A Benzothiazole Based Optical Chemosensor for Carbondioxide Detection

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The old chemistry between CO_2 and primary alkyl amines has been revisited. Amines, amino methyl naphthalene and amino methyl pyrene with appended aromatic fluorophores, reversibly reacted with CO_2 in polar aprotic solvent (e.g. DMSO, DMF) with the formation of carbamic acids. As a result, strong fluorescence occurred, thus directly reporting on the CO_2 entrapment. Carbamic acids were studied by ^{1}H and ^{13}C NMR spectroscopy in DMSO-d_6. The carbamate bond, despite being covalent, is reversible and can be broken upon heating or simply flashing solutions with inert gases. Synthesis and evaluation of a CO_2-sensing amino acid a naphthyl glycine is also reported for potential CO_2 monitoring under bio relevant conditions in aqueous solutions. Carbon dioxide generally being an unreactive molecule, is difficult to sense. But it is found to combine rapidly with amines at ordinary temperatures and pressures to form carbamates. The reaction of two molecules of an amine, in presence of CO_2 to form carbamates. The chemistry essentially involves an acid–base equilibrium.