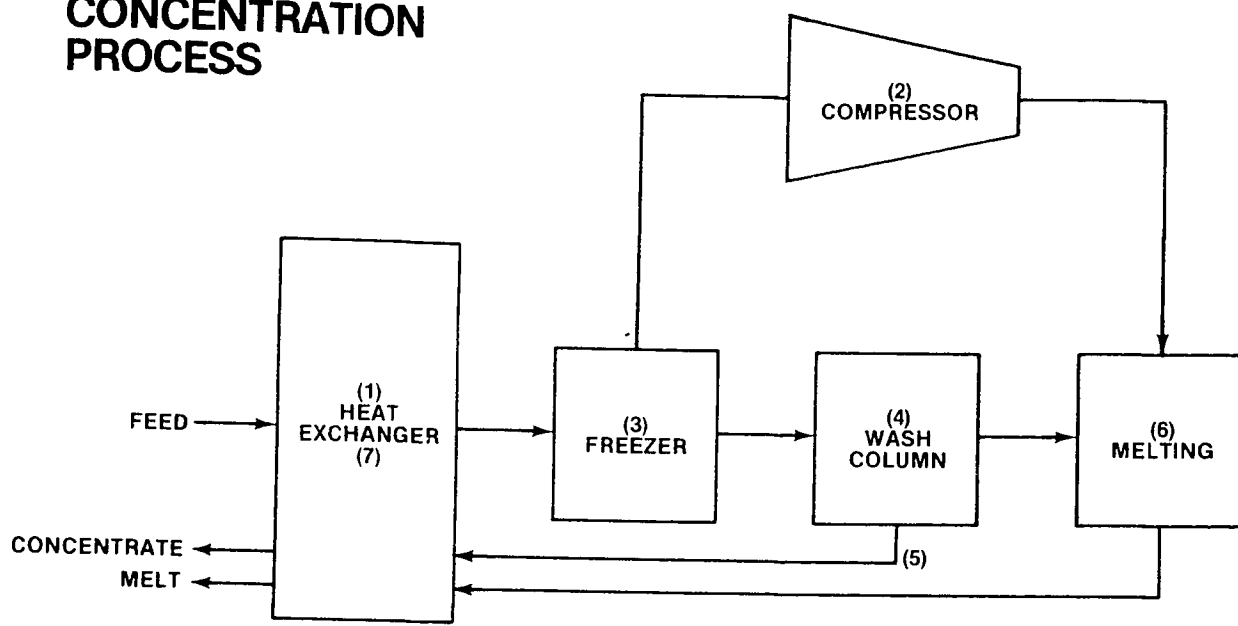


FREEZE CONCENTRATION PROCESS



- (1) Whey (or milk) enters and is cooled to pre freezing temperature
- (2) Compressor reduces pressure in freezer
- (3) Some of the water in cold whey vaporizes, drawing heat from remaining water which freezes
- (4) Ice crystals and condensed whey separated by pumping mixture up from base of column. Ice compacted and removed at top
- (5) Concentrated whey flows to heat exchanger
- (6) Ice melted by compressor's heat
- (7) Cold condensed whey and cold water used to cool whey entering system

New freeze process to cut energy costs

LANCASTER — Dairy Research Inc and 14 major dairy cooperatives from across the U.S. recently formed a joint venture to develop freeze concentration processes and equipment for dairy products. Freeze concentration is a potentially energy-efficient method of removing water from whey and milk.

DRINC initiated the joint venture concept to extend the impact of research dollars. DRINC is the dairy industry's product and process research and development organization.

The dairy cooperative partners, include NEDCO, Maryland & Virginia Milk Producers Assn., Milk Marketing Inc., Land O'Lakes and others.

DRINC estimates freeze concentration could cut their energy costs a minimum of 45 percent.

The joint venture partnership, called Dairy Venture I, has total initial capitalization of \$400,000. DRINC has invested \$100,000 in the project; cooperatives commitments range from \$10,000 to \$50,000 each.

Freeze concentration is

basically the same for sea water, whey, milk or any other water-based solution: part of the water is removed by turning it to ice crystals. Whey, a by-product of cheesemaking, is 94 percent water because most of the milk's solids have gone into the cheese. Before liquid whey is transported or dried, it is concentrated to save energy. Freeze concentration, potentially, uses less energy than existing processes due to recent advances in techniques and equipment.

In the system to be developed, raw whey is first chilled to pre-freezing temperature in a heat exchanger. It then enters the freezer, where under lowered pressure, some of the water in the whey vaporizes, drawing heat from the liquid. This heat loss causes part of the remaining water to freeze.

The resulting mixture of ice crystals and concentrated whey is pumped through the bottom of a wash column in which the ice crystals are compacted by the upward pressure and the

concentrated whey is drained off. The ice crystals are removed and melted. The resulting cold water and concentrated whey flow separately to the heat exchanger, chilling the entering raw whey.

Freeze concentration's energy savings are due to the small changes in temperature required in each step in the process. On the basis of 1979 prices for oil and electricity, a plant using freeze concentration to process one million pounds of raw whey a day could save about \$300,000 a year. If oil prices rise as expected, the savings could be even greater.

DRINC estimates that if freeze concentration were used industry-wide, whey processors could save a minimum of \$15 million a year, based on 1979 costs, and milk and whey processors together could save \$38 million.

The low temperatures used in the process could produce other benefits for the dairy industry. The quality of heat-sensitive products would be protected,

and equipment would need cleaning and replacement less often because there would be little corrosion or fouling.

If the project is successful, equipment could be operating in plants within three years. Dairy Venture I and CSI hope to market the technology world-wide.

From its formation in 1971 to 1979, DRINC has funded 47 commercial development projects and 48 basic research projects. As an operating arm of UDIA, DRINC is financed by dairy farmers and processors. UDIA and its other operating arms, American Dairy Association and National Dairy Council, conduct a total promotion program to increase sales of U.S.-produced milk and dairy products.

DRINC chose freeze concentration for the first joint venture because the project has excellent possibilities for success, would be too costly for one organization to finance, and is of special interest to processors presently concentrating dairy products.

Cost of the process workshops is \$250 (including meals, instructional materials and tours), and pre-registration one week prior to the start of each of the workshops is requested with the Energies Education Institute, Adult and Continuing Education, Southwest State University, Marshall, Minn. 56258 (507/537-6252).

The mechanics workshop at the Canby AVTI on July 7-8 will provide experience in working with the modifications necessary to utilize alcohol fuels and will provide 10 hours of instruction on both spark ignition and diesel engines. Cost is \$100 (including meals and all lab and instructional materials), and pre-registration is requested by June 30 with the Energies Education Institute, Adult and Continuing Education, Southwest State University, Marshall Minn 56258 (507/537-6252).

workshops will be held at Southwest State University June 23-26 and July 7-10, and a mechanics workshop is scheduled July 7-8 at the Canby AVTI.

Production workshops will provide an opportunity to observe a number of farm-size alcohol plants currently in operation in the area as well as firsthand experience in cooking, fermentation and distillation labs. Topics will include energy requirements, plant design and federal Bureau of Alcohol-Tobacco-Firearms regulations.

There will be an opportunity to work in diesel engine and gasoline engine laboratory settings and observe some current developments in cellulose conversion techniques. The economics of an alcohol plant operation and by-product uses will also be a part of the curriculum.

Farm alcohol fuel workshops begin

MARSHALL, Mn. — Three alcohol fuel workshops are scheduled this summer at Southwest State University and the Canby Area Vocational-Technical Institute dealing with production processes and the utilization of alcohol fuels in spark ignition and diesel engines.

Southwest State University and the Canby and Granite Falls AVTI's have been designated as the North Central Alcohol Fuel Training Center by the U.S. Department of Energy and are co-sponsoring the workshops as the Energies Education Institute.

Production process



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For Sale JD 55 combine with cab, 12' grain head and 3 row corn head, wide and narrow, good condition, 717-872-7104

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For Sale - 1980 model Sundance tub grinder, used 2 months, grinds hay, ear corn, corn stover, stacks, small bales and round bales, reason for selling going to all haylage \$8000, Kasten forage wagon, 3 beaters, very good condition \$1600, 717-624-7585 or 624-2429

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For Sale 75 KVA diesel generator, ideal for 60,000 chicken or similar operation. Used less than 200 hrs. Must see to appreciate. 717-464-2125 or 717-786-1731

For Sale - JD 6600 combine, 15' grain platform, 4.30" corn heads, 301-778-2372 9 a.m. - 6 p.m. 301-778-5255 6-10 p.m.

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For Sale Massey Harris model 82 combine with cab, 10 ft grain head, engine recently overhauled, good condition, \$1500 Call 717-789-3219 Perry Co

Cletrac crawler tractor, gas, nice condition, electric start, \$900 215-262-8800

1 AC combine, 6' cut, good condition, JD sickle bar mower, 4 side delivery rakes, old style, Smoker hay elevator, Int disc harrow, 2 spring tooth harrows, 3 plows, 1 with hyd lift, cultipacker, IH 2 row corn planter, NI corn picker, WC AC tractor for parts, 2 wheel trailer, snow plow blade, water trough, other articles not listed, please call 201-234-0453

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Wanted - Int model 312 or 412, fast hitch, 16" bottom, semi mounted plow, Ralph Bashore, Rd 2 Box 297, Mifflintown, PA 17059, 717-463-2628

For Sale JD 4 bar tractor rake, \$450, 580 Case diesel backhoe and loader, works good \$5900, 717-273-2331

For Sale 4.30" row AC flat top corn head, fits C or C2, A 1 shape, ready to go \$2500 or best offer, 302-368-5334

For Sale 1978 NH 1012 stack wagon, excellent condition, single or stack unloading \$4995, ready to go to work, Bradford Co 717-364-5405