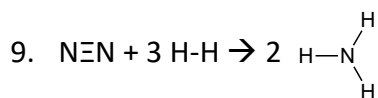
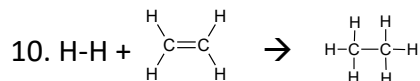


Bond Energy Worksheet Answers

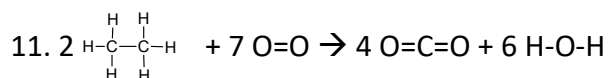
- $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [\text{H-H} + \text{Cl-Cl}] - [2(\text{H-Cl})]$
 $= [436 \text{ kJ/mol} + 242 \text{ kJ/mol}] - [2(431)]$
 $= -184 \text{ kJ/mol}$
- $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [4 \text{ H-C} + \text{C=C} + \text{F-F}] - [\text{C-C} + 4 \text{ C-H} + 2 \text{ C-F}]$
 $= [4(413) + 614 + 155] - [348 + 4(413) + 2(485)]$
 $= 2421 - 2970 \text{ kJ/mol}$
 $= -549 \text{ kJ/mol}$
- $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [6 \text{ H-C} + 2 \text{ C-O} + 2 \text{ O-H}] - [6 \text{ H-C} + 2 \text{ C-O} + 2 \text{ O-H}]$
 $= [6(413) + 2(358) + 2(463)] - [6(413) + 2(358) + 2(463)]$
 $= 4120 - 4120 \text{ kJ/mol}$
 $= 0 \text{ kJ/mol}$
- $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [\text{H-C} + 3 \text{ C-Cl}] - [2 \text{ C-Cl} + \text{C=O} + \text{H-Cl}]$
 $= [413 + 3(328)] - [2(328) + 799 + 431]$
 $= 1397 - 1886 \text{ kJ/mol}$
 $= -489 \text{ kJ/mol}$
- $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [4 \text{ H-C} + 2 \text{ O=O}] - [2 \text{ C=O} + 4 \text{ H-O}]$
 $= [4(413) + 2(495)] - [2(799) + 4(463)]$
 $= 2642 - 3450 \text{ kJ/mol}$
 $= -808 \text{ kJ/mol}$
- $\text{H-H} + \text{O=C=O} \rightarrow \text{H-O-H} + \text{C}\equiv\text{O}$
 $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [\text{H-H} + 2 \text{ C=O}] - [2 \text{ H-O} + \text{C}\equiv\text{O}]$
 $= [436 + 2(799)] - [2(463) + 1072]$
 $= -2034 - 1998 \text{ kJ/mol}$
 $= 36 \text{ kJ/mol}$
- $2 \text{ H-O-O-H} \rightarrow 2 \text{ H-O-H} + \text{O=O}$
 $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [4 \text{ H-O} + 2 \text{ O-O}] - [4 \text{ H-O} + \text{O=O}]$
 $= [4(463) + 2(146)] - [4(463) + 495]$
 $= 2144 - 2347 \text{ kJ/mol}$
 $= -203 \text{ kJ/mol}$
- $\text{C}\equiv\text{O} + 2 \text{ H-H} \rightarrow \begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{O}-\text{H} \\ | \\ \text{H} \end{array}$
 $\Delta H = \text{Bonds Broken} - \text{Bonds Formed}$
 $= [\text{C}\equiv\text{O} + 2 \text{ H-H}] - [3 \text{ H-C} + \text{C-O} + \text{O-H}]$
 $= [1072 + 2(436)] - [3(413) + 358 + 463]$
 $= 1944 - 2060 \text{ kJ/mol}$
 $= -116 \text{ kJ/mol}$



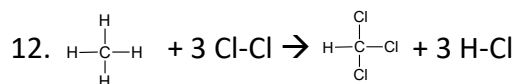
$$\begin{aligned} \Delta H &= \text{Bonds Broken} - \text{Bonds Formed} \\ &= [\text{N}\equiv\text{N} + 3 \text{H}-\text{H}] - [6 \text{N}-\text{H}] \\ &= [941 + 3(436)] - [6(391)] \\ &= 2249 - 2346 \text{ kJ/mol} \\ &= -97 \text{ kJ/mol} \end{aligned}$$



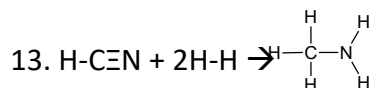
$$\begin{aligned} \Delta H &= \text{Bonds Broken} - \text{Bonds Formed} \\ &= [\text{H}-\text{H} + 4 \text{H}-\text{C} + \text{C}=\text{C}] - [6 \text{C}-\text{H} + \text{C}-\text{C}] \\ &= [436 + 4(413) + 614] - [6(413) + 348] \\ &= 2702 - 2826 \text{ kJ/mol} \\ &= -124 \text{ kJ/mol} \end{aligned}$$



$$\begin{aligned} \Delta H &= \text{Bonds Broken} - \text{Bonds Formed} \\ &= 2[\text{C}-\text{C} + 6 \text{H}-\text{C}] + [7 \text{O}=\text{O}] - [8 \text{C}=\text{O} + 12 \text{O}-\text{H}] \\ &= 2[348 + 6(413)] + [7(495)] - [8(799) + 12(463)] \\ &= 9117 - 11,948 \text{ kJ/mol} \\ &= -2831 \text{ kJ/mol} \end{aligned}$$



$$\begin{aligned} \Delta H &= \text{Bonds Broken} - \text{Bonds Formed} \\ &= [4 \text{H}-\text{C} + 3 \text{Cl}-\text{Cl}] - [\text{C}-\text{H} + 3 \text{C}-\text{Cl} + 3 \text{H}-\text{Cl}] \\ &= [4(413) + 3(242)] - [413 + 3(328) + 3(431)] \\ &= 2378 - 2690 \text{ kJ/mol} \\ &= -312 \text{ kJ/mol} \end{aligned}$$



$$\begin{aligned} \Delta H &= \text{Bonds Broken} - \text{Bonds Formed} \\ &= [\text{H}-\text{C} + \text{C}\equiv\text{N} + 2\text{H}-\text{H}] - [3 \text{C}-\text{H} + \text{C}-\text{N} + 2 \text{H}-\text{N}] \\ &= [413 + 891 + 2(436)] - [3(413) + 293 + 2(391)] \\ &= 2176 - 2314 \text{ kJ/mol} \\ &= -138 \text{ kJ/mol} \end{aligned}$$