Measuring Mass

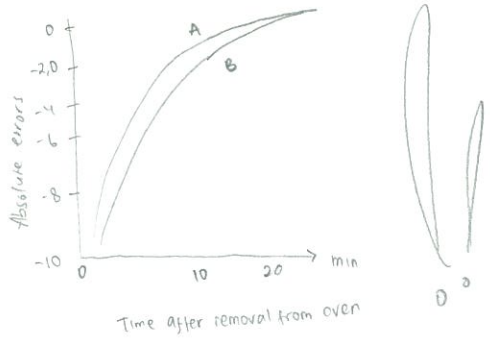
Analytical balance must be used to measure masses with high accuracy

Less accurate laboratory balance → used to mass measurements when the demands for reability aren't critical.

2.) Types of Analytical Balances

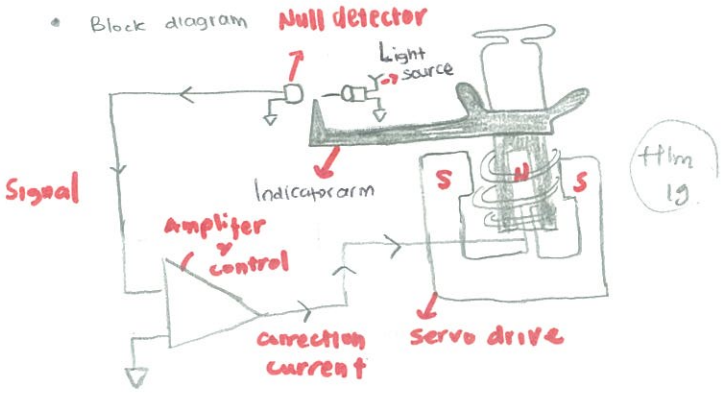
- Analytical balance → instrument that has max capacity that range from 1gr to several kg & precisions at max capacity at least 1 part in 10^5
  → full capacity = 10^6
- Macrobalances → most common type of analytical balance
  → has max load of 160 - 200 gr & precision of 0,1 mg.
- Semimicroanalytical balance → has max load of 10 - 30gr & precision of 0,01 mg
- Microanalytical balance → has max load of 1 - 3gr
  → precision of 0,001 mg / 1 µg
- Equal arm balance → traditional analytical balance
  → tedious & time consuming
- Single pan analytical balance → speed & convenience ... vastly superior
- Electronic analytical balance → replace single pan balance
  ↳ has neither beam nor knife edge
  ↳ speed, ruggedness, convenience, accuracy & capability for computer control & data logging

負偏差 = 誤差 = errors



b.) Electronic Analytical Balance

- Leviate → to cause an object to float in air
- Servo System → device which small electric signal cause mechanical system to return to null position.
- Block diagram



- Cell → in each, the pan is tethered to system of constraints
  → incorporate several flexures that permit limited movement of the pan & prevent torsional force from disturbing the alignment of balance mechanism.
- At null, the beam is parallel to gravitational horizon & each flexure pivot is in relaxed position.
- Generally ... mechanic taring control that cause the ... to read 0 with container (boat/weighing bottle) on the pan
- Tare → mass of empty sample container
- Taring → process of setting balance to read 0 in the presence of the tare
- Provide unprecedented speed & ease of use
- Reliable mass measurement are obtainable with little/no instruction or practice