

## 三氟化氮 Nitrogen Trifluoride

NF<sub>3</sub>气体在 高能化学激光、电子工业(IC)以及太阳能光电产业等方面具有非常广泛的应用。目前,昊华气体拥有一条年产6000吨的NF<sub>3</sub>生产线,其生产工艺、设备均处于国内领先地位。

Nitrogen Trifluoride is widely used in high energy chemical laser, electronic industry (IC) and solar photovoltaic industry. At present, Haohua Gas has the NF<sub>3</sub> production line with an annual capability of 6000 tons, and its production process and equipment are in the leading position in China.

### 主要用途:

NF<sub>3</sub>的三个主要用途,一是用作高能化学激光气的氟源,二是作为电子工业(IC)中的蚀刻剂、清洗剂,三是应用于太阳能光电产业。

NF<sub>3</sub>其它用途:生产全氟铵盐,用作填充气体以增加灯泡的寿命和亮度,也可在采矿等技术中用作氧化剂等。

### 物化性质:

NF<sub>3</sub>在室温和大气压力下是无色、稳定和有毒的气体。相对分子质量为71.002,沸点为-129.06℃。

NF<sub>3</sub>在室温下较稳定,但在800~1200℃下发生猛烈分解;NF<sub>3</sub>是一种有潜力的氧化剂,特别是在约200℃时,其反应性与氧相当;NF<sub>3</sub>在与其它元素反应时主要用作氟化剂;NF<sub>3</sub>在常温下不与水、稀酸和稀碱溶液反应,但在100℃下与碱性溶液接触时会缓慢水解生成亚硝酸盐及氟化物,在电火花作用下,NF<sub>3</sub>可与水猛烈反应;NF<sub>3</sub>与H<sub>2</sub>或氢化物可快速反应并放出大量的热,该反应是NF<sub>3</sub>用于高能化学激光器的基础;NF<sub>3</sub>可与有机物作用,但通常需升高温度以引发反应,因而常常发生爆炸;在低于70℃时NF<sub>3</sub>气体对普通金属不腐蚀,因此可用钢、不锈钢、镍、铜和铝等材料制作相关设备。

### 安全数据:

NF<sub>3</sub>是一种有毒、不可燃的压缩气体;

无气味,但其中所含的杂质使它闻起来有发霉的气味;

暴露极限: OSHA: PEL=10ppm. ACGIH: TWA/TLV=10ppm. NIOSH: 1000ppm. 当进入浓度超过暴露极限的泄方区时需配备自给式呼吸器(SCBA);

氧化剂，会引起或促进金属和非金属物质的燃烧，特别是温度超过200℃时；燃烧产物有毒；

使用 NF<sub>3</sub>的任何系统都不应有油、油脂和其它有机物；

存储于钢瓶中，压力小于1500psig，盛装 NF<sub>3</sub>的气瓶不允许在高于52℃的环境下使用、贮存和运输。

**包装规格：**

包装：高压无缝碳钢钢瓶

包装规格：47L 国标或 DOT 瓶、470L Y 瓶等。

**Physical and chemical properties:** NF<sub>3</sub> is a colorless, stable and toxic gas at room temperature and atmospheric pressure. The relative molecular weight is 71.002, and the boiling point is - 129.06 °C.

NF<sub>3</sub> is stable at room temperature, but decomposes violently at 800~1200 °C; NF<sub>3</sub> is a potential oxidant, especially at about 200 °C, its reactivity is equivalent to that of oxygen; NF<sub>3</sub> is mainly used as a fluorination agent when it reacts with other elements; NF<sub>3</sub> does not react with water, dilute acid and dilute alkali solution at room temperature, but slowly hydrolyzes to form nitrite and fluorine when it contacts with alkaline solution at 100 °C. Chemical, NF<sub>3</sub> can react violently with water under the action of electric spark; NF<sub>3</sub> can react rapidly with H<sub>2</sub> or hydrides and release a lot of heat, which is the basis of NF<sub>3</sub> used in high energy chemical lasers; NF<sub>3</sub> can interact with organics, but it usually needs to raise the temperature to initiate the reaction, so it often explodes; when the temperature is lower than 70 °C, NF<sub>3</sub> gas does not corrode ordinary metals, so steel and stainless steel can be used. Nickel, copper, aluminum and other materials manufacturing related equipment.

**Safety data:**

NF<sub>3</sub> is a kind of poisonous and nonflammable compressed gas;

No smell, but the impurities in it make it smell moldy;

Exposure limit: OSHA: pel = 10ppm. ACGIH: TWA / TLV = 10ppm. NIOSH: 1000ppm. Se  
lf contained breathing apparatus (SCBA) is required when entering the discharge  
area with concentration exceeding the exposure limit;

Oxidants can cause or promote the combustion of metal and non-metal substances,  
especially when the temperature is over 200 °C; the combustion products are to  
xic;

Any system using NF<sub>3</sub> shall be free of oil, grease and other organic matters;

The cylinder stored in the cylinder with the pressure less than 1500psig and NF  
3 is not allowed to be used, stored and transported in the environment higher t  
han 52 °C.

**Package specification:**

Package: high pressure seamless carbon steel cylinder

Package specification: 47l national standard or dot bottle, 470l y bottle, etc.

**三氟化氮质量指标:**

GB/T 21287-2007电子工业用气体 三氟化氮

| 项目 Item<br>(体积分数 volume percent)         | 企标<br>Institute Standard<br>Q/LMY106-2009 |
|--|---|
| $\text{NF}_3, \times 10^{-2}$            | $\geq 99.99$                              |
| $\text{N}_2, \times 10^{-6}$             | $\leq 5$                                  |
| $\text{O}_2 + \text{Ar}, \times 10^{-6}$ | $\leq 3$                                  |
| $\text{CF}_4, \times 10^{-6}$            | $\leq 40$                                 |
| $\text{CO}, \times 10^{-6}$              | $\leq 1$                                  |

|   |          |
|---|----------|
| $\text{CO}_2, \times 10^{-6}$                 | $\leq 5$ |
| $\text{N}_2\text{O}, \times 10^{-6}$          | $\leq 5$ |
| $\text{SF}_6, \times 10^{-6}$                 | $\leq 5$ |
| 酸度 Acidity(as HF), $\times 10^{-6}$           | $\leq 1$ |
| 水 ( $\text{H}_2\text{O}$ ) , $\times 10^{-6}$ | $\leq 1$ |

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