

General Chemistry I

July 1, 2021

1. Predict which substance in each of the following pairs would have the greater intermolecular force:

SeO₂ or SO₂

CH₃CH₂CH₂NH₂ or H₂NCH₂CH₂NH₂

CH₃CH₃ or H₂CO

CH₃OH or H₂CO

2. Rationalize the difference in boiling points for each of the following pairs of substances:

HF (20 °C); HCl (-85°C)

Br₂ (59°C) and ICl (97°C)

HCl(-85°C); LiCl (1360 °C)

CHCl₃ (61°C) and CHBr₃ (150°C)

3. Based on the principle that like dissolves like (i.e. molecules with similar IMFs will form homogenous mixtures with each other), predict which pairs of substances would you expect to form homogeneous solutions when combined? What types of IMFs are involved?

a) CCl₄ and H₂O

b) KCl and H₂O

c) Br₂ and CCl₄

5. The partial pressure of oxygen was observed to be 156 torr in air with a total atmospheric pressure of 743 torr. Calculate the mole fraction of O_2 present.
6. The partial pressure of CH_4 (g) is 0.175 atm and that of O_2 (g) is 0.250 atm in a mixture of the two gases.
- What is the mole fraction of each gas in the mixture?
 - If the mixture occupies a volume of 10.5 L at 65°C , calculate the total number of moles of gas in the mixture.
 - Calculate the number of grams of each gas in the mixture.
7. A person accidentally swallows a drop of liquid oxygen, O_2 (l), which has a density of 1.149 g/mL. Assuming the drop has a volume of 0.050 mL, what volume of gas will be produced in the person's stomach at body temperature (37°C) and a pressure of 1.0 atm?

8. For each pair of compounds, pick the one with the highest boiling point. Explain your reasoning.

a. CH_3OH or CH_3SH

b. CH_3OCH_3 or $\text{CH}_3\text{CH}_2\text{OH}$

c. CH_4 or CH_3CH_3