protein extracts from plant/algal tissue. Extraction using the procedure described below will result in maximum yield of proteins and diminish protein degradation and aggregation.

Extracts may be quantified using detergent (LDS) compatible methods and have been shown to give highly reproducible and quantitative results in subsequent SDS PAGE gel electrophoresis, Western Blotting, and Immunoprecipitation.

PEB has been tested on a wide range of species and tissues from higher plants, mosses, lichens, algae, diatoms, dinoflagellates, and cyanobacteria.

### Application information
- **Confirmed reactivity:** PEB has been tested on a wide range of species and tissues from higher plants, mosses, lichens, algae, diatoms, dinoflagellates, and cyanobacteria. Extracts may be quantified using detergent (LDS) compatible methods, and have been shown to give highly reproducible and quantitative results in subsequent SDS PAGE gel electrophoresis, Western blotting, and Immunoprecipitation (IP). Most of Agrisera commercial antibodies are tested on plant or algal samples extracted with this buffer. An example can be found here.

### Selected references
Before you start

Prepare sufficient 1x PEB for all samples by diluting 4x stock (the pH of your 1x PEB should be between 8.25 and 8.75). It is recommended to include a protease inhibitor (not supplied with this buffer) from a freshly made stock while preparing the ready-to-use 1x PEB to increase the yield of non-degraded protein in the extract. We recommend including 1:50 vol/vol from a freshly prepared 50x stock (in 1x PEB) to give the desired final concentration recommended by the manufacturer (e.g. 0.1 mg/ml for Pefabloc SC, Roche).

The total volume of 1x PEB required is dependent on the sample type and amount of tissue used: for 100 mg fresh plant tissue we recommend 500 µl 1x PEB; for algal samples (corresponding to 4-10 µg total chlorophyll) we recommend 200 µl 1x PEB. Keeping sample volumes in a range of 0.2-0.5 ml has been found to contribute to better extraction results, an upscale in volume is not recommended.

Material preparation

**plant tissue:** weigh and snap freeze in liquid nitrogen and store at -80°C until processing.
**algal cultures:** centrifuge to form a pellet or collect on filters (e.g. GF/F or polycarbonate) and freeze at -80°C until processing.

**Extraction**

1. Grind frozen material in liquid N₂ in a pre-chilled mortar with a pestle to a fine powder and transfer to a 1.5 ml tube
2. Add 1x PEB and immediately freeze sample in liquid N₂ 500 µl for 100 mg plant tissue or 200 µl for cells corresponding to 4-10 µg total chlorophyll; keep tube upright to hold sample at the bottom of the tube
3. Carefully subject sample to sonication just until sample is thawed, re-freeze sample immediately in liquid N₂ to avoid heating
4. Repeat sonication step (3) depending on species, place on ice until all samples are processed
5. Centrifuge your samples for 3 min at 10 000 x g to remove insoluble material and unbroken cells, the pellet should be white/light-grey
6. Transfer supernatant to new tube using a pipette, be careful not carry over debris

**Protein determination**

Assay total protein content of recovered supernatant using a detergent compatible assay. Based on the amount and/or tissue of the species used you may expect a protein content of 1.5-6 µg/µl.

**Storage**

Protein extracts may be stored for 24 hrs at +4°C or up to 6/12 month at -20°C/-80°C. We recommend to aliquot samples. Re-freezing protein samples may induce degradation/aggregation.

**Loading on a gel**

A freshly prepared reducing agent should be added (e.g. Dithiotreitol, final concentration 50 mM) to the volume prepared for loading. Heat at 70°C for 5 min, briefly spin down and load on a gel. Protein loads of 0.5-5 µg/lane should be sufficient for most Western Blot applications.