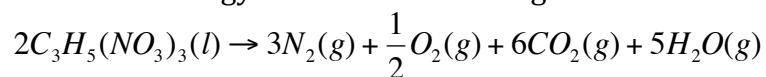


## Standard Enthalpies of Formation

$$\Delta H_{rxn}^{\circ} = \sum_{\text{products}} \Delta H_f^{\circ} - \sum_{\text{reactants}} \Delta H_f^{\circ}$$

What is the  $\Delta H_{rxn}$  for the detonation of nitroglycerin?

How much energy is released when 10g is detonated?



## Bond Enthalpies

$$\Delta H_{rxn} = \sum \text{broken} - \sum \text{formed}$$

### AVERAGE BOND ENTHALPIES (kJ/mol) AT 25 °C

#### Single Bonds

	H	C	N	O	F	Si	P	S	Cl	Br	I
H	436	413	391	463	565	318	322	347	432	366	299
C	413	346	305	358	485	---	---	272	339	285	213
N	391	305	163	201	283	---	---	---	192	243	---
O	463	358	201	146	184	452	335	---	218	201	201
F	565	485	283	184	155	565	490	284	253	249	278
Si	318	---	---	452	565	222	---	293	381	310	234
P	322	---	---	335	490	---	201	---	326	---	184
S	347	272	---	---	284	293	---	226	255	213	---
Cl	432	339	192	218	253	381	326	255	242	216	208
Br	366	285	243	201	249	310	---	213	216	193	175
I	299	213	---	201	278	234	184	---	208	175	151

#### Multiple Bonds

Double Bonds (kJ/mol)		Triple Bonds (kJ/mol)	
C=C	602	C≡C	835
O=O	498		
C=O	732	C≡O	1072
N=O	607		
N=N	418	N≡N	945
C=N	615	C≡N	887