c.

| Bond Broken | | Bond Formed | |
|---|---|---|---|
| 4 x C–H | ⇒ 4 x 413 | 2 x C=O | ⇒ 2 x 799 |
| 2 x O=O | ⇒ 2 x 492 | 4 x O–H | ⇒ 4 x 463 |
| | 2642 kj | | 3450 kj |

$\Delta H = \Sigma \text{input} - \Sigma \text{output}$

$= 2642 - 3450$

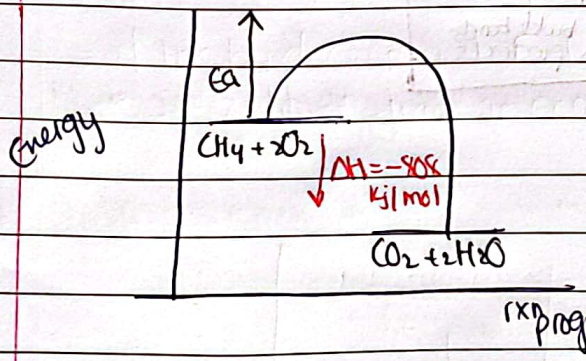
$= -808$ kj/mol

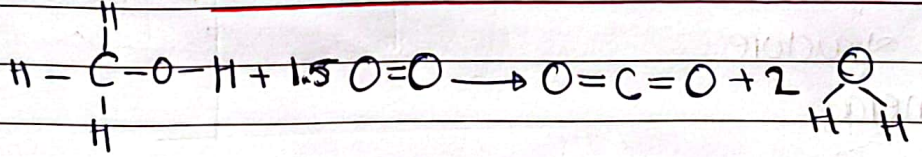
exo

input < output

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O + 808$ kj/mol

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O \quad \Delta H = -808$ kj/mol.



Bond Broken:

| | |
|---|---|
| 3 x C–H | 3 x 413 |
| 1 x C–O | 1 x 358 |
| 1 x O–H | 1 x 463 |
| 1.5 x O–O | 1.5 x 495 |
| | 2802.5 kj |

Bond Build:

| | |
|---|---|
| 2 x C=O | 2 x 799 |
| 4 x O–H | 4 x 463 |
| | 3450 kj |