Chapter 6 - Lecture Worksheet 3

1. Using standard heats of formation, calculate the standard enthalpy change for the following reaction.

$CO_2(g) + 4H_2(g)$ -----> $CH_4(g) + 2H_2O(g)$

(1) -711 kJ (2) -165 kJ (3) -15 kJ (4) 15 kJ (5) 165 kJ (6) 229 kJ (7) 711 kJ

2. Using average bond enthalpies estimate the standard enthalpy change for the same reaction.

$CO_2(g) + 4H_2(g)$ -----> $CH_4(g) + 2H_2O(g)$

Which is more accurate ? Why ?

	Standard Enthalpy of formation (kJ/mol)
$CH_4(g)$	–75
$CO_2(g)$	–394
$C_2H_2(g)$	+227
$H_2O(g)$	–242
$H_2O(l)$	–286
$NH_3(g)$	–46
HCl(g)	–92
HCl(aq)	-167
$CaCO_3(s)$	-1208
$Ca(OH)_2(aq)$	-1003
$Ca(OH)_2(s)$	-986
CaO(s)	-635
$SO_2(g)$	-297
$SO_3(g)$	-396

	Average Bond Enthalpies (kJ/mol)
H–H	436
N–H	391
N–N	161
N=N	418
N≡N	945
O-H	463
C-O	351
C=O	728
C≡O	1072
Cl-Cl	242
Cl-H	432
Br-Br	193
Br-H	366
C-H	413