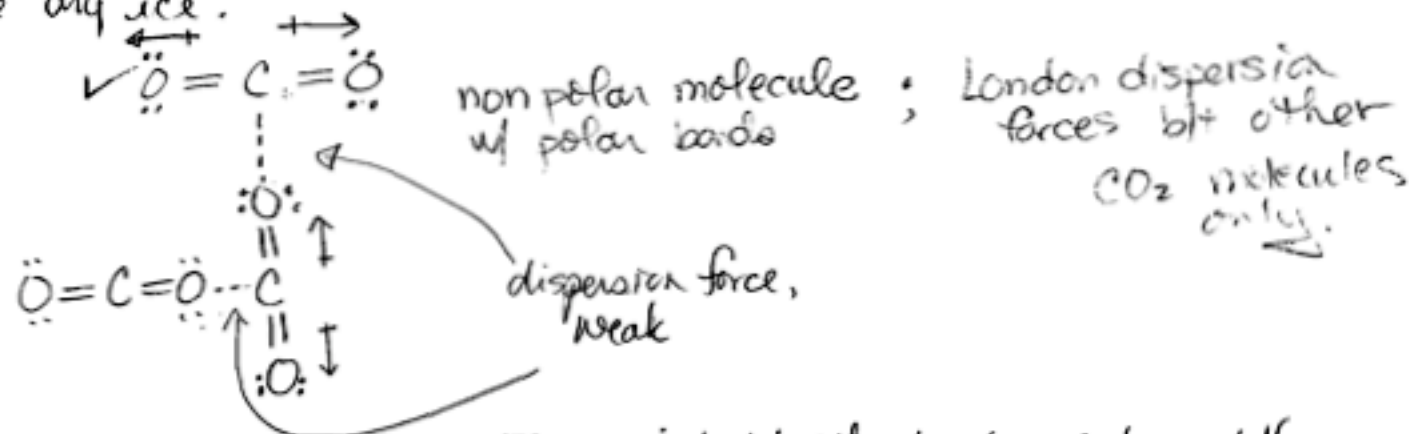


7/7

3. The atmosphere of Mars is about 95% carbon dioxide (CO₂). During the Martian winter, temperatures at the poles on Mars drop as low as -140°C, and a large portion of the atmospheric carbon dioxide freezes to form "dry ice" at the polar ice cap. These slabs of dry ice later sublime (change phases from solid to gas) during the Martian summer, when temperatures reach 20°C, and the gaseous carbon dioxide creates winds with speeds up to 400 miles per hour.

Using chemical concepts and structures, fully explain why dry ice exists naturally in the Martian climate but not on Earth.

Because CO₂ is not a polar molecule, the only intermolecular force attracting them to each other are London dispersion forces. These forces are not strong, but when temperatures are very low such as in Mars, the molecules slow down and condense. When CO₂ freezes at the low temperatures in Mars, the CO₂ molecules attract to one another to create dry ice.



CO₂ has a low boiling point b/c the bonds between them are not very strong. ~~the other hand, it has a higher freezing point because it can freeze at a higher temperature than some other molecules;~~ therefore Dry ice exists naturally in Mars because the climate there allows CO₂ to freeze. If the temperature on Earth drops as dramatically and as low as it does in Mars, dry ice may exist naturally on Earth as well.