Supplementary Information

Directional amine-based solvent extraction for simultaneous enhanced water recovery, salt separation and effective descaling from hypersaline brines

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Table S1 Detailed characteristics of seawater from Bohai Bay in China.

Items	Values
pH (-)	7.9
Suspended solids (SS, mg/L)	11
Total dissolved solids (TDS, mg/L)	3.6×10^4
Electrical conductivity (EC, μs/cm)	5.4×10^4
Biochemical oxygen demand (BOD, mg/L)	0.4
Chemical oxygen demand (COD, mg/L)	1.5
Total alkalinity (TA, $CaCO_3$, mg/L)	131
Phenolphthalein end-Point alkalinity (PA, $CaCO_3$, mg/L)	0
K^+ (mg/L)	349
Na^+ (mg/L)	1.1×10^4
Ca^{2+} (mg/L)	370
Mg^{2+} (mg/L)	1.3×10^3
Cl^- (mg/L)	1.9×10^4
SO_4^{2-} (mg/L)	2.9×10^3
Total phosphorus (TP, mg/L)	0.1
SiO_2 (mg/L)	0.9
NO_3^- (mg/L)	0.5
Mn (mg/L)	< 0.002
Cu (mg/L)	< 0.002
Al (mg/L)	< 0.025
Fe (mg/L)	0.005

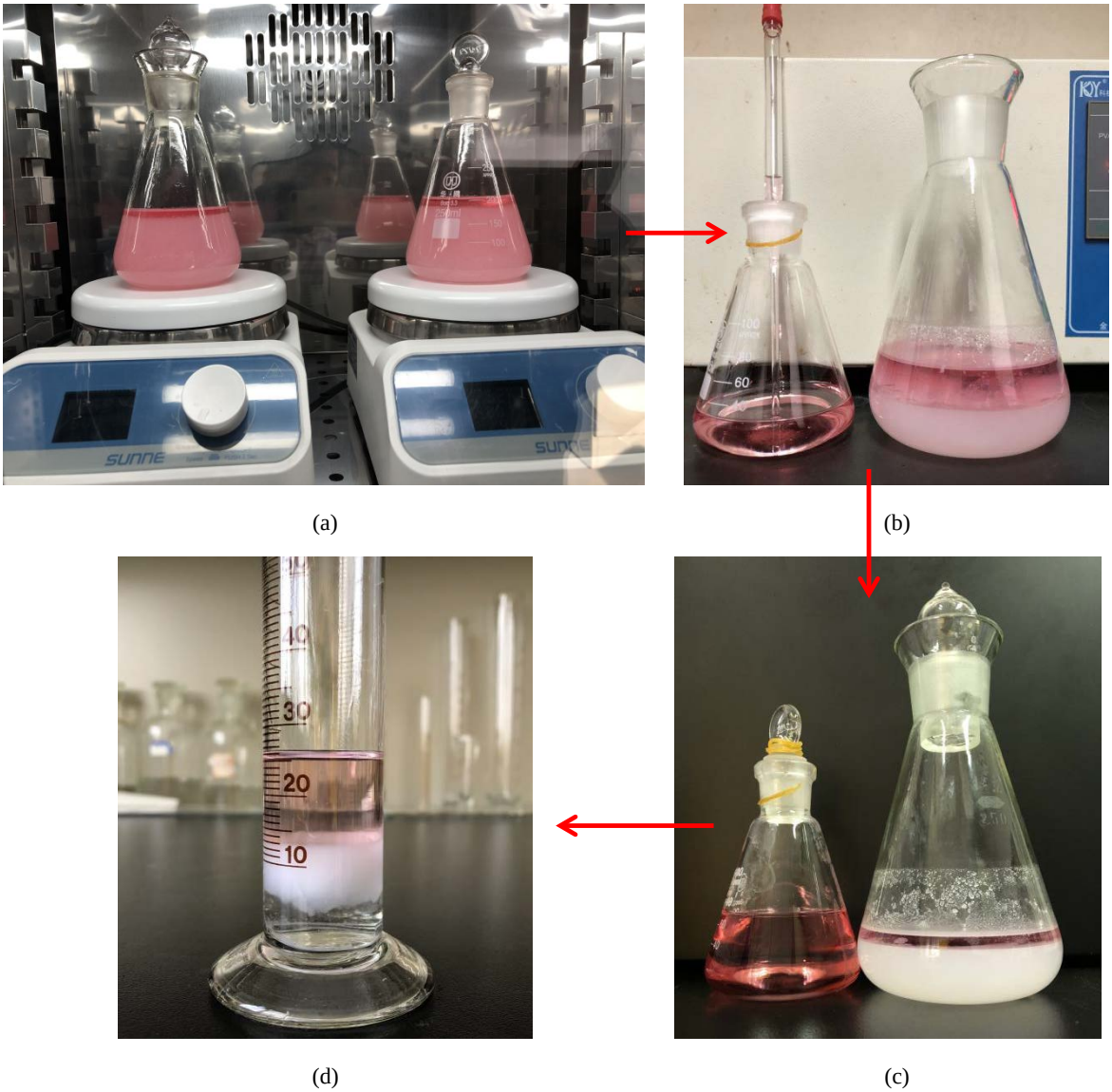
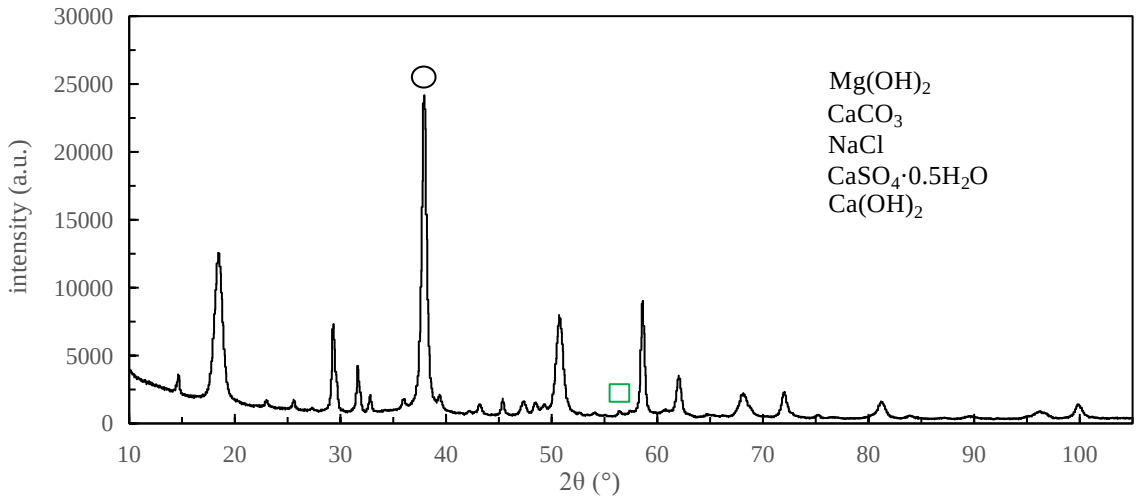


Fig. S1 Pictures of the biphasic mixture mixing-extraction and transfer steps using a glass pipet in open-to-air style during batch DIPA experiment.



Name	Compound Name	Formula	S-Q
PDF 44-1482	Brucite, syn	$Mg(OH)_2$	0.5859726
PDF 05-0586	Calcite, syn	$CaCO_3$	0.2162044
PDF 33-0310	Bassanite, syn	$CaSO_4 \cdot 0.5H_2O$	0.1426247
PDF 05-0628	Halite, syn	NaCl	0.05056857
PDF 04-0733	Portlandite, syn	$Ca(OH)_2$	0.004629712

Fig. S2 Composition of the precipitated solid in dewatered raffinate by XRD analysis.

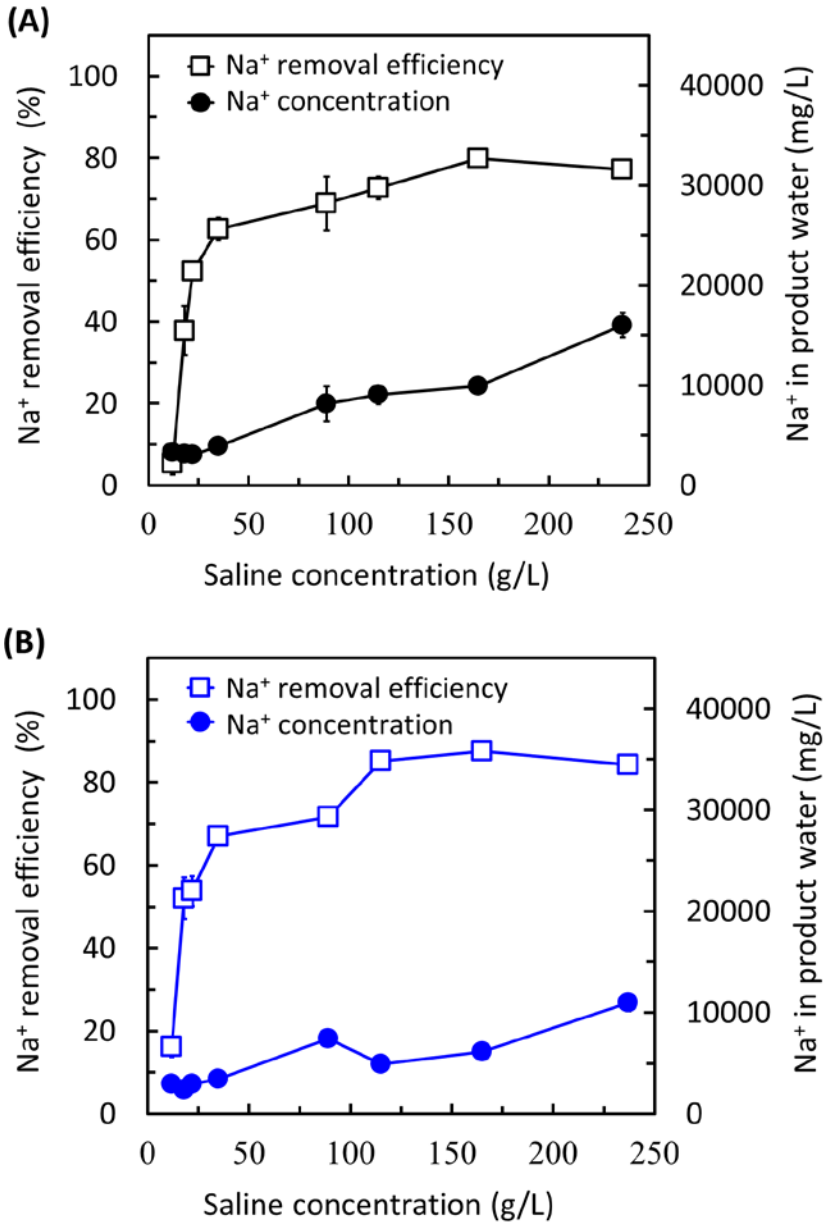


Fig. S3 Na^+ removal efficiency and Na^+ concentration in product water as a function of saline concentration at 5℃ (A) and 15℃ (B).