

Name: KEY Date: _____

A Matter of Balance

In the box below, fill in the correct skeletal equation and draw the structural diagram for the following reaction:

Word Equation	Hydrogen	+	Oxygen	→	Water
Skeletal Equation	H_2	+	O_2	→	H_2O
Structural Diagram	$H-H$	+	$O-O$	→	$\begin{array}{c} H & & H \\ & \diagdown & / \\ & O \end{array}$

Now count how many of each element you have on both the reactant and product side of the equation:

Reactants	#
H	2
O	2

Products	#
H	2
O	1

Are these numbers the same or different? different

Is this okay? NO

Explain: the law of conservation of mass does not hold. mass of reactants \neq mass of products.

Add elements / compounds so that the number of atoms on the reactant side equal the number of atoms on the product side.

Word Equation	Hydrogen	+	Oxygen	→	Water
Skeletal Equation	H_2	+	O_2	→	H_2O
Structural Diagram	$H-H$ $H-H$	+	$O-O$	→	$\begin{array}{c} H & & H \\ & \diagdown & / \\ & O \end{array}$ $\begin{array}{c} H & & H \\ & \diagdown & / \\ & O \end{array}$
Balanced Equation	$2H_2$	+	O_2	→	$2H_2O$

Check:

Reactants	#
H	4
O	2

Products	#
H	4
O	2

*reminders:

- cannot change the subscripts (eg. H_2)
- change by adding coefficients (eg. $2H_2$)

Question 1

Word Equation	Hydrogen gas	+	Chlorine gas	→	Hydrogen monochloride (hydrochloric acid)
Skeletal Equation	H_2	+	Cl_2	→	HCl
Structural Diagram	$H-H$	+	$Cl-Cl$	→	$H-Cl$ $H-Cl$
Balanced Equation	H_2	+	Cl_2	→	$2HCl$

Check:

Reactants	#
H	2
Cl	2

Products	#
H	2
Cl	2

Question 2

Word Equation	Hydrogen	+	Nitrogen	→	Ammonia
Skeletal Equation	H_2	+	N_2	→	NH_3
Structural Diagram	$H-H$ $H-H$ $H-H$	+	$N-N$	→	$N-H-N$ $N-H-N$ N
Balanced Equation	$3H_2$	+	N_2	→	$2NH_3$

Check:

Reactants	#
H	6
N	2

Products	#
H	6
N	2

Question 3

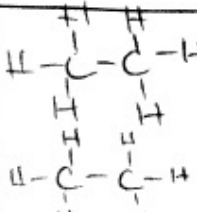
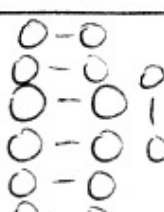
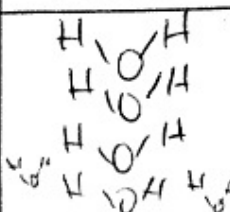
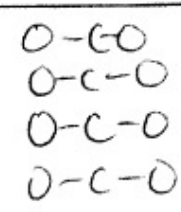
Word Equation	Methane	+	Oxygen	→	Water	+	Carbon dioxide
Skeletal Equation	CH_4	+	O_2	→	H_2O	+	CO_2
Structural Diagram	$\begin{array}{c} H \\ \\ H-C-H \\ \\ H \end{array}$	+	$O-O$ $O-O$	→	$\begin{array}{c} H-O-H \\ H-O-H \end{array}$	+	$\begin{array}{c} O \\ / \backslash \\ C \\ / \backslash \\ O \end{array}$
Balanced Equation	CH_4	+	$2O_2$	→	$2H_2O$		CO_2

Check:

Reactants	#
H	4
O	4
C	1

Products	#
H	4
O	4
C	1

Question 4

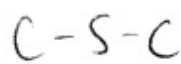
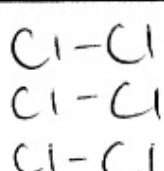
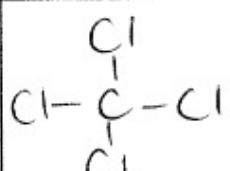
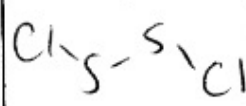
Word Equation	Ethane	+	Oxygen	→	Water	+	Carbon dioxide
Skeletal Equation	C_2H_6	+	O_2	→	H_2O	+	CO_2
Structural Diagram		+		→		+	
Balanced Equation	$2 C_2H_6$	+	$7 O_2$	→	$6 H_2O$		$4 CO_2$

Check:

Reactants	#
H	12
O	14
C	4

Products	#
H	12
O	14
C	4

Question 5

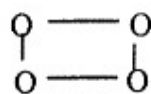
Word Equation	Carbon disulfide	+	Chlorine	→	Carbon tetrachloride	+	Disulfur dichloride
Skeletal Equation	CS_2	+	Cl_2	→	CCl_4	+	S_2Cl_2
Structural Diagram		+		→		+	
Balanced Equation	CS_2	+	$3 Cl_2$	→	CCl_4		S_2Cl_2

Check:

Reactants	#
C	1
S	2
Cl	6

Products	#
C	1
S	2
Cl	6

Question 6: What is wrong with the following structural diagram for $2O_2$?



Balancing Equations

Directions: Balance the following unbalanced skeletal equations by writing the correct coefficient in the blank provided. If the coefficient is 1, leave the blank blank. Use scrap paper for the structural diagrams if needed.

