• Hydrogen Gas Generation Molecular Sieves...

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the methanator catalyst converter.

This basic system is best suited to smaller capacity generators where consideration of minimum equipment cost is of greater importance than absolute optimization of overall operating cost. For example, the reformer catalyst tube size and furnace setting is kept at an economical minimum size by the use of slightly higher steam natural gas input ratio. In addition, the system design is kept at its simplest minimum by making no attempt to achieve heat recovery.

Conversely, the operating cost of utility consumption becomes a much more important consideration in larger hydrogen plant designs. Here, research technology is brought to bear in larger size reformer design modifications that permit a change of operating conditions which are able to achieve comparable results with a substantial resultant savings in steam input. This reduced input also is reflected in further savings of heating fuel consumption in the reformer furnace, providing a two-way operating cost reduction.

Further conservation of utilities is also achieved by the use of an indirect heat exchanger to transfer heat in the steam reformed gas to the product gas entering the methanator catalyst chamber, employment of condensate quenching in a two-bed shift converter catalyst tower, and the use of an interstage condenser in the purifier reactivation steam jet vacuum system.

Design Economics

Table I illustrates a typical comparative list of operating costs of the basic system, and the optimized design of molecular sieve hydrogen gas generator, based on average utility rates. To determine justification of the optimized design in comparison with the basic system, a 2,000 scfh unit would produce 16 MM scf per 8,000 hr year operation at an annual utility cost of $9,776.00, as a basic system. Under the same conditions, this same operation as an optimized system would cost $7,104.00 per year, for an annual savings of $2,672.00. Under normal circumstances, this differene in operating cost makes it difficult to consider the added capital expense of an optimized system.

On the other hand, a 20,000 scfh system would produce 160 MM scf/year of hydrogen, which represents a factor of 10 times the operational cost difference. Thus, by considering an annual savings of $26,720.00, the initial added expense of achieving maximum economy of production becomes a very important consideration.

Table II indicates a typical final product gas composition achieved by the molecular sieve type hydrogen gas generator, which includes a methanator catalyst unit for hydrogenation applications. By maintaining methane leakage at approximately 0.1%, and residual unreacted CO at about 0.1%, the dry effluent from the molecular sieve purifier containing less than 500 ppm of CO_2, will result in a methanator treated gas of 99.75% purity, less any nitrogen diluent present in the fuel supply.

While essentially all moisture will be removed from the gas by the molecular sieves, some amount of water vapor will be present in the methanator effluent as a result of the conversion reaction.

Since the molecular sieve purifier design lends itself to the most economical performance at relatively low pressure process operation, it is possible to run the reformer also at greatest economy of heating fuel and reaction steam input to maintain a minimum level of unreacted hydrocarbons.

With the use of a steam jet for molecular sieve vacuum regeneration and, in the smaller generator sizes, the use of high pressure velocity burners on the reformer furnace, there is no electrical power requirement in the operation other than a source of 110 v supply for the control and safety aid circuit.

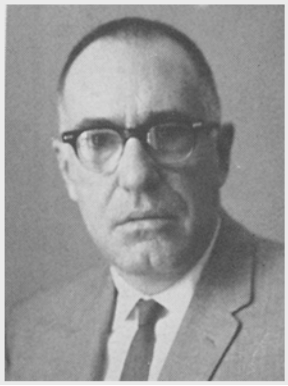
The generator system itself has no blowers, pumps or other motor driven equipment, which would normally be considered maintenance items. (Larger plant designs may employ a combustion air blower for the reformer furnace burner equipment.) A final product gas compressor of the size and type required for specific needs may be added to the outlet of the generator system.

Thus molecular sieves has found proven application for hydrogen production at competitive equipment and operating cost, with comparable purity to more conventional methods of generation from hydrocarbon fuel, while providing simplified, fully automatic operation and substantially greater freedom of potential maintenance.

[Received May 3, 1970]

• Names in the News . . .

Peter Kalustian



R. J. Sims

B. L. Thomas Associates, Cincinnati based consulting firm of Edible Fats & Oils experts, announces that Peter Kalustian ('45), has joined their firm. Mr. Kalustian has had over 36 years of experience in foods, and has held many positions of responsibility in production, plant operations, product development, sales and corporate management with the Drew Chemical Corp. He is very well known in the edible fat industry and has had a significant role in the commercial development of hard butters for chocolate-type coatings, special fats for nondairy products, margarines and shortenings. Mr. Kalustian will head the Eastern office of the firm.

R. J. Sims ('50) has been recently promoted to Research Associate at General Foods Corp. Technical Center in White Plains, N.Y. He is now in charge of the Fats and Oils Technology Center of the Corporate Research Department.

C. W. Sampson ('48), General Manager Export Division, Emery Industries Inc. retires after 39 years of service with the company.

R. N. Speer has been elected Vice President-Manufacturing of Universal Oil Products Company. In this new position, Speer, who has been vice president and general manager of UOP's C&H Group, will assume additional line operating responsibilities over certain manufacturing units of the company. In making the announcement, J. O. Logan, president of UOP, said that effective January 1 the divisions of the Transportation Equipment Group will become the responsibility of Speer. General managers of the Aerospace Division, Bostrom Division, Amalga Division and their affiliated units will report directly to Speer.

The Board of Directors of Sandoz-Wander, Inc. has announced the election of A. J. Frey as President and Chief Executive Officer. Dr. Frey, who was formerly Executive Vice President of the Company's Pharmaceutical Division, will serve as Chairman of the Company's Management Committee. Sandoz-Wander, Inc., is headquartered at Hanover, New Jersey.