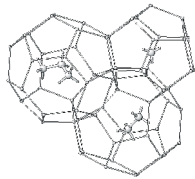


## W0214

**The Structure of Natural Gas Hydrates.** K.A. Udachin, H. Lu, J.A. Ripmeester, Steacie Inst. for Molecular Sciences, National Research Council, Ottawa, Ontario, Canada K1A 0R6

Natural gas hydrates are clathrate inclusion compounds of water and hydrocarbons plus small amounts of other gases such as CO<sub>2</sub>, H<sub>2</sub>S, etc, with the guest molecules trapped in cages in the hydrate crystal lattices. Their role in the geosphere is still very much under investigation, with potential impacts on the global energy supply, geohazards and global climate change.



The hydrates for which structures are reported were both recovered from the Cascadia Margin, offshore Vancouver Island. The first one crystal, found in an oil-stained sample taken from a hydrate outcrop on the sea floor, is cubic structure II (Figure), *Fd-3m*,  $a=17.141(1)$  Å (composition: 2CH<sub>4</sub>·0.78C<sub>2</sub>H<sub>6</sub>·0.22C<sub>3</sub>H<sub>8</sub>·17H<sub>2</sub>O). The second, taken from 2.8m below the sea floor and associated with a cold vent field, is cubic structure I *Pm-3n*,  $a=11.857(1)$  Å (composition: CH<sub>4</sub>·5.9 H<sub>2</sub>O). In all cases guest molecules are off the geometrical centers of the cages and are in van-der-Waals contact with water molecules. The large cages of both cubic structures I and II were found to be 100% occupied with guest molecules.