

# The Sacred in Science

## Session 2 – *Heat*

<http://www.redshirt.org/longer-writings/courses/the-sacred-in-science/>

### 1. **FIRE:**

Oxygen in relation to earth, air, water, and fire. Organic chemistry (C, H, O, N). The Geology of metals: "The Earth is on fire!"

- Take Away Mindfulness Demonstrations:
  - Carbon Test [goggles & aprons, propane tank with nozzle, dried leaf, food, rock, bone, fingernail, meat, fish, eggshell, egg, milk, plastic, leather]
  - Oxygen Test [collecting jar apparatus, splint, oxygen tank]
  - Oxidizing Carbon [candle, glass tube]
  - Oxidizing Wood [wood branch]
  - Oxidizing Iron {O/A}, Magnesium [iron powder, magnesium ribbon]
  - Oxidizing Bone & Rock [bone, rock]
  - Slaking Dust [bone, rock, cement, CaO]

### 2. **EXTREME HEAT: Temperature, Kinetic Energy, Calories**

- Take Away Mindfulness Demonstrations:
  - Trusting Your Senses {O/A} [3 Bowls of hot, cold, and lukewarm water]
  - Stress Friction [hangar]
  - Red Hot Steel [steel ball, stand with mesh]
  - Extreme Expansion of propane + O<sub>2</sub> [balloons, long rod, propane tank, oxygen tank]

### 3. **COLD: CO<sub>2</sub> Five Ways**

This is great fun for the demonstration person and for the audience! You start showing CO<sub>2</sub> in its pure form as a gas, then make it chemically, and then with dry ice.

- Take Away Mindfulness Demonstrations:
  - 1) Direct from Tank [CO<sub>2</sub> tank, collecting jar apparatus, candle, fire extinguisher]
    - Tongue
    - In Test Tube, Extinguish Flame
  - 2) Chemicals [Vinegar + Baking Soda, collecting jar apparatus]
    - Little: Pour onto candle
    - Big: Floating Bubbles
  - 3) Invisible [candle, glass tube, propane tank with nozzle]
    - Where did the candle go?
    - Carbon Soot on Glass with propane flame
  - 4) Dry Ice [bubbles, quarters, pan, soap solution]
    - Blowing Bubbles
    - Vibrating Quarter
    - Screaming Pan

- Skating Puck
- 5) Homemade Soda [cups, sugar water, pitcher, food coloring]

#### 4. **THERMODYNAMICS: Specific Heat, Expansion, Water: Earth's Savior**

- Take Away Mindfulness Demonstrations:
  - Regelation [regelation apparatus]
  - Ping Pong Ball in boiling water [camp stove, pot, ping pong balls]
  - Expansion/Contraction [Bimetallic Strip, Ball/Ring]
  - Hot Marble in cold water [propane tank with nozzle, marbles, pot]
  - Homemade Thermometer [glass tubes]
  - Expanding Pendulum [stand with brackets, wire, plumb bob]
  - Tyndall's Specific Heat Apparatus [camp stove, wax discs, metal balls, specific heat weights, tongs]

#### 5. **EXTREME COLD: What if the Sun ceased to give light and heat?**

Properties of liquid nitrogen, Absolute Zero!

- Take Away Mindfulness Demonstrations:
  - Liquid Nitrogen
    - Brittle Lettuce
    - Instant Ice
    - Banana Hammer
    - Shrinking Balloon
    - Freeze Small Marshmallows
    - Potato Chips
    - Nitro Cream with cups & spoons & whisk & bowl
    - ... then Eat, Pour on Floor



#### 6. **THERMODYNAMICS (again)**

- Take Away Mindfulness Demonstrations:
  - Ice Bomb
  - Homemade Blinker from Bimetallic Strip
  - Weights of hot and cold air on homemade balance
  - Weights of hot and cold water on laboratory balance

#### 7. **CHEMISTRY**

- Take Away Mindfulness Demonstrations:
  - Grand Cycle: Burning
  - Grand Cycle: Growing
  - Grand Cycle: Eating
  - Calcium Cycle: Our Bones
  - Calcium Cycle: Earth's Bones
  - Calcium Cycle: Lime Cycle
  - Other Cycles: Hydrolysis
  - Other Cycles: Fermentation
  - Other Cycles: Saponification
  - Other Cycles: Action of an Acid

- Other Cycles: Action of a Base
- Other Cycles: Action of an Acid + a Base

For a reference to *current writers on the hoped for, next version of humankind*, go to “Good Reading” <http://www.redshirt.org/good-reading/>.

## References

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- Van der Post, L. (1961). *The Heart of the Hunter ... With drawings by Maurice Wilson*. Pp. 254. Hogarth Press: London.
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