

Name: \_\_\_\_\_

date: \_\_\_\_\_ period: \_\_\_\_\_

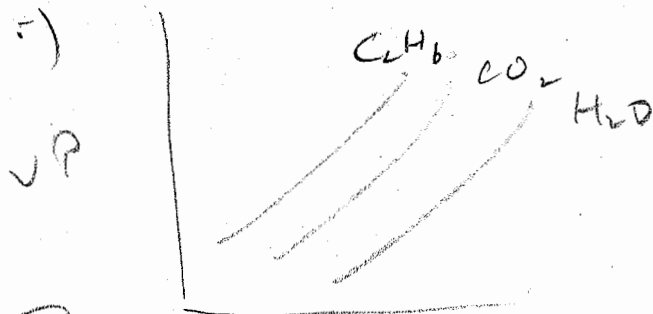
Ch. 7 IMF

test

55 points (5 ec)

ngss chemistry

1. Sketch a vapor pressure versus temperature graph with three curves on a single graph. Label the axis of the graph and the curves, which corresponds to: carbon dioxide, water, ethane (or dicarbon hexahydride). Basis / rationale of identifying which curve corresponds to which chemical? (15 points)



CO <sub>2</sub>	44
H <sub>2</sub> O	
C <sub>2</sub> H <sub>6</sub>	30

5 pts @

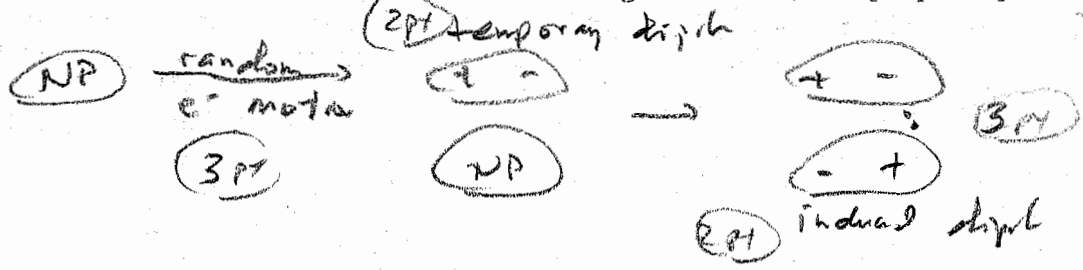
ii) O →  $\Sigma \neq 0$  → polar → H-bond IMF → strong IMF  
 ↓  
 difficult to separate liquid molecules

lowest VP: ↓ VP ← ↓ gas ← ↓ evaporate

iii) both CO<sub>2</sub> & C<sub>2</sub>H<sub>6</sub>  $\Sigma = 0$  → nonpolar → London IMF  
 # e<sup>-</sup> CO<sub>2</sub> > C<sub>2</sub>H<sub>6</sub>, so

C<sub>2</sub>H<sub>6</sub>: ↓ IMF → easy to separate liquid → ↑ evaporate → ↑ gas → ↑ VP

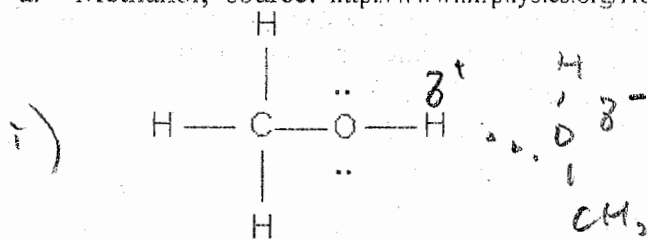
2. Describe the basis of the London IMF in the nitrogen molecule, N<sub>2</sub>. [10 points]



3. Identify the type of IMF in \_\_\_; Sketch two molecule to show which part of the molecules attract each other: basis / rationale ? [10 points]

a. Methanol; source: <http://www.mrphysics.org/HotPotatoes/LewisDotDiagrams/LewisStructuresRev3.htm>

2 p



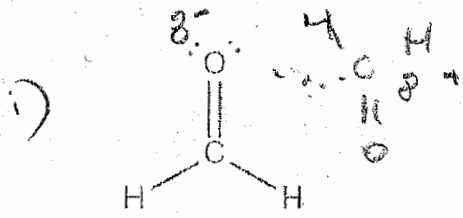
3

ii)  $\Sigma \neq 0 \rightarrow$  polar  $\neq$   $\exists$  OH  $\rightarrow$  H-bond IMF

end base

b. Formaldehyde; source: <https://techiescientist.com/h2co-lewis-structure/>

2 p



3

ii)  $\Sigma \neq 0 \rightarrow$  polar  $\rightarrow$  dipole dipole IMF

end

4. Based on chemical principles learned in the class, which chemical, carbon dioxide versus carbon monoxide, has the ... basis / rationale /? [10 points]

a. smaller vapor pressure?

CO:  $\uparrow$  IMF  $\rightarrow$  harder to separate liquid  $\rightarrow$   $\downarrow$  evaporation  $\rightarrow$   $\downarrow$  gas  $\rightarrow$   $\downarrow$  VP

nonpolar

$\downarrow$   
London

$\downarrow$   
weaker IMF

polar

$\downarrow$   
dipole-dipole

$\downarrow$   
stronger IMF

2 + 2 pt

b. higher boiling point?

CO:  $\uparrow$  IMF  $\rightarrow$  harder to slip apart liquid molecule  $\rightarrow$  harder to boil  $\rightarrow$   $\uparrow$  BP

5. What is an intermolecular force? [5 points]

attractive force between molecule

2 + 3 pt

6. What is the basis / rationale of separating the red versus blue food dyes in the chromatography lab? [10 points] hint: explicitly refer to the mobile versus stationary phase.

difference in IMF strength between dye molecule & molecules in stationary phase

5 pts

- sticky dye / strong IMF comes out last  
or less " " " 1st