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Proposed Thermodynamic Nomenclature of Cryogenic Refrigeration Cycles for Liquefaction of Natural Gas

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A new and systematic naming method is proposed as academic nomenclature of cryogenic refrigeration cycles for liquefaction of natural gas. Over decades, a large number of LNG processes have been designed and patented, even though only a few are operational in practice, including SMR (single mixed-refrigerant), C3-MR (propane-precooled mixed-refrigerant), cascade, or AP-X processes. These processes have been named and widely called by the refrigerants used in the cycles, by a technical term, or even by a proper noun (or a “product” name). In order to identify and reasonably compare the thermodynamic nature, it is necessary to name the closed refrigeration cycles more logically from an academic point of view. The nomenclature is composed of three components: (1) the refrigerant (methane, nitrogen, mixed-refrigerant, etc.) (2) the number of stages (1, 2, 3, etc.), and (3) the cycle type (JT, Brayton, Claude, etc.) In addition, the series or parallel combination of two or more cycles is denoted by symbols (+, //, etc.). Abbreviation (with “factorization” formula) is also presented for short and convenient notation.

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