In-Depth Analysis: CH4 Emissions from Industrial Processes

1. Full-Series Trend (1970–2024): A Minor but Accelerating Source

Methane emissions from industrial processes are a very minor source in the national context, growing from just ~**0.1 Mt CO2eq** in 1970 to ~**0.5 Mt CO2eq** in 2024. While the absolute numbers are small, the pattern of growth is a clear and consistent story of acceleration, mirroring the larger trends in India's industrial sector.

2. Breakpoint Detection: A Four-Stage Acceleration

The analysis identifies breakpoints at **1984, 2006, and 2020**. The slopes of the four resulting regimes tell a simple story of compounding growth: [**-0.005 → 0.005 → 0.015 → 0.028**].

- **1970–1983:** The period begins with no growth.
- **1984–2005:** A long, 22-year period of very slow, near-zero growth begins.
- **2006–2019:** The growth rate triples, aligning with the major industrial and manufacturing boom of the 2000s. As the scale of industry grew, so did the associated methane slip.
- **2020–2024:** The post-COVID break is **highly significant (p-value** *approx* **0.000002)**. The growth rate has nearly doubled again in the last few years, reflecting the intense industrial rebound.

3. Conclusions: A Symptom of Industrial Intensity

- **A Clear Acceleration Curve:** This tiny emission source provides a textbook example of an accelerating trend, with each new phase of industrialization bringing a higher rate of growth.
- **A Proxy for Industrial Scale:** The trend confirms that as the sheer scale of industrial processes in India has grown, the associated (and previously negligible) methane emissions have begun to grow at an accelerating pace.
- **Not a Direct Climate Concern:** The scale of these emissions is too small to be a direct climate policy concern. However, the trend serves as another data point confirming the immense and accelerating intensity of India's post-COVID industrial activity.