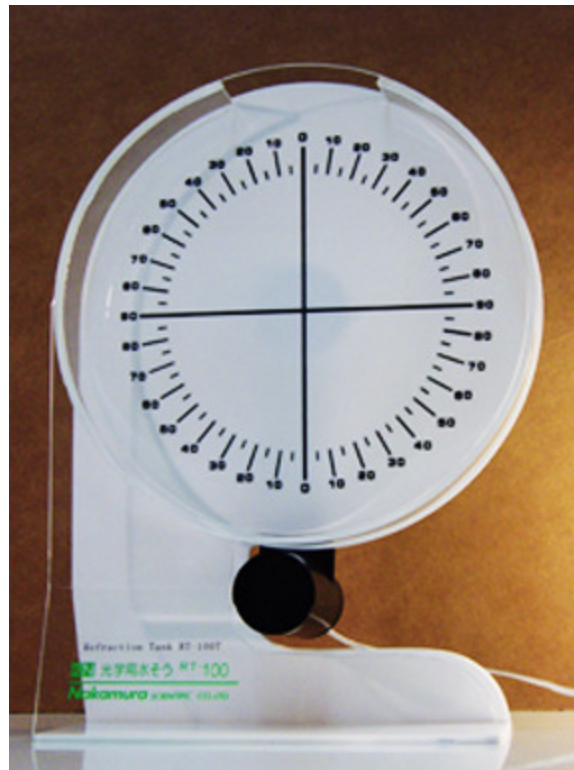


## **Refraction Tank**

**N99-D20-1282**



### **IMPORTANT!**

#### **Read the following before using this equipment:**

1. Carefully follow all instructions and observe all precautions given in this manual.
2. Avoid applying excessive force when adjusting the light source.
3. Never use solvent or thinner to clean the tank.
4. Use a lower voltage (4V) for experiments that take longer than 15 minutes.

#### **Purpose**

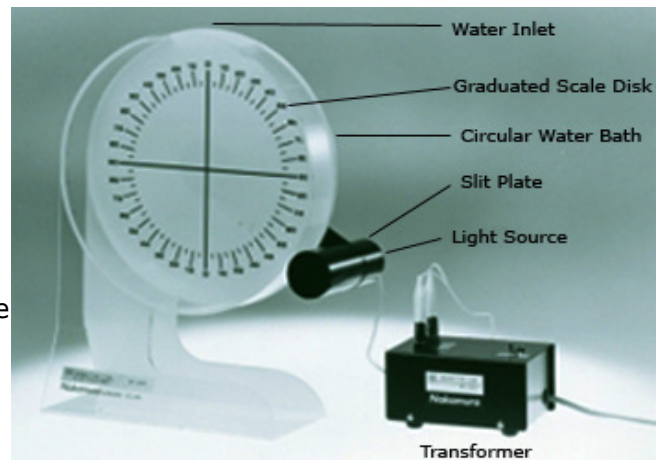
Used to facilitate quantitative observation of the refraction or reflection of light passing through air and water.

## Structure

The apparatus consists of circular bath and light source. The circular bath has a built-in scale enabling the angles of incidence and reflection/refraction to be easily ascertained. The light source is composed of a lamp and slit plate and can be positioned at any point along the circular scale.

### Adjusting the light source

1. Position the light source at a pre-selected spot on the rim of the water bath and secure it in place using the fixing screw located on the backside of the bath.
2. Connect the light source cord to a dry cell or equivalent power supply (4-6V).
3. Light passing from the slit will fall upon the scale. Turn the slit plate until the light beam passes through the center of the bath.
4. Loosen the fixing screw and rotate the back cover of the light source either clockwise or counterclockwise until the sharpest image is formed (avoid using excessive force during this adjustment).



### Note:

- If the beam of light cannot be centered on the scale disk as in step 4 above, turn the slit plate for center adjustment as in step 3 above.
- No further adjustment will be necessary until the lamp has to be replaced.
- To replace the lamp, loosen the fixing screw and remove the lamp and back cover together.

### Experiment 1: Refraction of light passing from air through water

1. Place the circular water bath on a flat, level surface and fill it with water to the mid-line (90-90 line). This will require approximately 1 liter of water.
2. Slowly move the light source from its top position (zero on the scale) downward while at the same time observing the path of light.
3. *Reference:* Upon examination, students can note the angle of incidence and the angle of refraction and use these figures to ascertain the relationship between the two.

### Experiment 2: Refraction of light passing from water into air

Fill the water bath as in the previous experiment, but this time very slowly move the light source up starting at the bottom position (zero on the lower part of the scale) for a similar observation.

**Reference:**

Student groups will be able to record readings of the angles in the water and air. Results will be similar to those discovered in experiment 1. They will also find that at and beyond a certain angle, the light will be totally reflected and unable to pass into the air above the surface of the water.

**Note:**

- The front part of the light source, especially the slit plate, will get very hot while the lamp is on. Take care not to touch it.
- The lamp can use a power source of up to 6V. If an experiment is to take longer than 15 minutes, then the power must be reduced to 4V and the lighting in the room reduced accordingly.

Air to Water:

<b>Angle of incidence</b>	0	10	20	30	40	50	60	70	80
<b>Angle of refraction</b>	0	7.5	15	22	29	35	40	45	47

Water to Air

<b>Angle of incidence</b>	0	10	20	30	40
<b>Angle of refraction</b>	0	14	27	42	59

**Specifications**

- Water Bath: Acrylic Resin, outside diameter 250mm  
 Working voltage: 6V max. (1.7); proper voltage 4V  
 Light Source: 1.3A  
 Slit Width: 0.8mm  
 Dimensions: 260 (width)x100 (depth)x350mm (height)



**Storage**

Should the inside of the bath become stained, or if the bath has been stored for a prolonged period of time, it can be cleaned with a diluted synthetic detergent or warm water. Be sure to loosen the fixing screw and remove the lamp before cleaning. Never use a solvent or thinner to clean the tank.





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