

Homework 2 Key

$$1 \text{ ppm} = 1000 \text{ ppb}$$

1. a. 0.118 ppm
 $= 118 \text{ ppb}$

$$0.118 \text{ ppm} \times \frac{1000 \text{ ppb}}{1 \text{ ppm}} = 118 \text{ ppb}$$

b. 25 ppm
 $= 25000 \text{ ppb}$

+1

You'll be able to smell ozone in both of these samples.

8. a. 2A

b. alkaline earth metals

c. Be 4
Mg 12

Ca 20
Sr 38

Ba 56
Ra 88

+1

d. 2

10. a. 8 protons, 8 electrons, 10 neutrons

b. 16 protons, 16 electrons, 19 neutrons

c. 92 protons, 92 electrons, 146 neutrons

d. 35 protons, 35 electrons, 47 neutrons

e. 10 protons, 10 electrons, 9 ~~protons~~ neutrons

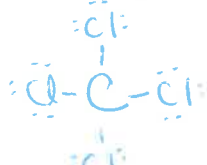
f. 88 protons, 88 electrons, 138 ~~protons~~ neutrons

+2

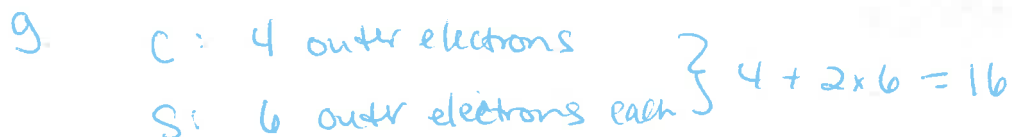
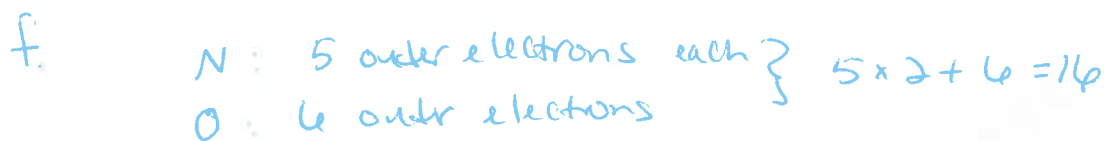
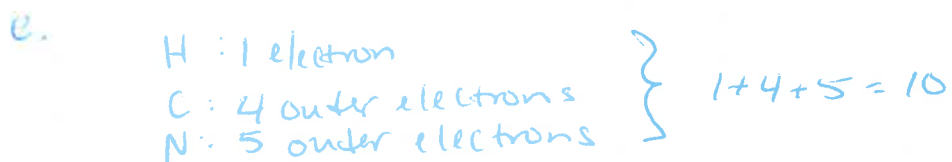
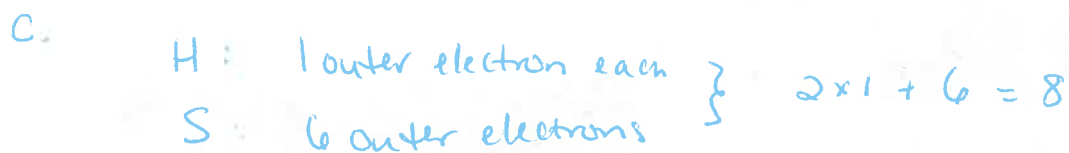
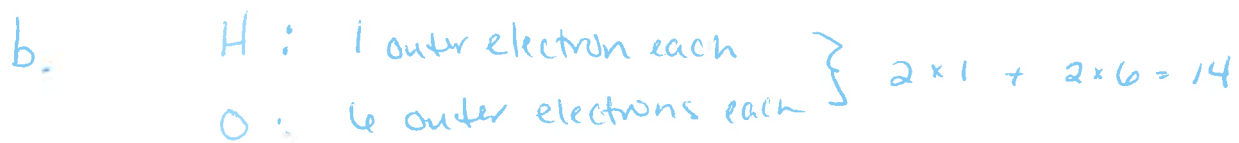
13. c: 4 outer electrons

Cl: 7 outer electrons for each

$$4 + 7 \times 4 = 32 \text{ total electrons}$$



+3



15. a. Wave 1 has a longer wavelength than wave 2. +1
 b. wave 1 has a ~~lower~~ ^{lower} frequency than wave 2.

20. a. shortest/smallest UV-C UV-B longest/greatest UV-A wavelength +1
 b. UV-A UV-B UV-C energy
 c. UV-A UV-B UV-C damage

26. a. No. There can only be carbon, fluorine + chlorine. +1
 b. HCFCs have hydrogen, carbon, fluorine + chlorine but HFCs have no chlorine.

30. The slogan is saying that we need ozone in the stratosphere (up high) to protect us from the sun's UV light but ozone in the troposphere (nearby) is an air pollutant. +1

31. Allotropes of oxygen have different molecular structures (like O₂ and O₃). Isotopes of oxygen differ in the number of neutrons in the nucleus of the atom. (like ¹⁶₈O and ¹⁸₈O) +2

34. The Lewis dot structures of ozone are (see problem 33 for example)



I predict that the bond lengths in ozone will be between 132 and 121 pm... like a 1.5 bond because we can't measure the two different resonance structures

36. lowest energy

Radio

← least damage



IR

visible

+1

highest energy

UV

← most damage

44. The Antarctic is the coldest place on earth (as low as -90°C) and polar stratospheric clouds form. At the surface of these clouds (the ice crystals), "safe" molecules are converted to reactive species such as $\text{HOCl} + \text{Cl}_2$. When the sun comes out, the $\text{HOCl} + \text{Cl}_2$ are broken down, releasing Cl atoms. The Cl atoms then break down O_3 . To form the O_3 hole, extreme cold + no wind + darkness is needed, followed by rapidly increasing amounts of sunlight. The conditions are not quite right in the Arctic - the PSCs diffuse before the sun comes out.

+2