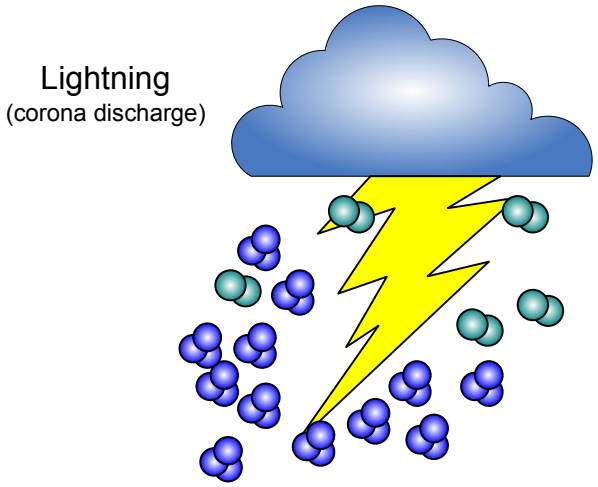
How much ozone does one lightning strike produce?



Assumptions:

- The lightning strike is 5,280-ft (1-mile) above the ground
- The ionized gas (corona) affected by the lightning strike is 3-ft in diameter and remains constant from cloud to ground
- 99% of the gas in contact with the corona is converted to ozone
- The density of air is constant (0.089-lbs/ft^3) through the 1 mile long corona

Calculate the volume of the corona (V_c):
$V_c = \pi r^2 \times L$ {r = 1.5-ft, L = 5280-ft}
$V_c = \pi 1.5^2 \times 5{,}280 = 37{,}322\ ft^3$

This volume needs to be adjusted since only 20.9% of this volume actually contains oxygen.

Vcc (corrected) = 37,322-ft^3 x 0.209 = 7,800.3 ft^3

Calculate the mass of oxygen (M_{ox}) in the corona:
Density of oxygen (D_o) is 0.089-lbs/ft^3 (1.429 kg/m^3)
$M_{ox} = D_o \times V_{cc}$
M_{ox} = 0.0804 x 7,800.3 = 627.1-lbs of oxygen

Since the average lightning strike is between 100 million & 1 billion volts, we assume that 99% of the oxygen is converted to ozone (O_3), the remaining 1% reverts back to oxygen (O_2):

We now take gas molecular weights (MW) into account.
The MW of oxygen is 32 & the MW of ozone is 48:
$M_{oz} = 627.1 \times (MW\ O_2/MW\ O_3) * 99\%$
$M_{oz} = 627.1 \times 32/48 * 99\% = 413.9$-lbs O_3

Using the assumptions above, for every lighting strike there is 418-lbs of ozone produced. The average storm can have as many as 1,000 lightning strikes hit the ground. This equates to 418,000-lbs (209 tons) of ozone produced during each storm!