

## Direct measurement of crosslink density

### Summary

The Swell Ratio Tester (SRT™) is an in-house design that allows safe and simple determination of the swelling properties of polymeric materials. The data generated provides insight into crosslinked solid polymers, like polyethylene, or solvated systems such as hydrogels and organogels. The SRT™ can help researchers understand the structure of a polymer system, or can aid in formulation work and quality control. A new version, the SRT-3, provides the user three times the throughput as the original design.



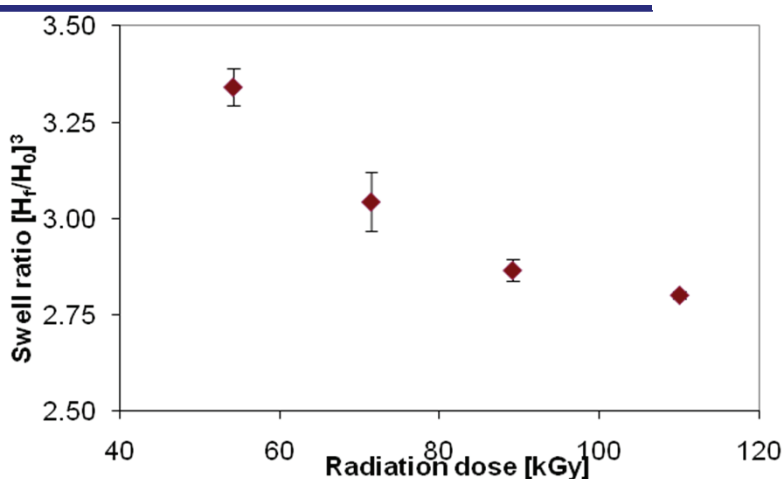
### Description

The SRT™ measures the swelling ratio of crosslinked polymers as they are placed in a good solvent. From Flory's network theory, the data can be used to calculate the crosslink density, molecular weight between crosslinks, and the number of crosslinks/chain. The SRT™ test is in compliance with ASTM F2214-02 "Standard Test Method for In Situ Determination of Network Parameters of Crosslinked Ultra High Molecular Weight Polyethylene (UHMWPE)". This instrument was developed under an SBIR grant from the NSF.

Although its primary use is in determining crosslink density for the orthopaedic industry, it can also be used to study swellable systems such as hydrogels in contact lenses and drug release as a function of solvent environment and temperature.

### Specifications

- Temperature range: Ambient - 150°C
- Position Resolution:  $\pm 15 \mu\text{m}$
- Chamber size (cm):  $\phi 1.9 \times 3.8$
- SRT
- Temperature Resolution:  $\pm 0.1 \text{ }^\circ\text{C}$
- Unit size (cm): 25 x 25 x 15
- SRT-3™
- Temperature Resolution:  $\pm 1 \text{ }^\circ\text{C}$
- Unit size (cm): 61 x 76 x 50



### Markets

- Biomedical polyethylene
- Hydrogels
- Crosslinked polymers



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- **Design prototypes for proof-of-concept studies**
- **Create and execute experimental design**
- **Validate and verify manufacturing processes**
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