

# Cross-Disciplinary

## Dry Ice

Read the following paragraphs, and complete the exercises below.

By adding or removing heat, most substances will change state from a solid to a liquid to a gas, or the reverse. The addition of heat turns solid water—ice—into liquid water. Adding more heat can transform liquid water into a gas. Removing heat from water can reverse this process.

### SKIPPING STEPS

A few substances skip some of these steps. For example, carbon dioxide ( $\text{CO}_2$ ) goes from the solid state directly to the gaseous state. This process is called *sublimation*. You might be familiar with the common name for solid carbon dioxide, “dry ice.” It’s “dry” because it does not pass through the liquid state when heated.

Dry ice *sublimes*, which means it turns from solid to gas, at  $-78.5^\circ\text{C}$ . When used in an ice chest, dry ice sublimates at a rate of five to ten pounds every 24 hours. This makes dry ice ideal for use in keeping certain frozen foods, such as ice cream, cold in an ice chest. The fact that dry ice sublimates into a smokelike gas also makes it ideal for use in certain theatrical effects. Do you want “fog” to creep along a stage? Place some dry ice in a tub of water under the stage, turn on a fan, and watch the fog rise.

### EXERCISES

1. If you live in a very cold area, you may have seen the depth of a bank of snow shrink even though temperatures remain below the melting point of water. How might you account for this observation?

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2. When used as a theatrical special effect to simulate fog, carbon dioxide gas tends to stay near the floor of the stage. What might account for this effect?

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3. Describe an advantage of using dry ice to ship cardboard cartons of ice cream over long distances.

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