「儀器設計實務」Practical Issues of Instrument Design

課程綱要

林志民 2014. 6

**1. How to design a vacuum system, including the following.**

Mean Free Path of gas molecules: Viscose flow Vs. Molecular flow  
Gas flow: Throughput, Conductance, Pumping speed

Pumps: Mechanical pump, Roots, Turbo, Diffusion, Dry pumps

Gauges: Mechanical, Thermal conductance, Ionization,

Chambers: Joints (metal, elastomer), parts

Surface outgas

Material: SUS, Al alloy, ceramic, plastic,

Virtual leak

Baking

Leak test, etc.

**2. How to design a machined part.**

Mechanical drawing, tolerance and fit, thermal expansion, …

Material: SUS, Al alloy, ceramic, plastic, …

Machining methods

**3. How to design an optical system**

For example, a spectrometer.

**4. How to deal with electronic signals**

For example, signal reflection and filtering.

**5. How to design ion optics (if time allows)**

**Reference Book:**

Building Scientific Apparatus

A practical guide to design and construction

by John H. Moore, C. C. Davis and M. A. Coplan

2ed, 3rd or 4th edition