HYDROCARBON DEWPOINT PROJECT – REAL NATURAL GASES

SUPPORTING INFORMATION

Introduction

The second part of the project studied seven samples of real natural gas taken from gas fields around the British Isles. The gases were selected to represent the extremes of composition that could be encountered in gases entering the UK network. They are not generally representative of those for which on-line are measurements carried out across the network.

Analysis methods

The mixtures were analysed using the following methods:

1. **Lab GC 1**
    - Danalyser 500 (TCD detector): N_2, CO_2, and C_1 to C_5 hydrocarbons.
    - HP 4890 GC (FID detector): C_5 to C_{12} hydrocarbons.
    - All components up to *n*-C_6, benzene, toluene, cyclohexane and methyl cyclohexane measured individually.
    - Other (C_{7+}) components grouped into hydrocarbon fractions.
        - Fraction boiling points assigned by calculation of a weighted average
        - Fraction specific gravities assumed to be the same as the *n*-alkane

2. **Lab GC 2**
    - Danalyser 500 (TCD detector): N_2, CO_2, and C_1 to C_5 hydrocarbons.
    - Varian 3400 GC (FID detector): C_5 to C_{12} hydrocarbons.
    - All components up to *n*-C_6, benzene, toluene, cyclohexane and methyl cyclohexane measured individually.
    - Other (C_{7+}) components grouped into hydrocarbon fractions.
        - Fraction boiling points assigned by calculation of a weighted average
        - Fraction specific gravities assumed to be the same as the *n*-alkane

3. **Process GC 3**
    - Danalyser 700 (TCD & FID detectors): all components.
    - All components up to *n*-C_6, benzene, toluene, cyclohexane and methyl cyclohexane measured individually.
    - C_7 to C_9 components grouped into three individual hydrocarbon fractions, C_{10+} components grouped into a single hydrocarbon fraction.
        - Fraction boiling points assigned values determined by Lab GC1
        - Fraction specific gravities assumed to be the same as the *n*-alkane

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4. **Process GC 4**
    - Orbital 'all in one' system based on a Siemens Maxum Edition II instrument (TCD, FID & FPD detectors): all components.
    - All components up to *n*-C_5, sulphides and thiols measured individually.
    - Other (C_{6+}) components grouped into hydrocarbon fractions.
        - Fraction boiling points and specific gravities calculated automatically by the instrument's software.

5. **Automatic chilled mirror**
    - Measurements carried out using a Michell Condumax II instrument.
    - Operated at the default sensitivity setting of 275mV.

6. **Manual chilled mirror**
    - Measurements carried out using a Chandler model A-2 dew point tester.

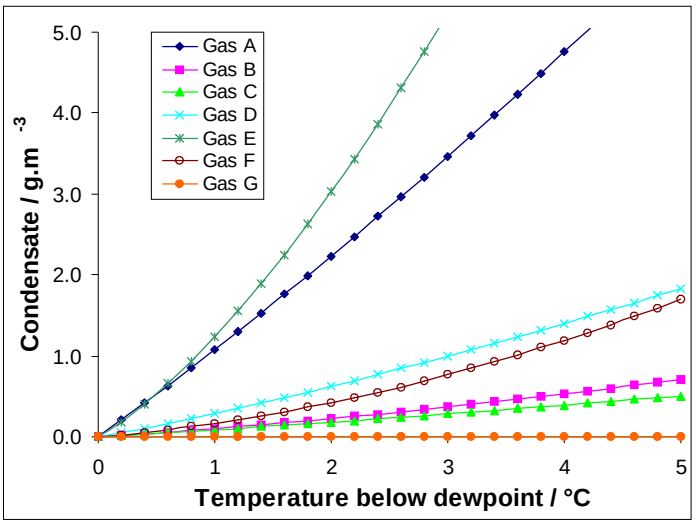
[Water measurements carried out using a Messer FM62 PRV water vapour analyser.]

Calculations

- Hydrocarbon dewcurves for Lab GC 1, Lab GC 2 and Process GC 3 calculated using the RKS equation of state.
- Hydrocarbon dewcurves for Process GC 4 calculated by the instrument's software.
- All water dewlines calculated using the RKS equation of state with interaction parameters $R_{ij} = 0.5$.

Hydrocarbon condensation rates

Plot of potential liquid hydrocarbon content against temperature below dewpoint:



[Calculated from Lab GC 1 data]