

Activity: Intermolecular Forces

- 1) IF you used HF and HF in this same simulation, predict the observations in the Data Table below

	Relative force to pull apart	Polar or nonpolar?	IMF
Br ₂ and Br ₂	easy	Non polar	London Dispersion
H ₂ and H ₂	easy	Non polar	London Dispersion
HBr and HBr	difficult	polar	Dipole-Dipole
H ₂ and HBr	medium	polar-nonpolar	Induced Dipole
PREDICT: HF and HF	difficult	polar	Dipole Dipole

Analysis

Considering the observed IMF and strength of those forces, complete the following questions with your best predictions.

- 1) Rank the following molecules from lowest to highest boiling point: H₂, Br₂, and F₂. Explain your prediction based on IMF.

H₂, F₂, Br₂

They go in that order because the mass size also increases down the list and the boiling point is dependant on how easy it is to break apart molecules.

- 2) Predict which of the following has the highest boiling point: HF or HBr. Explain your prediction based on IMF.

Hydrogen fluoride because of its nonpolarity

- 3) Consider water, H₂O. Predict how water's boiling point compares to HBr and HF? Explain your prediction based on IMF.

HBr, HF, H₂O

HBr should have the lowest boiling point because it has the weakest IMFs (dipole-dipole). Between water and HF, I would expect HF to have a lower boiling point because it has less mass.

- 4) Look up the boiling points of H₂, H₂O, Br₂, F₂, HBr, and HF. Were your predictions correct? Explain.

H₂: -252.9°C

H₂O: 100°C

Br₂: 59 °C

F₂: -188 °C

HBr: -66 °C

HF: 19.5 °C

My predictions were correct because H₂, Br₂, and F₂ are nonpolar, so they have low boiling points, and F₂ should be lower than Br₂ because of its smaller mass. Br₂ has a higher boiling point than HF because of its large mass, which makes it more polarizable. H₂O has the highest boiling point because it has the strongest IMF.