

# Radiocarbon dating of Dissolved Inorganic Carbon (DIC) extracted from ground water

Typical radiocarbon measurement errors (1mg C, standard measurement conditions):

14 C Age	Approximate Error
Less than 6,000 years	Better than +/- 30 years
6,000-10,000 years	Better than +/- 40 years
10,000-20,000 years	>= +/- 200 years

**Containers:** Use dense laboratory plastic bottles HDPE (such as Nalgene), a 250 mL sample bottle is sufficient. A backup (spare) sample of the water is useful in case analysis needs to be repeated or if breakage occurs. If field testing of the water indicates low carbonate content or pH, then a larger volume of water may be required. Ideally each sample should yield at least 1mg of carbon

Alkalinity of water, HCO <sub>3</sub> mg/L	Minimum volume of sample required for analysis
10-50	150ml
>50	100ml

**Sample Collection:** Purge bore until conductivity and temperature are constant to remove stagnant water from the bore. Minimize contact with the air while filling the bottle. Fill the sample bottle completely to the top with no head space using a low flow rate to avoid excessive air bubbles during filling, tighten lid of full bottle. Label with sample I.D. and collection date.

**Optional treatment:** Seawater samples for radiocarbon analysis must be treated to suppress microbial activity. It is recommended that 1-2 mg of mercuric chloride be added before completely filling sample bottles. The mercuric chloride suppresses bacterial activity which can alter the carbon distribution in the water and has no effect on 14C measurements. Lake water and samples high in TOC may also require poisoning.

**Documentation and Transport:** We recommended that bottles are packed into an esky or solid container for protection with absorbent material in case of leaks or damage during transit. Sample submission forms and MPI import permits are available from the laboratory radiocarbon@gns.cri.nz. The shipment must be accompanied by a copy of the MPI laboratory sample import permit, (write the permit number on the outside of the package), sample documentation and a declaration of the contents; i.e. water samples for destructive analysis.

## Additional Services

**Removal hydrogen sulphide:** Water samples that contain hydrogen sulphide (detectable through smell or use of test strips) require extra processing at the laboratory with CuO and silver wire to remove sulphur from the extracted CO<sub>2</sub> which would otherwise poison the graphitisation process. Surcharge incurred.

**Samples with low TDIC:** Samples with low TDIC <0.5mmol/kg H<sub>2</sub>O require combining multiple aliquots to obtain sufficient material for a standard AMS 14C determination. \*Samples with low DIC content are also at higher risk of contamination during collection and preparation and thus provide lower quality data. Surcharge incurred.

## Contact us



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