

1. A 2 mol sample of $\text{CO}_2(\text{g})$ and a 2 mol sample of $\text{SO}_2(\text{g})$ are placed separately in two 8 L rigid containers at 25°C .

Question	Circle Correct Answer		Explanation
Greatest Pressure?	$\text{CO}_2(\text{g})$	$\text{SO}_2(\text{g})$	Same for both gases $PV = nRT$ Same $V, n, \& T$ $\therefore P$ is same
Greatest average kinetic energy?	$\text{CO}_2(\text{g})$	$\text{SO}_2(\text{g})$	Same for both gases Same T T is ave. KE
Greatest particle speed?	$\text{CO}_2(\text{g})$	$\text{SO}_2(\text{g})$	Same for both gases $MM_{\text{CO}_2} = 44 \text{ g/mol}$ Lighter gas $MM_{\text{SO}_2} = 64 \text{ g/mol} = \text{faster}$ Speed
Greatest density?	$\text{CO}_2(\text{g})$	$\text{SO}_2(\text{g})$	Same for both gases $MM = \frac{dRT}{P}$ ($MM)(P) = dRT$ $d = \frac{(MM)(P)}{RT}$
Fastest to effuse if there was a pinhole opening in each container?	$\text{CO}_2(\text{g})$	$\text{SO}_2(\text{g})$	Same for both gases CO_2 has less mass than SO_2 $\therefore \text{CO}_2$ moves faster

2. CCl_4 is a liquid whereas CI_4 is a solid when both are at 25°C .
a. Which substance has a higher melting point? Justify your answer.

$\text{CCl}_4 = \text{liquid}$

$\text{CI}_4 = \text{solid}$

CI_4 has the higher melting pt.

CI_4 is a solid, thus it has

Stronger attractions between its molecules than CCl_4 . (IMF's)

\therefore more E needed to melt & break IMF's of CI_4 .

2. CCl_4 is a liquid whereas Cl_4 is a solid when both are at 25°C .

b. Students were asked to explain the difference in state of matter of the two substances at 25°C . Their responses are below. Which student is correct?

~~Student A's response:~~ More energy is needed to break the bond in Cl_4 than in CCl_4 because the Cl-Cl bond is stronger than the C-Cl bond.

~~Student B's response:~~ More energy is needed to break the attraction between Cl_4 molecules than those between CCl_4 molecules. The dipole moment of the CCl_4 molecule is larger than that of the Cl_4 molecule because Cl is more electronegative than I.

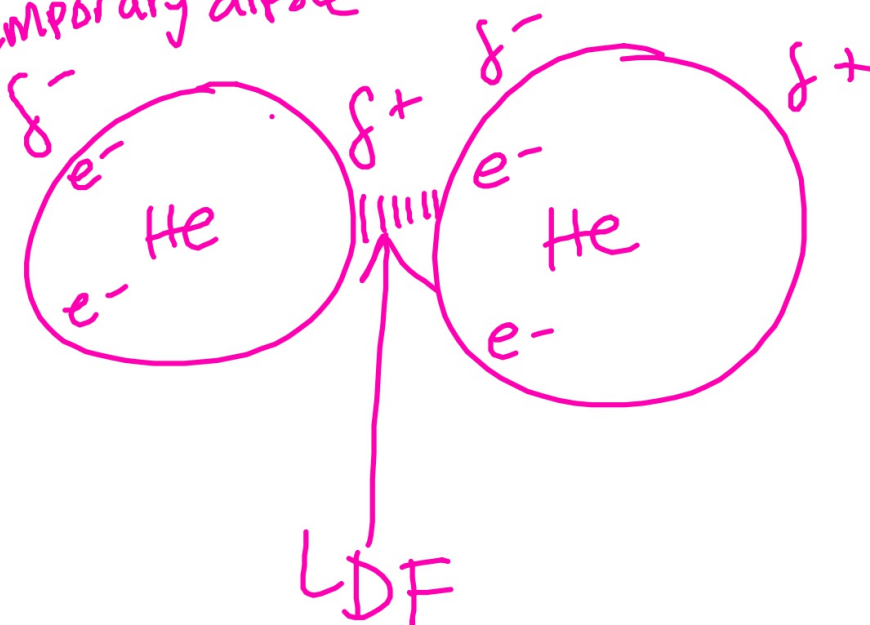
Nonpolar
= zero
net dipole mom.

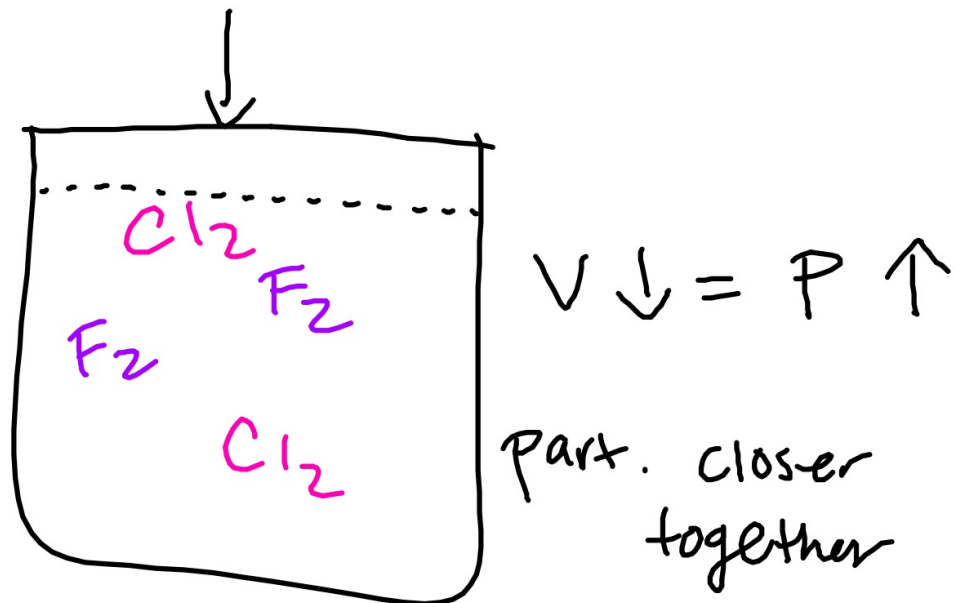
~~Student C's response:~~ More energy is needed to break the attraction between Cl_4 molecules than those between CCl_4 molecules. The London dispersion forces are stronger in CCl_4 than in Cl_4 because Cl is more electronegative than I.

Student D's response. More energy is needed to break the attraction between Cl_4 molecules than those between CCl_4 molecules. The London dispersion forces are stronger in Cl_4 than in CCl_4 because Cl_4 has a more polarizable electron cloud than CCl_4 .

Ability to create
temporary dipoles

temporary dipole





Cl₂ condenses 1st b/c
Cl₂ has stronger IMF's than F₂

