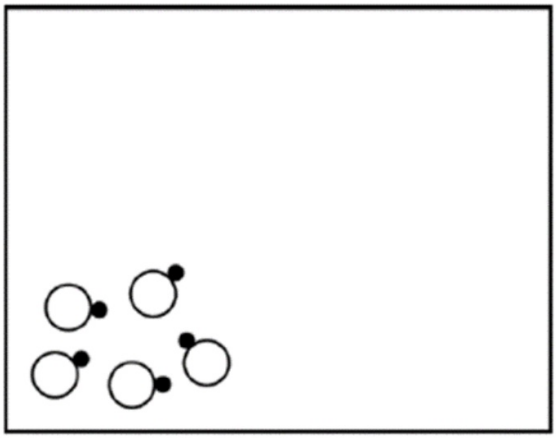
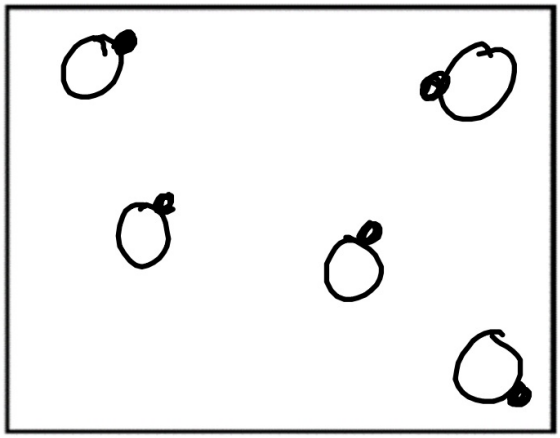
1. A representation of five molecules of HBr in the liquid state is shown in box 1 below. In box 2, draw a representation of the HBr molecules after complete vaporization has occurred.



Box 1



Box 2

Strength of IMF's

How Polar

Strength of LDF's

Molecule	Boiling Point of Compound (K)	Dipole Moment (debyes)	Polarizability (10^{-24} cm^3)
HCl	188	1.05	2.63
HBr	207	0.80	3.61
HI	238	0.38	5.44

Most Polar

Strongest IMF

Strongest LDF's

2. The boiling points, dipole moments, and polarizabilities of three hydrogen halides are given in the table above.

(a) What can be inferred from the boiling point data?
(b) What can be inferred from the dipole moment data?
(c) What can be inferred from the polarizability data?

Molecule	Boiling Point of Compound (K)	Dipole Moment (debyes)	Polarizability (10^{-24} cm^3)
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2. The boiling points, dipole moments, and polarizabilities of three hydrogen halides are given in the table above.

(d) Based on the data in the table, what type of intermolecular force among the molecules HCl(l), HBr(l), and HI(l) is able to account for the trend in boiling point? Justify your answer.

LDF's. HI has the highest boiling pt + highest polarizability.

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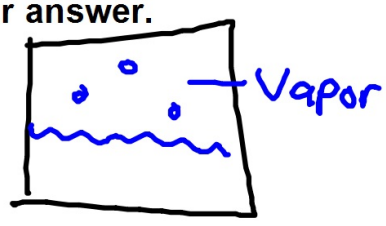
2. The boiling points, dipole moments, and polarizabilities of three hydrogen halides are given in the table above.

Same moles

(e) Equimolar amounts of HCl(l), HBr(l), and HI(l) are placed into separate, previously evacuated identical 5 L containers at 100 K. Which liquid would have the greatest vapor pressure 100 K? Justify your answer.



HCl b/c HCl has the lowest boiling pt. indicating the most evaporation.

HF 170 K ✗ 293 K ✓

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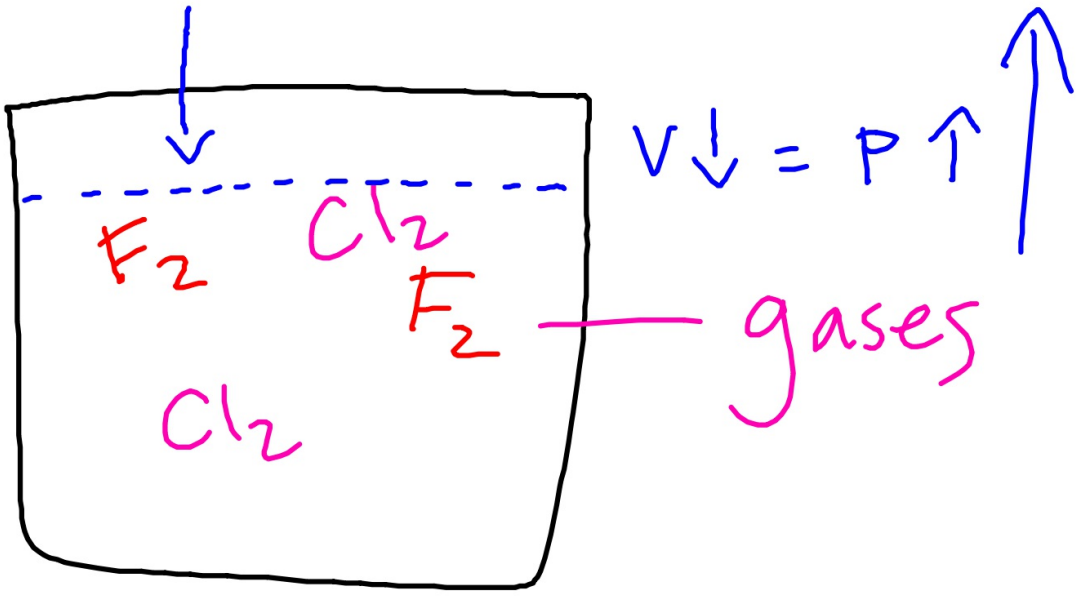
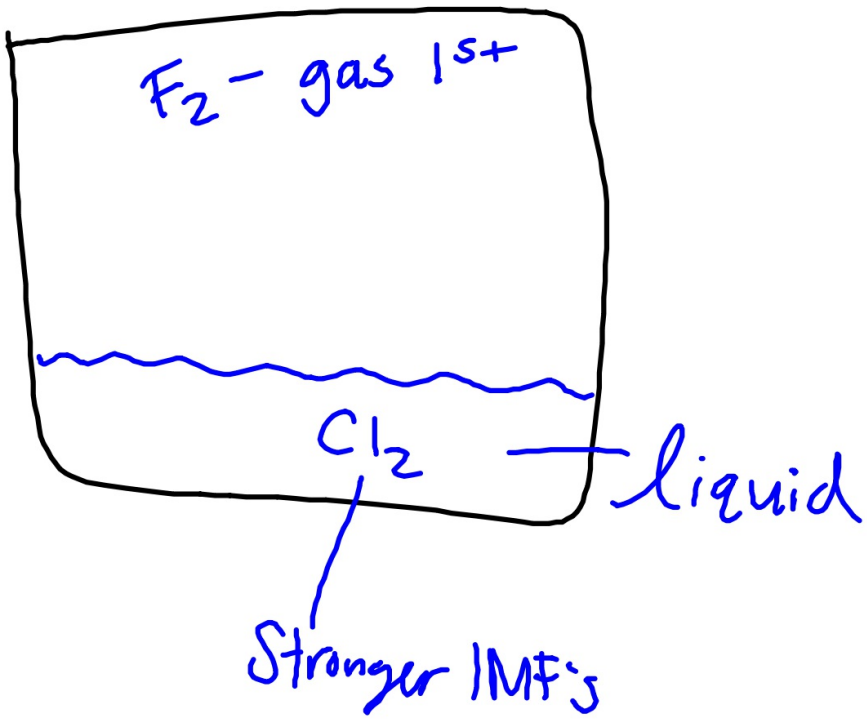
2. The boiling points, dipole moments, and polarizabilities of three hydrogen halides are given in the table above.

(f) Based on the data in the table, a student predicts the boiling point of HF should be 170 K. The accepted boiling point of HF is 293 K. Explain why the student's prediction is wrong in terms of types and strength of intermolecular forces among HF molecules.

H-bonding occurs in HF.
H-bonding is stronger than LDF's, thus higher b.p.



Cl2 condenses 1st


F_2 - gas 1st
Cl_2
liquid
Stronger IMF's