

## Very Low Temperature Measurement – Liquid He Unit ES-CT470

One of the features of ESR spectroscopy is that the lower the sample temperature, the higher the sensitivity becomes. This is because the number of spins in the two spin states, split by Zeeman interaction, becomes greater the lower the temperature. In some samples e.g. some metal complexes, the spin-spin relaxation time ( $T_2$ ) is too short to measure at room temperature and require very low temperature to measure the ESR spectrum. In such cases, measurement at low temperature is useful and the ES-CT470 liquid He VT unit is a useful attachment for such measurements.

The photo shows the ES-CT470 set-up. The main features of the system are:-

1. Easy set up.

Installation time ~20 min.

2. Fast cool down

Room temp to 4.5 K in ~15min.

3. High temperature stability

$\pm 0.01\text{K}$  (2.5 to 4.2 K)

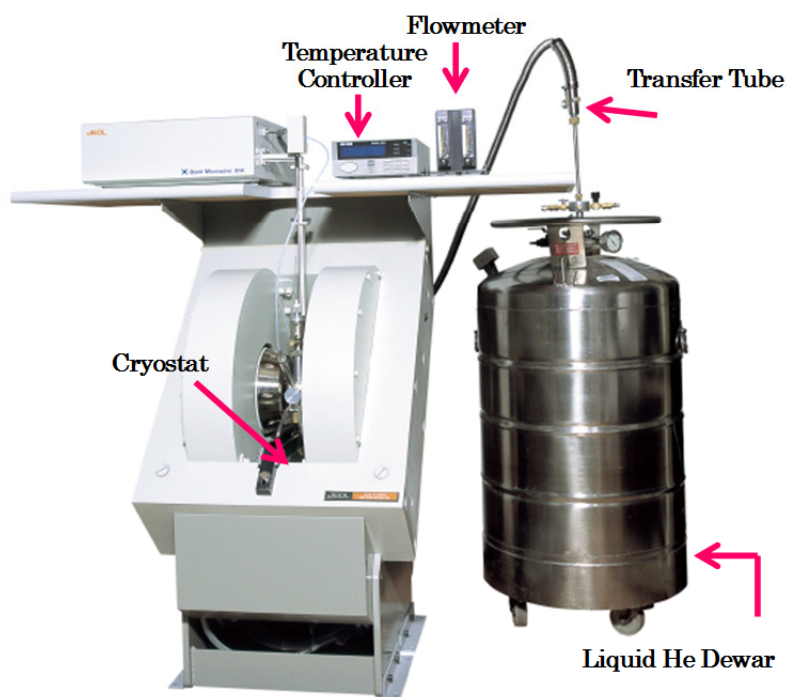
$\pm 0.5\text{K}$  (4.2 to 470 K)

4. Liquid He supply from rear of magnet

Good front access.

Optical-irradiation possible from front of magnet

5. Easy sample exchange



ES-CT470 Setup  
Dewar is not included in the basic supply.

The figure shows the temperature dependence of  $\text{Fe}^{3+}$  signal in glass. For paramagnetic species, the signal intensity is inversely proportional to the absolute temperature (Curie's law.) For samples such as natural products which can be obtained only in very small quantities, high sensitivity by lowering temperature is clearly advantageous.

