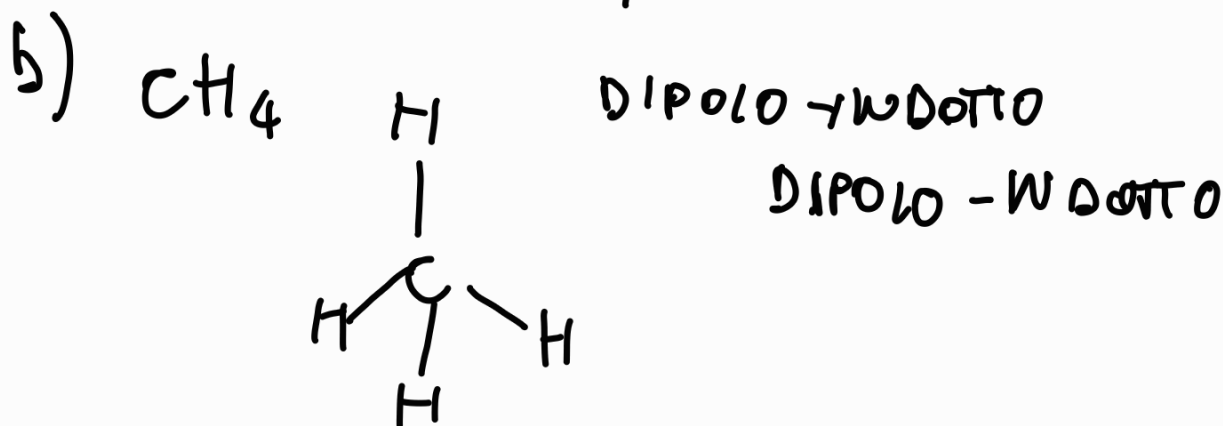
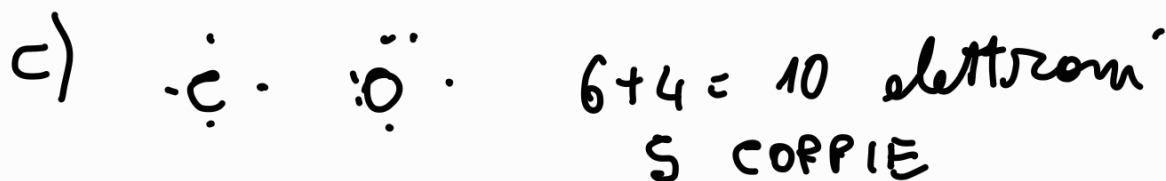


① a) Ne INTERAZIONI DIPOLO - INDOTTO
DIPOLO - INDOTTO

$$PM = 20.18 \text{ g/mol}$$

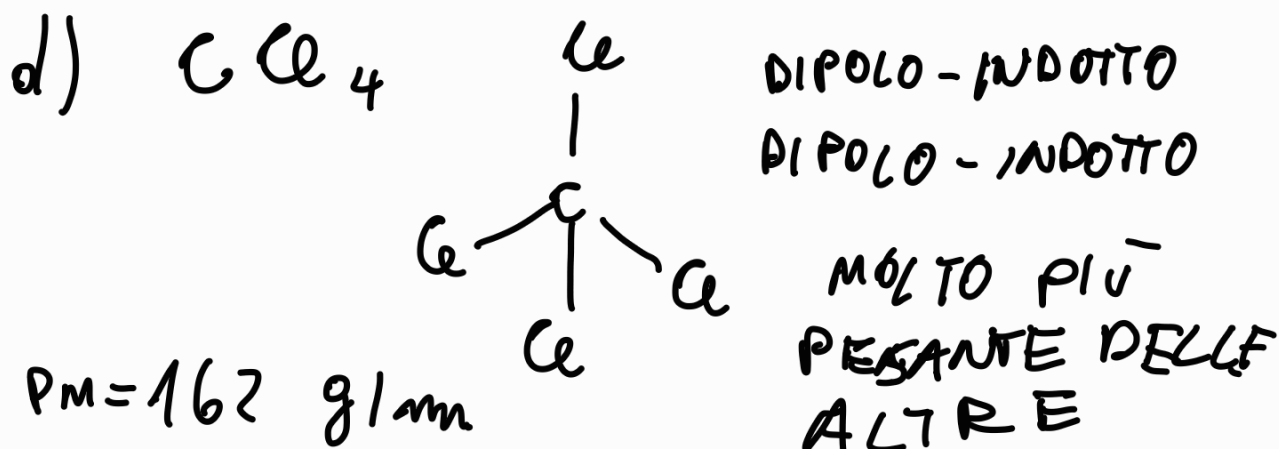


$$PM = 16.0 \text{ g/mol}$$



DIPOLO - DIPOLO

$$PM = 28 \text{ g/mol}$$



$$PM = 162 \text{ g/mol}$$

CCl_4 UNICO LIQUIDO A T AMBIENTE

$$T_{\text{EB.}}(\text{CH}_4) = -161.6^\circ\text{C}$$

$$T_{\text{EB.}}(\text{CO}) = -191.4^\circ\text{C}$$

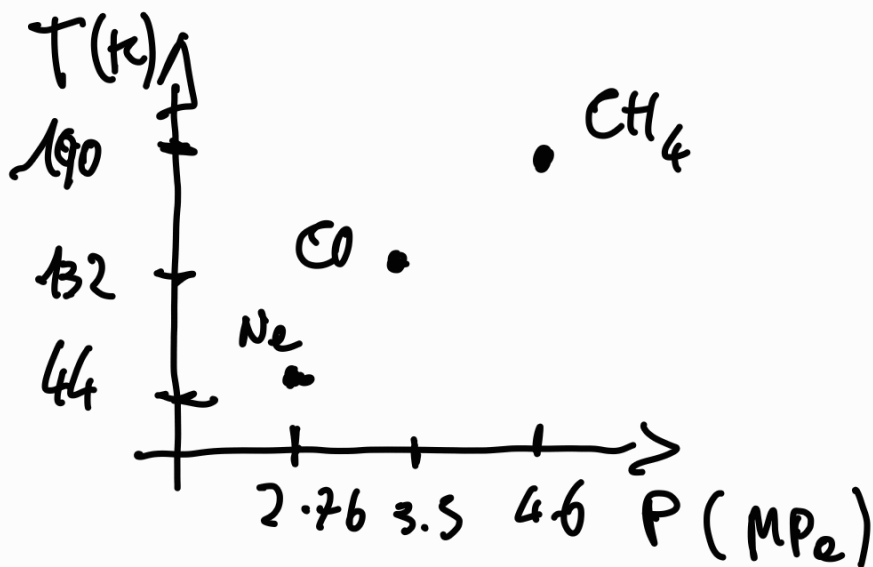
$$T_{\text{EB.}}(\text{Ne}) = -246^\circ\text{C}$$

PUNTI CRITICI

CH_4 190.6 K 4.6 MPa

CO 132.9 K 3.5 MPa

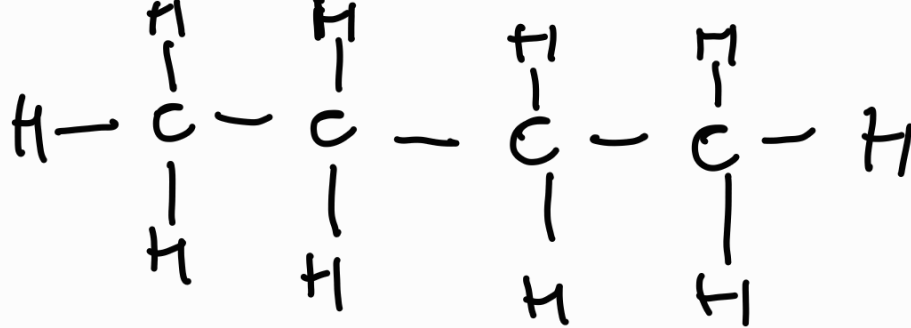
Ne 44.4 K 2.76 MPa



$\text{Ne} < \text{CO} < \text{CH}_4 < \text{CCl}_4$
~~~~~  
DIFFICILE

②

a) BUTANO  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$



SOLO DIPOLO - INDOTTO MA ALTO  
PESO MOLECOLARE

$$P_M = 58 \text{ g/mol}$$

$$T_{EB} = 0^\circ \text{C} \text{ CIRCA}$$

b)



$$P_M = 32 \text{ g/mol}$$

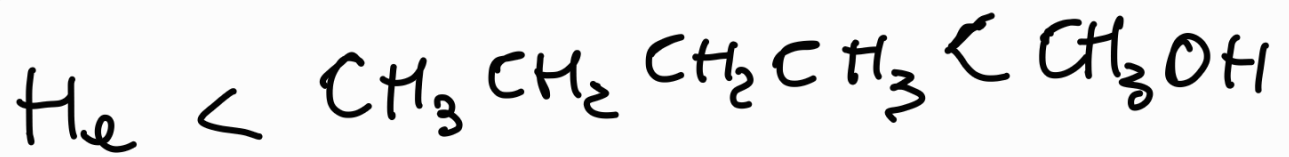
$$T_{EB} = 65^\circ \text{C} \text{ CIRCA}$$

c)  $\text{He}$  DIPOLO - INDOTTO

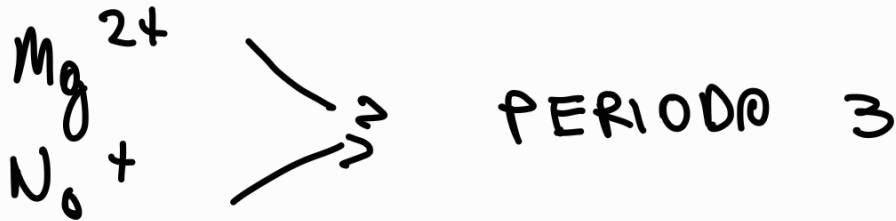
ATOMO LEGGERO SO  $2e^-$

$$T_{ED} = -269^\circ \text{C}$$

QUINDI

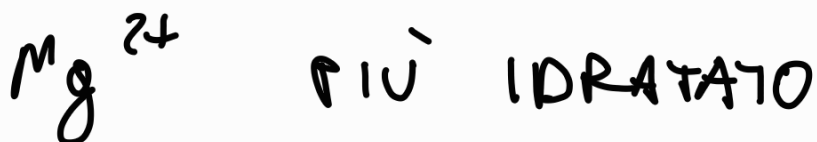


③

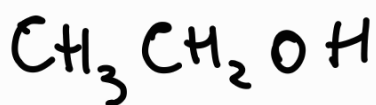


QUINDI RAGGIO  $\text{Cs}^+ >$  RAGGIO  
DI  $\text{Mg}^{2+}$  e  $\text{Ne}^+$

INVECE RAGGIO  $\text{Mg}^{2+} <$  RAGGIO  $\text{Ne}^+$   
NON SOLO  $\text{Mg}^{2+}$  HA MENO ELETTRONI MA  
E' ANCHE GRUPPO 2



④



$$V = 125 \text{ mL}$$

$$d = 0.7849 \text{ g/mL}$$

$$\Delta H_{\text{vap}} = 47.32 \text{ kJ/mol}$$

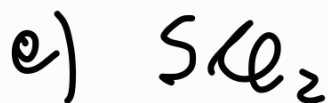
$$\begin{aligned}\text{MASSA} = m &= d \cdot V = 125 \cdot 0.7849 \\ &= 98.14 \text{ g}\end{aligned}$$

$$\text{PM} = 46 \text{ g/mol}$$

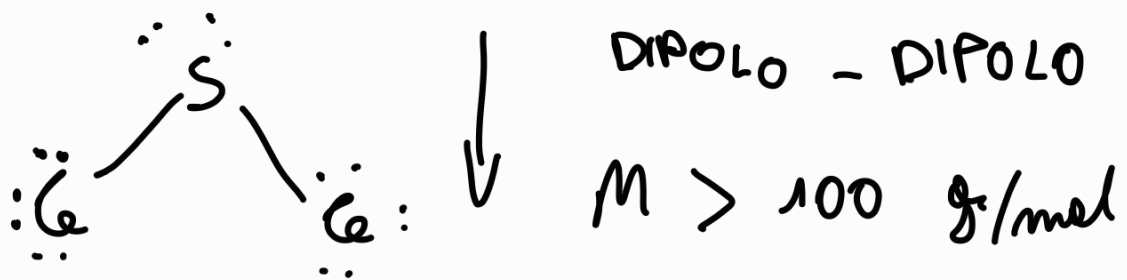
$$n = \frac{m}{\text{PM}} = 2.13 \text{ mol}$$

$$\begin{aligned}\text{CALORE} = q &= n \cdot \Delta H_{\text{vap}} = \\ &= 2.13 \cdot 47.32 = \underline{101.1 \text{ kJ}}\end{aligned}$$

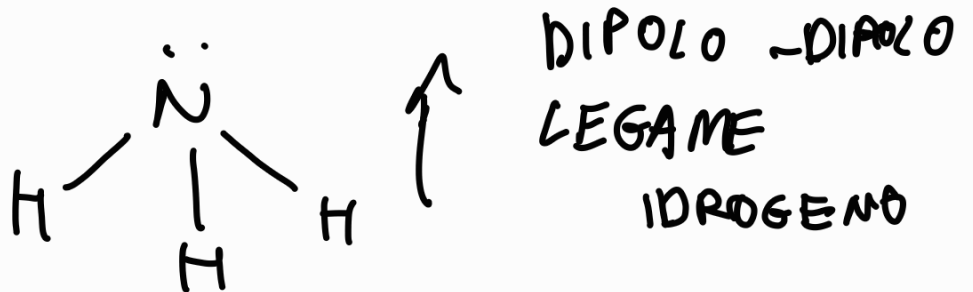
⑤



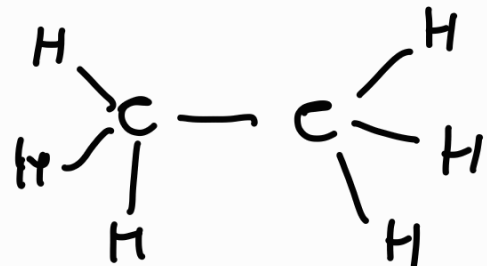
$$7 \cdot 2 + 6 = 20 \quad \textcircled{10} \text{ COPPIE}$$



b)  $\text{NH}_3$



c)  $\text{C}_2\text{H}_6$  ETANO



SOLO DISPERSIONE

d)  $\text{N}_2$  DISPERSIONE DEBOLE

$\text{N}_2 < \text{C}_2\text{H}_6 < \text{NH}_3 < \text{SOCl}_2$   
 $-246^\circ\text{C} \quad -88^\circ\text{C} \quad -33^\circ\text{C} \quad 59^\circ\text{C}$

---

⑥

$\text{C}_8\text{H}_{18}$

$$\ln p = \left( -\frac{\Delta H_v^\circ}{RT} \right) + c$$

EQUAZIONE RETTA  $\rightarrow 1/T$

$$y = a x + b$$

$\rightarrow \ln p \rightarrow -\Delta H_v^\circ / R$

RETTA PASSA PER DUE PUNTI

$$T_1 = 25^\circ \text{C} = 298 \text{ K}$$

$$P_1 = 13.6 \text{ mmHg}$$

$$T_2 = 50^\circ \text{C} = 323 \text{ K}$$

$$P_2 = 45.3 \text{ mmHg}$$

$$x_1 = 1/T_1 \quad \ln P_1 = y_1$$

$$x_2 = 1/T_2 \quad \ln P_2 = y_2$$

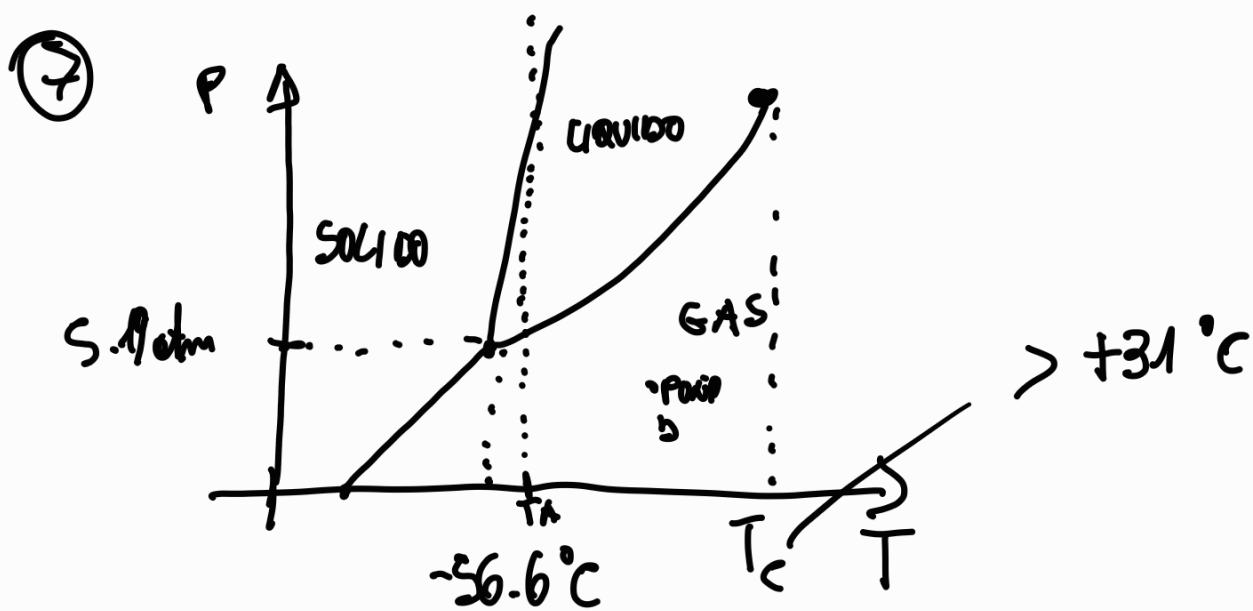
SISTEMA

$$\begin{cases} y_1 = ax_1 + b \\ y_2 = ax_2 + b \end{cases} \rightarrow y_1 - y_2 = a(x_1 - x_2)$$

$$a = \frac{y_1 - y_2}{x_1 - x_2} = \frac{2.610 - 3.88}{0.003356 - 0.003096}$$

$$= -4626.92$$

$$\Delta H_v^\circ = R \cdot 4626.92 = 38.5 \text{ kJ/mol}$$



- a) A  $T$  COSTANTE  $= T_A$  SE AUMENTO  
LA PRESSIONE PASSO DA GAS A  
LIQUIDO A SOLIDO QUINDI DENSITA'  
SOLIDO  $>$  DENSITA' LIQUIDO  
PENDENZA CURVA LIQUIDO - SOLIDO  
E' POSITIVA

b) GAS

- c)  $45^\circ\text{C} > T_{\text{CRITICA}}$  PUO' SOLO  
DIVENTARE UN FLUIDO SUPERCRITICO

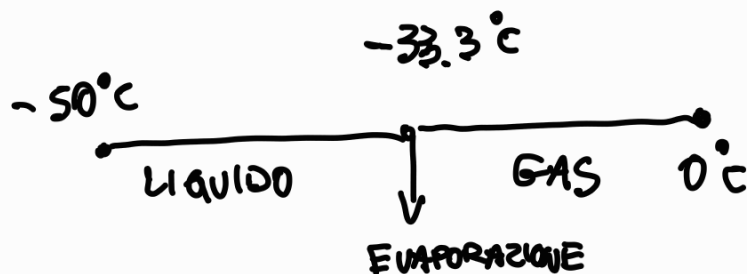


⑦  $C_l = 4.7 \text{ J/g}^\circ\text{K}$  CALORE SPECIFICO LIQUIDO

$C_g = 2.2 \text{ J/g}^\circ\text{K}$  CALORE SPECIFICO GAS

$\Delta H_v = 23.33 \text{ kJ/mol}$

$12 \text{ kg NH}_3$



$\Delta T_{\text{LIQUIDO}} = 50 - 33.33 = 16.7^\circ\text{K}$

$Q_1 = \text{CALORE PER RISCALDARE LIQUIDO} = 16.7 \cdot C_l \cdot \text{MASSA}(\text{NH}_3)$   
 $= 16.7 \cdot 4.7 \cdot 12 \cdot 10^3$   
 $= 941880 \text{ J} = 941.88 \text{ kJ}$

EVAPORAZIONE ASSORBE CALORE A T COST.

$Q_2 = \Delta H_v \cdot m_{\text{NH}_3} = 23.33 \cdot \frac{12 \cdot 10^3}{17.04} \rightarrow \text{PM}(\text{NH}_3)$   
 $= 16430 \text{ kJ}$

RISCALDO IL GAS

$\Delta T_{\text{GAS}} = 33.3 - 0 = 33.3^\circ\text{K}$

$Q_3 = 33.3 \cdot C_v \cdot \text{MASSA}(\text{NH}_3) = 33.3 \cdot 2.2 \cdot 12 \cdot 10^3$

$$= 879.12 \text{ kJ}$$

$$Q_{\text{Tot}} = Q_1 + Q_2 + Q_3 = 1.8 \cdot 10^4 \text{ kJ}$$