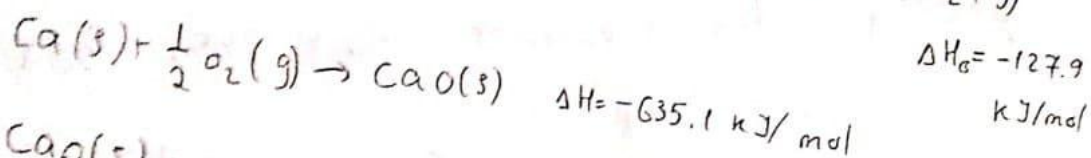
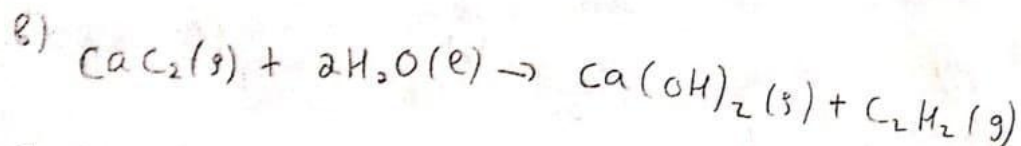


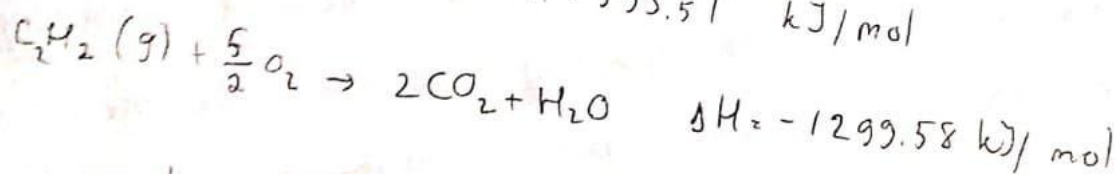
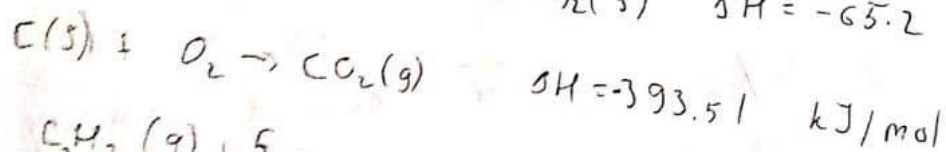
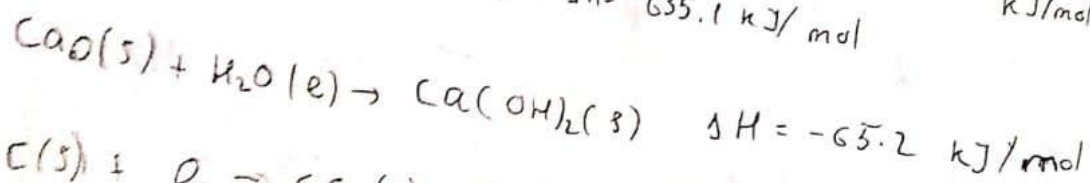
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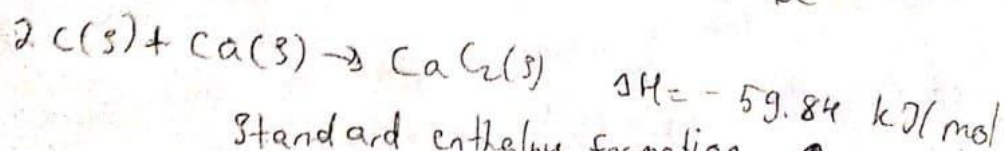
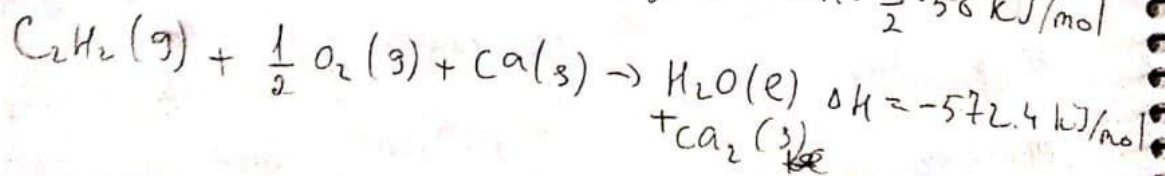
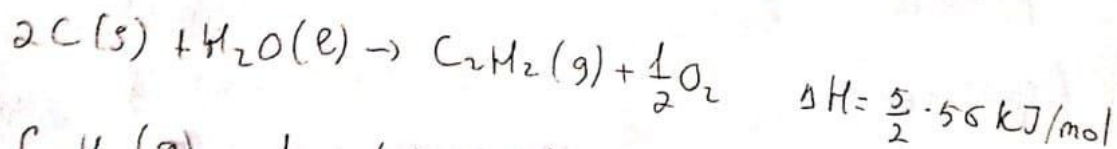
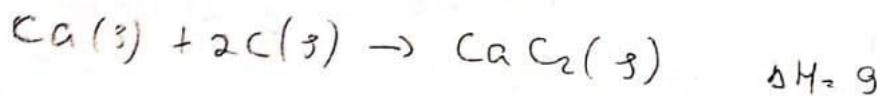
Question 3



$$\Delta H_f = -127.9 \text{ kJ/mol}$$



Final formation



Standard enthalpy formation \uparrow
Final answer

Question 3

a) Although an element's entropy is larger than zero at any temperature, ΔH at a temperature other than 298 K includes the enthalpy change associated with transporting the elements there from 298 K.

Question 2

a) Generally $(\partial H / \partial p)_T$ measure how the energy change with the spacing between the molecule of gas. So high spacing high value of $(\partial H / \partial p)_T$. And that is possible only when there is no intramolecular force is present between the molecules of gas. However in case of real gas the intramolecular forces is present between the molecules, that's why spacing between the molecule is low. So $(\partial H / \partial p)_T$ value has to be small for real gas.

Question 2

b) $C_p = (\sigma H / \sigma P)_P$ H is an exact differential in P and T .
it obeys cyclic rule

$$(\sigma H / \sigma T)_P * (\sigma T / \sigma P)_H * (\sigma P / \sigma H)_T = -1$$

$$(\sigma H / \sigma T)_P = -1 / (\sigma T / \sigma P)_H * (\sigma P / \sigma H)_T$$

$$C_p = -(\sigma H / \sigma P)_T / (\sigma T / \sigma P)_H \quad (1 / (\sigma P / \sigma H)_T = (\sigma H / \sigma P)_T)$$

Question 1

a) $dg=0$ $g=0$

$w = -ive$ (negative)

$\Delta U = -ive$ (no heat exchange between system and surrounding)

$\Delta H = -ive$

($\because \Delta U = -ive$
 $\therefore \Delta H = -ive$)

$g=0$ and $w < 0$
 ΔH and ΔU are negative

$g=0$ $w = -ive$ $\Delta U = -ive$ $\Delta H = -ive$

Question 1

b) $P_1 V_1 = P_2 V_2$ T is constant

$$W = nRT \ln \frac{P_1}{P_2} \quad n = 1.25 \text{ mole}$$

$$T = 320 \text{ K}$$

$$P_1 = 3.10$$

$$P_2 = 1.00$$

$$R = 8.31 \text{ J K / mol}$$

$$= 1.25 \text{ mole} \times 8.31 \text{ J/mole K} \times 320 \text{ K} \times \ln\left(\frac{3.10}{1.00}\right)$$

$$= \underline{3760.7} \text{ Joule isothermal}$$

$$W = -nRT \left(\left(\frac{P_2}{P_1} \right)^{\frac{\gamma}{\gamma-1}} - 1 \right)$$

$$\gamma = \frac{5}{3} \quad \gamma - 1 = 2/3$$

$$W = -3 \times 1.25 \times 8.3 \times 320 \times \left[\left(\frac{1}{3.1} \right)^{\frac{5/3-1}{5/3}} - 1 \right]$$

$$= .9984 \left[\left(\frac{1}{3.1} \right)^{\frac{2}{5}} - 1 \right] = \underline{-35765}$$

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