

Chemical Reactions

Name - _____

- 1.) Give an example of a system which is closed with respect to light.

- 2.) Give an example of a system which is open with respect to light but closed in respect to mass.

- 3.) You rip a piece of paper into several pieces.
 - a.) What is conserved with respect to the paper?

 - b.) What is not conserved with respect to the paper?

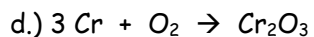
 - c.) One piece of paper is taken away. What is conserved now?

 - d.) One piece of paper is taken away. What is **NOT** conserved now?

- 4.) Which conservation laws, if any, are being broken in the following situations?
 - a.) $\text{Fe} + \text{S} \rightarrow \text{CuS}$

 - b.) 7.0 g of nitrogen are reacted with 8.0 g of oxygen to make 16.0 g of nitrogen monoxide.

 - c.) $2 \text{Ag}^+ + \text{SO}_4^{2-} \rightarrow \text{Ag}_2\text{SO}_4$



e.) 71.0 g of chlorine gas and 64.0 g of oxygen gas produce 135 g of chlorine dioxide gas.

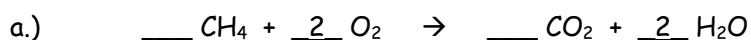
5.) Which of the following are conserved in a chemical reaction?

a.) phase

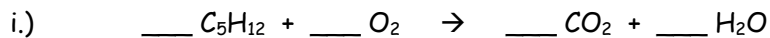
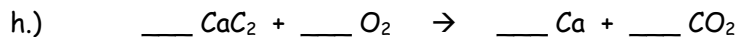
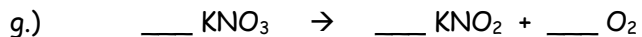
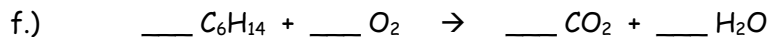
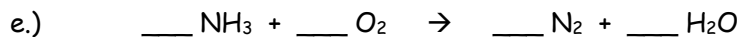
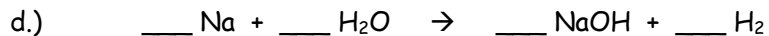
b.) number of atoms

c.) volume

6.) Do the following reactions obey the laws of conservation of atoms and mass? Explain.



7.) Balance the following chemical equations:



- j.) $\text{___ K}_2\text{SO}_4 + \text{___ BaCl}_2 \rightarrow \text{___ KCl} + \text{___ BaSO}_4$
- k.) $\text{___ KOH} + \text{___ H}_2\text{SO}_4 \rightarrow \text{___ K}_2\text{SO}_4 + \text{___ H}_2\text{O}$
- l.) $\text{___ Ca(OH)}_2 + \text{___ NH}_4\text{Cl} \rightarrow \text{___ NH}_3 + \text{___ CaCl}_2 + \text{___ H}_2\text{O}$
- m.) $\text{___ C} + \text{___ SO}_2 \rightarrow \text{___ CS}_2 + \text{___ CO}$
- n.) $\text{___ Mg}_3\text{N}_2 + \text{___ H}_2\text{O} \rightarrow \text{___ Mg(OH)}_2 + \text{___ NH}_3$
- o.) $\text{___ V}_2\text{O}_5 + \text{___ Ca} \rightarrow \text{___ CaO} + \text{___ V}$
- p.) $\text{___ Na}_2\text{O}_5 + \text{___ H}_2\text{O} \rightarrow \text{___ NaOH} + \text{___ O}_2$
- q.) $\text{___ Fe}_3\text{O}_4 + \text{___ H}_2 \rightarrow \text{___ Fe} + \text{___ H}_2\text{O}$
- r.) $\text{___ Cu} + \text{___ H}_2\text{SO}_4 \rightarrow \text{___ CuSO}_4 + \text{___ H}_2\text{O} + \text{___ SO}_2$
- s.) $\text{___ Al} + \text{___ H}_2\text{SO}_4 \rightarrow \text{___ H}_2 + \text{___ Al}_2(\text{SO}_4)_3$
- t.) $\text{___ Si}_4\text{H}_{10} + \text{___ O}_2 \rightarrow \text{___ SiO}_2 + \text{___ H}_2\text{O}$
- u.) $\text{___ NH}_3 + \text{___ O}_2 \rightarrow \text{___ N}_2\text{H}_4 + \text{___ H}_2\text{O}$
- v.) $\text{___ C}_{15}\text{H}_{30} + \text{___ O}_2 \rightarrow \text{___ CO}_2 + \text{___ H}_2\text{O}$
- w.) $\text{___ BN} + \text{___ F}_2 \rightarrow \text{___ N}_2 + \text{___ BF}_3$
- x.) $\text{___ CaSO}_4 \cdot 2\text{H}_2\text{O} + \text{___ SO}_3 \rightarrow \text{___ CaSO}_4 + \text{___ H}_2\text{SO}_4$
- y.) $\text{___ C}_3\text{H}_7\text{N}_2\text{O}_7 + \text{___ O}_2 \rightarrow \text{___ CO}_2 + \text{___ H}_2\text{O} + \text{___ N}_2$
- z.) $\text{___ C}_7\text{H}_{16}\text{O}_4\text{S}_2 + \text{___ O}_2 \rightarrow \text{___ CO}_2 + \text{___ H}_2\text{O} + \text{___ SO}_2$
- a1.) $\text{___ Na} + \text{___ ZnI}_2 \rightarrow \text{___ NaI} + \text{___ NaZn}_4$
- b1.) $\text{___ HBrO}_3 + \text{___ HBr} \rightarrow \text{___ Br}_2 + \text{___ H}_2\text{O}$
- c1.) $\text{___ Al}_4\text{C}_3 + \text{___ H}_2\text{O} \rightarrow \text{___ Al(OH)}_3 + \text{___ CH}_4$
- d1.) $\text{___ Ca(NO}_3)_2 \cdot 3\text{H}_2\text{O} + \text{___ LaC}_2 \rightarrow \text{___ Ca(NO}_3)_2 + \text{___ La(OH)}_2 + \text{___ C}_2\text{H}_2$
- e1.) $\text{___ CH}_3\text{NO}_2 + \text{___ Cl}_2 \rightarrow \text{___ CCl}_3\text{NO}_2 + \text{___ HCl}$
- f1.) $\text{___ Ca}_3(\text{PO}_4)_2 + \text{___ SiO}_2 + \text{___ C} \rightarrow \text{___ CaSiO}_3 + \text{___ CO} + \text{___ P}$

- g1.) $\text{___ Al}_2\text{C}_6 + \text{___ H}_2\text{O} \rightarrow \text{___ Al(OH)}_3 + \text{___ C}_2\text{H}_2$
- h1.) $\text{___ NaF} + \text{___ CaO} + \text{___ H}_2\text{O} \rightarrow \text{___ CaF}_2 + \text{___ NaOH}$
- i1.) $\text{___ LiH} + \text{___ AlCl}_3 \rightarrow \text{___ LiAlH}_4 + \text{___ LiCl}$
- j1.) $\text{___ CaF}_2 + \text{___ H}_2\text{SO}_4 + \text{___ SiO}_2 \rightarrow \text{___ CaSO}_4 + \text{___ SiF}_4 + \text{___ H}_2\text{O}$
- k1.) $\text{___ CaSi}_2 + \text{___ SbCl}_3 \rightarrow \text{___ Si} + \text{___ Sb} + \text{___ CaCl}_2$
- l1.) $\text{___ TiO}_2 + \text{___ B}_4\text{C} + \text{___ C} \rightarrow \text{___ TiB}_2 + \text{___ CO}$
- m1.) $\text{___ NH}_3 + \text{___ O}_2 \rightarrow \text{___ NO} + \text{___ H}_2\text{O}$
- n1.) $\text{___ SiF}_4 + \text{___ NaOH} \rightarrow \text{___ Na}_4\text{SiO}_4 + \text{___ NaF} + \text{___ H}_2\text{O}$
- o1.) $\text{___ NH}_4\text{Cl} + \text{___ CaO} \rightarrow \text{___ NH}_3 + \text{___ CaCl}_2 + \text{___ H}_2\text{O}$
- p1.) $\text{___ NaPb} + \text{___ C}_2\text{H}_5\text{Cl} \rightarrow \text{___ Pb(C}_2\text{H}_5)_4 + \text{___ Pb} + \text{___ NaCl}$
- q1.) $\text{___ Be}_2\text{C} + \text{___ H}_2\text{O} \rightarrow \text{___ Be(OH)}_2 + \text{___ CH}_4$
- r1.) $\text{___ NpF}_3 + \text{___ O}_2 + \text{___ HF} \rightarrow \text{___ NpF}_4 + \text{___ H}_2\text{O}$
- s1.) $\text{___ NO}_2 + \text{___ H}_2\text{O} \rightarrow \text{___ HNO}_3 + \text{___ NO}$
- t1.) $\text{___ LiAlH}_4 + \text{___ BF}_3 \rightarrow \text{___ LiF} + \text{___ AlF}_3 + \text{___ B}_2\text{H}_6$

Optional - The tough ones that A students should try.

- u1.) $\text{___ Cu} + \text{___ HNO}_3 \rightarrow \text{___ Cu(NO}_3)_2 + \text{___ } + \text{NO} + \text{___ H}_2\text{O}$
- v1.) $\text{___ FeCl}_2 + \text{___ KNO}_3 + \text{___ HCl} \rightarrow \text{___ FeCl}_3 + \text{___ H}_2\text{O} + \text{___ NO} + \text{___ KCl}$
- w1.) $\text{___ KMnO}_4 + \text{___ HBr} \rightarrow \text{___ MnBr}_2 + \text{___ Br}_2 + \text{___ KBr} + \text{___ H}_2\text{O}$
- x1.) $\text{___ K}_2\text{Cr}_2\text{O}_7 + \text{___ HCl} \rightarrow \text{___ Cl}_2 + \text{___ H}_2\text{O} + \text{___ KCl} + \text{___ CrCl}_3$