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Supporting information for:

Halophilic anaerobic oxidation of methane coupled to nitrite reduction by marine NC10 bacteria

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1. Schematic diagram of the sequencing batch bioreactor

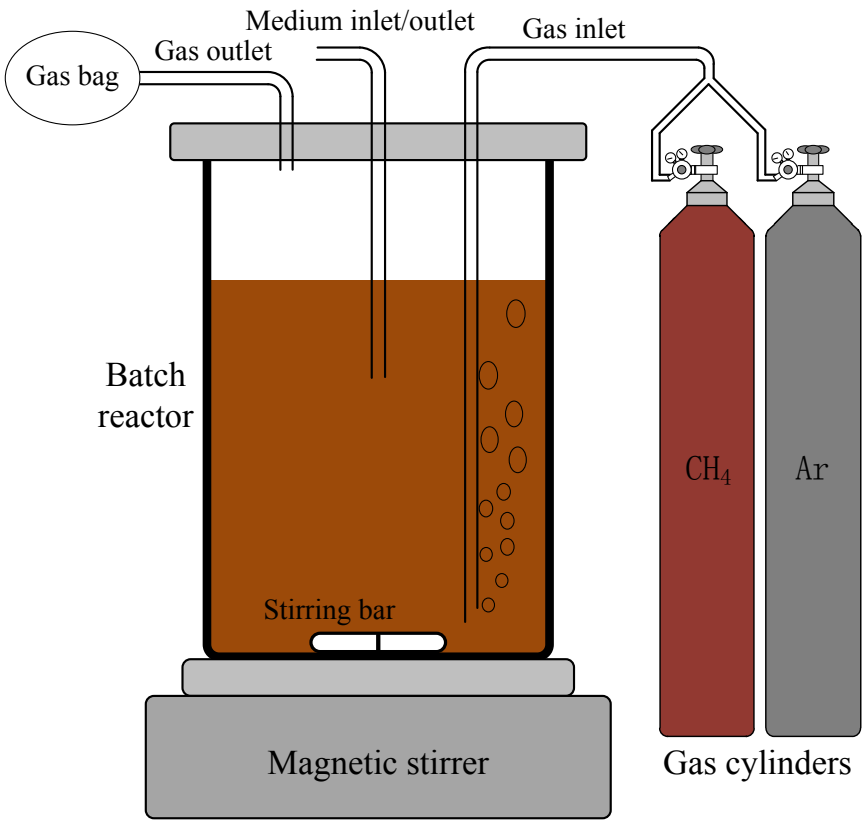

Fig. S1 Schematic diagram of the sequencing batch bioreactor in this work.

2. The primers used in PCR amplification

Table S1. PCR primers used in this work.

Primers	Sequences（5’-3’）	References
202F	GACCAAAGGGGGCGAGCG	(1)
1545R	CAKAAAGGAGGTGATCC	(2)
qP1F	GGGCTTGACATCCCACGAACCTG	(1)
qP1R	CGCCTTCCTCCAGCTTGACGC	(1)
qP2R	CTCAGCGACTTCGAGTACAG	(1)
A189_b	GGNGACTGGGACTTYTGG	(3)
cmo682	AAAYCCGGCRAAGAACGA	(3)
cmo182	TCACGTTGACGCCGATCC	(3)
cmo568	GCACATACCCATCCCCATC	(3)

3. Calculation of methane concentration in saline water

By definition, the Bunsen solubility coefficient can be expressed as follows:

$$\beta = \frac{V_{gas,STP}}{V_{liquid}} \quad \text{(S1)},$$

Where β is the Bunsen solubility coefficient and expressed as ml CH_4 (STP) dissolved in 1 ml H_2O [-]; $V_{gas,STP}$ is the normalized volume of gas absorbed in liquid [ml]; and V_{liquid} is the volume of liquid [ml].

The ideal gas equation, $PV = nRT$, can be substituted into Eq. S1, and it gives

$$\beta = \frac{nRT}{P_{STP}V_{liquid}} = \frac{RT}{P_{STP}}c_{STP} \quad \text{(S2)},$$

Where n is the amount of gas substance [mole]; R is the universal gas constant [8.3145 $J \cdot K^{-1} \cdot mol^{-1}$]; T is temperature in Kelvin degrees [K]; P_{STP} is the standard pressure [101.325 kPa]; c_{STP} is gas solubility in liquid at standard pressure [$mol \cdot L^{-1}$].

In dilute solutions, the gas solubility is in direct proportion to its pressure in headspace, so the gas solubility is

$$c = c_{STP}\frac{P}{P_{STP}} \quad \text{(S3)},$$

Where c is gas solubility [$mol \cdot L^{-1}$] and P is gas pressure in headspace [kPa].

Based on Eq. S2 and Eq. S3, the correlation between gas solubility and pressure can be given as

$$c = \frac{\beta}{RT}P \quad \text{(S4)}.$$

The Bunsen solubility coefficient can also be expressed as a function of temperature and salinity as follows (4):

$$\ln(\beta) = A_1 + A_2\frac{100}{T} + A_3\ln\left(\frac{T}{100}\right) + S\left[B_1 + B_2\frac{T}{100} + B_3\left(\frac{T}{100}\right)^2\right] \quad \text{(S5)},$$

Where S is salinity in parts per thousand [‰] and *A1, A2, A3, B1, B2*, and *B3* are constants [-] and their values are -67.1962, 99.1624, 27.9015, -0.072909, 0.041674, and -0.0064603, respectively, calculated by Yamamoto et al. [4].

In this work, the temperature is 298.15 K and the salinity is 20.5 ‰, and the Bunsen solubility coefficient is calculated to be 0.02784. Finally, Eq. S4 can be simplified into

$$c[\mu\text{M}] = 11.23P[\text{kPa}] \quad \text{(S6)}.$$

References

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3. **Luesken FA, Zhu B, van Alen TA, Butler MK, Diaz MR, Song B, Op den Camp HJ, Jetten MS, Ettwig KF.** 2011. pmoA Primers for detection of anaerobic methanotrophs. Appl Environ Microbiol **77:**3877-3880.
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