

Chemistry in Context

Second Session - Chapter 1

Answers to the assigned study questions and problems (17-19, 21, 31, 32, 34):

17. Give the correct formula for each of these substances.

- a. "Laughing gas," chemically named dinitrogen monoxide

Answer: N_2O

- b. Ozone, used in water purification

Answer: O_3

- c. Sodium fluoride, and anticavity ingredient in toothpaste

Answer: NaF

- d. Carbon tetrachloride, formerly used as a dry cleaning agent

Answer: CCl_4

18. What information does each formula convey about its compound, each a trace component of the atmosphere?

- a. CH_2O , formaldehyde

Answer: One molecule is made of one atom of oxygen, one atom carbon, and 2 atoms of hydrogen.

- b. H_2O_2 , hydrogen peroxide

Answer: One molecule is made of two atoms of hydrogen and two atoms of oxygen.

- c. CH_3Br , methyl bromide

Answer: One molecule is made of one atom of carbon, one atom of bromine, and three atoms of hydrogen.

19. Write balanced chemical equations to represent these reactions.

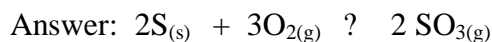
- a. Nitrogen (N_2) reacting with oxygen gas (O_2) to form nitric oxide (NO).

Answer: $\text{N}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightarrow 2\text{NO}_{(\text{g})}$

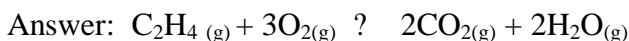
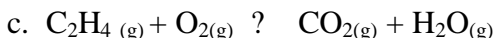
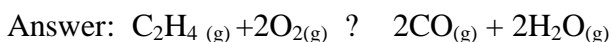
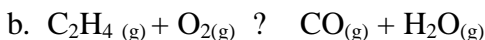
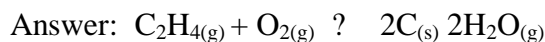
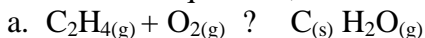
- b. Ozone (O_3) decomposing and oxygen gas (O_2) and atomic oxygen (O).

Answer: $\text{O}_{3(\text{g})} \rightarrow \text{O}_{2(\text{g})} + \text{O}$

c. Sulfur (S) reacting with oxygen gas (O₂) to form sulfur trioxide (SO₃)



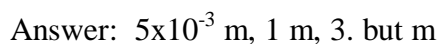
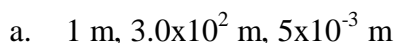
21. Balance these equations, all of which involve reactions of ethylene gas, (C₂H₄), oxygen gas (O₂).



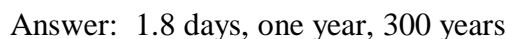
31. A certain city has an ozone reading of 0.13 ppm for one hour, and the permissible limit is 0.12 for that time. You have the choice of reporting that the city has exceeded the ozone limit by 0.01 ppm or saying that it has exceeded the limit by eight percent. What are the advantages of each method?

Answer: 10 of the accurate methods of expressing in the information. However, present the information and 0.01 ppm the impression that the amount exceeding the standard is very small. Reporting the information as 8 percent it is a better presentation of the effective magnitude of the information. The way that the information is presented often depends upon the perspective of the presenter and the attitude that the presenter wishes to create in the people receiving the information. Deceptive reporters often pick the presentation that best favors their agenda rather than presenting the information in the best way. It is often a very difficult ethical choice for scientists who wish to report the information.

32. Arrange these measurements in order of increasing size:



b. Draw an analogy between these three length measurements and time. Let one-year be equal to one m. How long will the other two measurements be in terms of time expressed in years?



33. If risk is related to public perception, what is your feeling about the relative risks associated with each of these items? Rank them in order of your perception of the most risky to the least risky. Be prepared to explain your choices to class members.

Smoking, using roller blades, eating beef, driving to work, getting a suntan, taking aspirin, drinking tap water, breathing polluted air

