

## Rubber band thermodynamics

General Chemistry, CH102 Spring 2011

1. When a rubber band is stretched rapidly, ...

- 0% 1. heat is given off
- 0% 2. heat is absorbed
- 0% 3. there is no heat flow, since only work is done

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2. When a rubber band is stretched rapidly, heat is given off. This means upon stretching bonds are ...

- 0% 1. broken
- 0% 2. formed
- 0% 3. neither broken nor formed, since the heat flow is due to the work done

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Countdown  
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3. When a rubber band is stretched rapidly, heat is given off due to formation of bonds within the rubber. For the process **relaxed** → **stretched**, the entropy change of the the **surrounding air**,  $\Delta S_{\text{sur}}$ , must be ...

- 0% 1.  $\Delta S_{\text{sur}} > 0$  (positive)
- 0% 2.  $\Delta S_{\text{sur}} < 0$  (negative)
- 0% 3. Further information needed

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4. When a rubber band is stretched rapidly, the **total entropy change** (that of the of the rubber band,  $\Delta S_{\text{sys}}$ , plus that of the surrounding air,  $\Delta S_{\text{sur}}$ ) must be ...

- 0% 1.  $\Delta S_{\text{tot}} = \Delta S_{\text{sys}} + \Delta S_{\text{sur}} > 0$  (positive)
- 0% 2.  $\Delta S_{\text{tot}} = \Delta S_{\text{sys}} + \Delta S_{\text{sur}} < 0$  (negative)
- 0% 3. Further information needed

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5. When a rubber band is stretched rapidly, the total entropy change is **negative**, since the rubber band **does not stretch by itself** (we must stretch it). The entropy change of the surrounding air is positive, since heat is given off. This means the entropy change of the rubber band upon being stretched **must be** ...

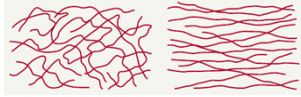
- 0% 1.  $\Delta S_{\text{sys}} > 0$  (positive)
- 0% 2.  $\Delta S_{\text{sys}} < 0$  (negative)
- 0% 3. Further information needed

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6. The entropy change of the band upon stretching is negative,  $\Delta S_{\text{sys}} < 0$ , since the rubber polymers become more aligned. When a **stretched** rubber band is **heated**, it will **spontaneously** ...



- 0% 1. lengthen (stretch further)
- 0% 2. shorten (contract)
- 0% 3. Further information needed

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Countdown  
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