

## I?m melting? inhaling carbon dioxide <sup>[1]</sup>

Dear Alice,

This is kind of urgent.

I'm in a production of the Wizard of Oz, playing the Wicked Witch. It's a lot of fun, but I've encountered a potential safety issue: They've decided that they're going to melt me by spraying my part of the stage with a fire extinguisher. I have to look into what kind, but we suspect/think/hope it's a CO<sub>2</sub> extinguisher.

Here's my concern: What happens when you're sprayed with a CO<sub>2</sub> extinguisher? They're going to aim it at my back, but I think I'll still be in a cloud of the stuff every night for tech week, and then four times a week during the run of the show. I kind of need to be able to breathe, and as much as I love this role, I'm not willing to get cancer for it. And while THIS isn't a singing role, I sing a lot, so I'd like also not to destroy my voice.

Do I need to insist that they find another way to do it, or take safety precautions, or is it safe and I should just stop worrying?

Thanks!

?Elphaba

### **Answer**

Dear Elphaba,

Congratulations on your awesome role in the production! And congratulations on checking to see if getting sprayed with carbon dioxide (CO<sub>2</sub>) nightly for several weeks would be harmful to your health. While the Wicked Witch melting in a cloud of swirling smoke is a wonderfully dramatic scene, it is good to know the facts about CO<sub>2</sub>.

CO<sub>2</sub> is naturally present in the air at a concentration of about 0.035 percent. Short-term exposure to CO<sub>2</sub> at levels below two percent has not been reported to cause harmful effects, but higher concentrations, like you might be exposed to when sprayed by a fire extinguisher, can affect respiratory functioning. In addition, high concentrations of CO<sub>2</sub> can cause the central nervous system to be simultaneously stimulated and depressed, a phenomena that can have dangerous results.

Your body responds pretty recognizably when it has had more than its desired dose of CO<sub>2</sub>.

Breathing CO2 concentrations of four to seven percent has been shown to produce headaches, hearing and visual disturbances, increased blood pressure, difficulty breathing, mental depression, and muscle tremors. As CO2 concentration increases, its effects become more dangerous and symptoms occur more quickly ? exposure to seven to fifteen per cent carbon dioxide can produce drowsiness, dizziness, and unconsciousness within a few minutes. At 17 to 30 percent CO2, people have experienced loss of controlled activity, unconsciousness, coma, convulsions, and death within a minute. Several deaths have been attributed to exposure to concentrations greater than twenty percent. As you can see, playing around with CO2 could be a risky endeavor, with very little margin for error.

If you start to feel shortness of breath, choking sensations, dizziness, or any of the other associated symptoms, you should remove yourself from CO2 exposure right away and get some fresh air. If you're in a well-ventilated room, or can have a fan near the stage to blow away the "smoke" your exposure may be lessened, but because CO2 fire extinguishers have a high concentration of carbon dioxide, it's probably not be the best option.

Have you talked to the visual effects coordinator to discuss this and other potential options for the scene? Or chatted with the director regarding your concerns? For a safer choice, you might consider using a fog machine, which creates smoke out of water vapor, or a commercial smoke bomb, which does not use CO2. Poking around on the internet for theater tricks for safe ways to create smoke or fog could turn up some interesting results. But for now, it might be best to stay away from the CO2, so you can play many roles after this one.

Break a leg (but not a lung),

Alice!

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