CHROMATOGRAPHIC DETERMINATION OF ADSORPTION ISOTHERMS AND ISOSTERIC HEATS OF ADSORPTION ON MOLECULAR SIEVES PART 2—ADSORPTION OF CARBON MONOXIDE, CARBON DIOXIDE AND ETHYLENE ON NaX ZEOLITE AND Mn CATION EXCHANGED NaX ZEOLITES

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The chromatographic method discussed earlier (Dwyer & Fernando, 1978) has now been used to study some characteristics of the adsorption of CO, C_2H_4 and CO_2 on NaX & NaMnX y zeolites (y refers to the % of Mn substitution; y=10, 40).

From the linear adsorption isotherms obtained for CO adsorption on NaX & NaMnX10, Henry Law constants have been obtained & found to be similar in magnitude; the (constant) isosteric heats deduced are 52 + 2.5 kJ mol & 58 + 2.5 kJ mol^{-1} respectively, On NaMnX40 however, the isotherms are non-linear and give a (constant) isosteric heat of 72 + 8kJ mol^{-1}; the extent of adsorption is also found to be very much greater.

Ethylene adsorption on NaX & NaMnX10 also gives rise to linear isotherms; however, the Henry Law constants indicate that the adsorption takes place to a greater extent on NaMnX10. A similarly significant increase in the isosteric heat from 55 + 1.5 to 74 + 2.5 kJ mol^{-1} has been observed. It is therefore evident that even on NaMnX10, ethylene is adsorbed on Mn containing sites although CO is not adsorbed in this manner. For both CO & ethylene, the adsorption is found to be independent of the presence of adsorbate on the adsorbent surface.

The study of the adsorption af carbon dioxide by a similar chromatographic technique has been found to be not feasible due to the existence of weaker chemisorption effects in addition to the physisorptions.

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References

Dwyer J & Fernando, J. N. O. (1978), Proceedings of the Sri Lanka Association for the Advancement of Science, **24**, Part 1, 54

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