$$C_7H_6O_2(s) + \frac{15}{2}O_2(g) \rightarrow 7CO_2(g) + 3H_2O(l)$$

Broken		ΔH (kJ/mol)
15	O-O	249
5	C-H	413
4	C-C	348
3	C=C	614
	C=O	799
	C-O	358
	O-H	463

Formed		ΔH (kJ/mol)
14	C=O	799
6	O-H	463

$\Delta H = \Delta H_{broken} - \Delta H_{formed}$

$= 10654 \frac{kJ}{mol} - 13964 \frac{kJ}{mol}$

$= -3310 \frac{kJ}{mol}$

$\Delta U = \Delta H_r^\circ - RT\Delta n$

$= -3226.7 \frac{kJ}{mol} \cdot 1\,mol - 0.008314 \frac{kJ}{mol\,K} \cdot 298.15\,K \cdot -\frac{1}{2}\,mol$

$= -3225.5\,kJ$

$= -3226.7 \frac{kJ}{mol} - 0.008314 \frac{kJ}{mol\,K} \cdot 298.15\,K \cdot -\frac{1}{2}$

$= -3225.5 \frac{kJ}{mol}$

$\Delta U = q_{sys,v}$ = mass of sample (g) · molar mass of sample $\left(\frac{mol}{g}\right)$ · $\frac{\Delta U^\circ}{mol}$ sample $\left(\frac{kJ}{mol}\right)$

Benzoic Acid: $1.000 \pm 0.0005\,g \cdot (122.12 \frac{g}{mol})^{-1} \cdot -3225.5 \frac{kJ}{mol}$