

Silane and Silicone Technologies for Post-Combustion CO₂ Capture

Table 1. Silanes/Silicones vs. Traditional Amines in Carbon Capture

	Silane / Silicone	MEA / MDEA
Toxicity	Low	Moderate
Corrosivity	Low	High
Degradation	Low	High
Thermal Stability	High (can operate > 120°C)	Degrades above ~120°C
Oxidative Stability	High	Low
Volatility	Very low	High
Gas Permeability (membranes)	High (higher than other polymeric membranes)	N/A
CO ₂ Selectivity	High, tunable (except for silicone membranes that require another layer to provides selectivity)	Moderate to high, varies by amine
Foaming Tendency	Low	High
Regeneration Energy	Lower (due to reduced water content and stability)	Higher (due to water evaporation and heat of reaction)
Commercial Maturity	Emerging / under development	Widely used and proven

