Dougherty Valley HS Chemistry - AP Thermochemistry – Bond Energy Practice 2

Name:

Period:

Seat#:

Worksheet #10

Directions: Show all work in a way that would earn you credit on the AP Test! This is always the rule! Some answers are provided at the end in italics and underlined. If you need more space, use binder paper and staple to your worksheet.

Average Bond Enthalpies (kJ/mol)										
Single Bonds										
С—Н	413	N—H	391		О—Н	463	F-F	155		
с—с	348	N—N	163		0-0	146				
C—N	293	N-O	201		O-F	190	Cl—F	253		
с—о	358	N—F	272		O-Cl	203	CI-CI	242		
C-F	485	N—Cl	200		O—I	234				
C-Cl	328	N—Br	243				Br—F	237		
C—Br	276				S-H	339	Br—Cl	218		
C—I	240	н—н	436		S-F	327	Br—Br	193		
c—s	259	H—F	567		S-Cl	253				
		H—Cl	431		S—Br	218	I—Cl	208		
Si—H	323	H—Br	366		s—s	266	I—Br	175		
Si—Si	226	H—I	299				I—I	151		
Si—C	301									
Si—O	368									
Multipl	e Bonds									
C=C	614	N=N	418		O2	495				
C≡C	839	N≡N	941		-					
C=N	615				S=O	523				
C≡N	891				s=s	418				
C=0	799									
C≡0	1072									

1) Considering bonds broken and formed ONLY, what is the enthalpy change for the following reaction: $C_{40}H_{82} \rightarrow C_{16}H_{34} + 2C_{12}H_{24}$

2) The rxn $BBr_3(g) + BCl_3(g) \rightarrow BBr_2Cl(g) + BCl_2Br(g)$ has a ΔH very close to zero. Explain why ΔH is so small.

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3)	Determine the enthalpy of reaction for the following using bond energies. $H_2(\alpha) \rightarrow H_2(\alpha) \rightarrow H_2(\alpha)$
	12(9) + 72 + 02(9) + 112 + 0(9) = 240 + 000
4)	Ammonia reacts with oxygen to form nitrogen dioxide and steam, as follows. Use data for bond energies to
	determine the bond energy of the N–O bond of NO ₂ (NH (a) $+$ 70 (a) \rightarrow (NO (a) $+$ 6H O(a)
	$4Nn_3(g) + 7O_2(g) - 4NO_2(g) + 6n_2O(g)$
5)	Determine the enthalpy of the following reaction using bond energies: $CH_{2}CH_{-}CH_{2} + 4.50-0 \rightarrow 30=C=0 + 3H_{-}O_{-}H_{-}$
6)	Determine the enthalpy for the following reaction: $C(s) + CO_2(a) \rightarrow 2CO(a)$
•,	The enthalpy of sublimation of
	graphile, C(s) is 719 kombi

7)	Calculate the bond dissociation energy for one mole of O−F bonds, given the following data. central atom of OF ₂) F ₂ (g) + ¹ / ₂ O ₂ (g) → OF ₂ (g) ΔH = 28 kJ	(Hint: oxygen is the
8)	Using bond enthalpy (in kJ mol ⁻¹) values, determine the heat of formation of methane:	Sublimation energy of C (s, gr) = 719 kJ/mol
9)	An unknown gas, X_2 , which behaves much like nitrogen gas (N=N), is analyzed and the follo formation are obtained. The X-H bond energy is known to be 383 kJ/mol. Use this information single-bond energy in the X_2H_4 molecule.	wing enthalpies of on to estimate the X-X X(g) = 412 kJ/mol H(g) = 217 kJ/mol X ₂ H ₄ (g) = 3 kJ/mol
10)	Calculate enthalpy of this reaction using bond energies and and the following enthalpy of for $C(s) + 2H_2(g) \rightarrow CH_4(g)$	mation C(g) = +715 kJ/mol: